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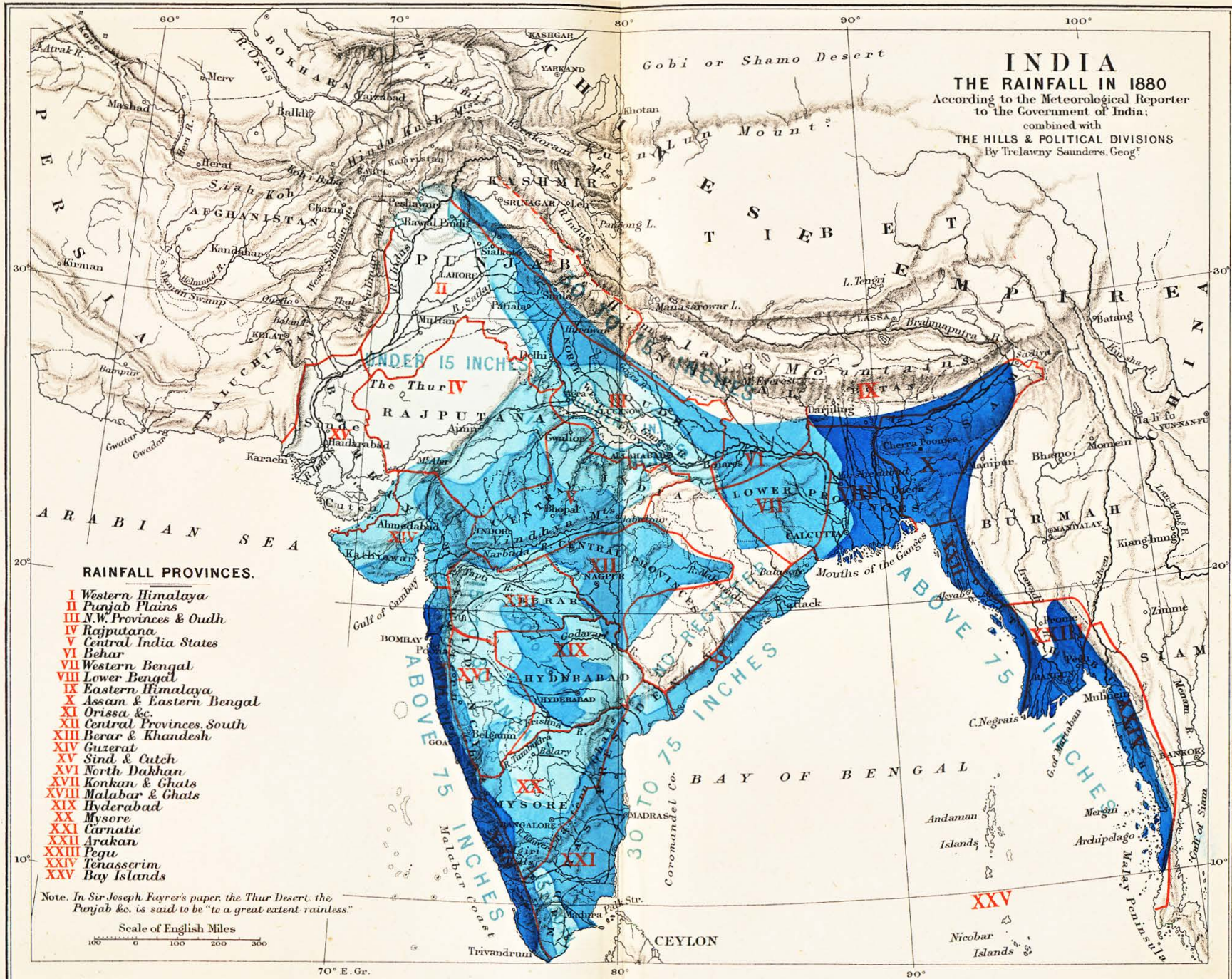
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INDIA

THE RAINFALL IN 1880
 According to the Meteorological Reporter
 to the Government of India;
 combined with
 THE HILLS & POLITICAL DIVISIONS
 By Trelawny Saunders, Geog^r



RAINFALL PROVINCES.

- I** Western Himalaya
- II** Punjab Plains
- III** N.W. Provinces & Oudh
- IV** Rajputana
- V** Central India States
- VI** Behar
- VII** Western Bengal
- VIII** Lower Bengal
- IX** Eastern Himalaya
- X** Assam & Eastern Bengal
- XI** Orissa &c.
- XII** Central Provinces, South
- XIII** Berar & Khandesh
- XIV** Guzerat
- XV** Sind & Cutch
- XVI** North Dakhan
- XVII** Konkan & Ghats
- XVIII** Malabar & Ghats
- XIX** Hyderabad
- XX** Mysore
- XXI** Carnatic
- XXII** Arakan
- XXIII** Pegu
- XXIV** Tenasserim
- XXV** Bay Islands

Note. In Sir Joseph Fayer's paper, the Thur Desert, the Punjab &c. is said to be "to a great extent rainless."

Scale of English Miles
 100 0 100 200 300

JOURNAL OF
THE TRANSACTIONS
OF
The Victoria Institute,
OR
Philosophical Society of Great Britain.

EDITED BY THE HONORARY SECRETARY,
CAPTAIN F. W. H. PETRIE, F.R.S.L. &c.

VOL. XV.



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· ERRATUM :—P. 363, line 8, *for* while, *read* why.

PREFACE.

THE Fifteenth Volume of the *Journal of the Transactions* of the VICTORIA INSTITUTE is now issued. It will be found to contain papers by the following authors:—Mr. R. BROWN, F.S.A., “On Language and the Theories of its Origin;” Mr. J. F. BATEMAN, F.R.S., F.R.S.E., on “Meteorology, Rainfall,” being a general inquiry into the causes and effects of Rainfall in the present day in various parts of the British Isles. Immediately following this paper is one “On the Rainfall and Climate of India,” by Sir JOSEPH FAYEE, K.C.S.I., M.D., F.R.S. As the whole question of the Meteorology of India is not only connected with the Climate of that country, but with its Physical Geography, the Institute is fortunate in being able to give to the world so carefully written and valuable an essay, illustrated by a map, specially drawn and kindly presented by Mr. TRELAWNEY SAUNDERS, in which, for the first time, a view of the Physical Geography as well as the Meteorology of India are combined;—the discussions on both papers—which are also not without their bearing on the arguments affecting some recent geological questions—will be found of much interest. The Rev. G. BLENCOWE takes up the question of “the Modern Science of Religion;” and the Right Rev. Bishop COTTERILL, D.D. (of Edinburgh), deals with “the Relation between Science and Religion through the principles of Unity, Order, and

Causation." Of Mr. J. E. HOWARD'S, F.R.S., two papers, that on "Scientific Facts and the Caves of South Devon" has much interest for those who have watched the geological inquiry it refers to. The Right Honourable the Lord O'NEILL takes for his subject "Some Considerations on the Action of Will in the Formation and Regulation of the Universe, being an Examination and Refutation of certain Arguments against the existence of a personal conscious Deity," and deals with it in a manner the force of which all will recognise. In a paper on "Pliocene Man in America," written at about the time that Professor Virchow and Dr. J. Evans, F.R.S. (at the Lisbon Meeting of the Berlin Anthropological Society), declared the discovered evidences of the existence of tertiary man to be wholly unreliable, Dr. SOUTHALL (United States) proves that the same may be said as regards certain alleged remains in the "Pliocene" in America; his remarks are supplemented by valuable communications from his Grace the DUKE OF ARGYLL, K.G.; Professor W. BOYD DAWKINS, F.R.S.; Principal and Vice-Chancellor J. W. DAWSON, C.M.G., LL.D., F.R.S.; Professor T. McK. HUGHES, M.A. (Woodwardian Professor of Geology at Cambridge), and others. The volume also contains papers by the Rev. H. G. TOMKINS, M.A., and the (late) Rev. J. P. THOMPSON, D.D., LL.D. (United States). To these, and to others, at home and abroad, who have contributed to the success of the Institute's work, the best thanks of the Members and Associates are due. The volume closes with an account of the Gunning Natural Science Scholarships.

During the year 1881 the increased circulation of the Journal, and the steady development of the Institute, both at home and abroad, have been marked; and in America its members, whilst retaining their individual connection with the Institute,

have successfully founded "the American Institute of Christian Philosophy;" an independent society, but with identical objects.

It will not be out of place here to notice one or two questions connected with the progress of scientific research.

First: The apparent results of the investigations of Professor P. F. Reinsch as regards the formation of Coal, threaten to revolutionize those opinions which have hitherto been accepted amongst Geologists, for he claims to have discovered that coal consists of microscopical organic forms of a low order of protoplasm; and states that although he carefully examined the cells and other remains of plants of a high order, he computed that they have contributed but a fraction of the matter of coal veins, however numerous they may be in some instances;—it is of course possible that further investigations may modify Professor Reinsch's views.

Secondly: The discoveries in Assyria and Babylonia, by one of the members of the Institute, Mr. HORMUZD RASSAM, promise to have a rare interest, and to bear upon the early history of those countries.*

Finally, the now accomplished Survey of Palestine has thrown valuable light upon what was before obscure, and the information gained has been confirmatory of the truth of Sacred History.

F. PETRIE,

Hon. Sec. and Editor.

December 31, 1881.

* Attention may here be called to a valuable and opportune little work, *Historical Illustrations of the Old Testament*, by the Rev. Canon Rawlinson, M.A. (Camden Professor of Ancient History).

JOURNAL OF THE TRANSACTIONS

OF THE

VICTORIA INSTITUTE,

OR

PHILOSOPHICAL SOCIETY OF GREAT BRITAIN.



ANNUAL GENERAL MEETING,

HELD AT THE HOUSE OF THE SOCIETY OF ARTS,

TUESDAY, JUNE 8, 1880.

THE RT. HON. THE EARL OF SHAFTESBURY, K.G., IN THE CHAIR.

Capt. F. PETRIE read the following Report:—

*FOURTEENTH ANNUAL REPORT of the Council
of the VICTORIA INSTITUTE, OR PHILOSOPHICAL SOCIETY
OF GREAT BRITAIN.*

Progress of the Institute.

1. IN presenting the FOURTEENTH ANNUAL REPORT, the Council desires to state that the progress of the Institute during the past year—although somewhat affected by those adverse influences which are still felt by nearly every interest and society—has been very encouraging; the number of new supporters has slightly increased, and during a second year nearly one-third have been Indian and Colonial Members, thus proving that the usefulness of the Society is already felt by those living beyond the limits of the United

Kingdom, and giving promise that so soon as the Society shall be powerful enough to carry out its Foreign Organization with vigour, its value and efficiency in accomplishing those high objects for which it was founded will be greatly enhanced.

2. Several Members and Associates have greatly assisted the Council, not only by making the Institute known in their respective localities whenever they considered opportunity offered, but also by communicating information, thus enabling the Society to better carry out its work, especially in regard to the general public, for whom the objects have a high importance, and for whom those papers which are published in the "People's Edition" are designed.

3. The following is the new list of the Vice-Presidents and Council:—

President.—The Right Hon. the EARL OF SHAFTESBURY, K.G.

Vice-Presidents.

The Right Hon. the EARL OF HARROWBY, K.G.

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Rev. ROBINSON THORNTON, D.D.

Rev. Principal T. P. BOULTBEE, LL.D.

W. FORSYTH, Esq., Q.C., LL.D.

J. E. HOWARD, Esq., F.R.S.

Sir JOSEPH FAYRE, K.C.S.I., F.R.S.

Hon. Treasurer.—W. N. WEST, Esq.

Hon. Sec. and Editor.—Capt. F. W. H. PETRIE, F.R.S.L., &c.

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(*F.S.*)

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A. J. WOODHOUSE, Esq., M.B.I.,

F.R.M.S.

Rev. Principal RIGG, D.D.

Rev. Prebendary C. A. ROW, M.A.

J. A. FRASER, Esq., M.D., I.G.H.

H. CADMAN JONES, Esq., M.A.

Rev. W. ARTHUR, D.D.

C. R. BREE, Esq., M.D., F.Z.S.

Rev. G. W. WELDON, M.A., M.B.

Rev. Principal J. ANGUS, M.A., D.D.

J. BATEMAN, Esq., F.R.S., F.L.S.

The MASTER of the CHARTERHOUSE.

D. HOWARD, Esq., F.C.S.

Professor H. A. NICHOLSON, M.D.,

F.R.S.E.

F. B. HAWKINS, Esq., M.D., F.R.S.

Sir H. BARKLY, K.C.B., F.R.S.

J. F. BATEMAN, Esq., F.R.S.

The BISHOP of BEDFORD.

BISHOP PERRY, D.D.

4. The increase of the Library continues, and some new works of reference have been added.

5. The Council regrets to announce the decease of the following valued supporters of the Institute:—

W. H. Balmain, Esq. (Member); F. Bretherton, Esq. (Associate); the Rt. Hon. Sir Stephen Cave, G.C.B. (Member); the Very Rev. Dean H. P. Hamilton, M.A., F.R.S., F.R.A.S., &c. (Associate); Rev. H. Moule, M.A. (Foundation Associate); Rev. G. Roberts (Associate); F. Smith, Esq. (Member); Rev. J. P. Thompson, D.D., LL.D. (Associate); P. Twells, Esq. (Foundation Life Member); Rev. J. Welland (Member); Rev. Preb. T. Willis, A.B. (Hon. Local Secretary).

6. The following is a statement of the changes which have occurred during the past twelve months:—

	if		Annual	
	Members.	Associates.	Members.	Associates.
Numbers on 12th June, 1879	36	22	320	364
Deduct deaths	1		3	5
	<u>35</u>		<u>317</u>	<u>359</u>
Withdrawn			18	28
			<u>299</u>	<u>331</u>
Changes.....		3	— 5	+ 2
			<u>294</u>	<u>333</u>
Joined between June 12th, 1879, and June 4th, 1880	2	1	24	73
	<u>37</u>	<u>26</u>	<u>318</u>	<u>406</u>
	63		724	
Total.....	787			

Hon. Foreign Correspondents and Local Secretaries, 46.

Finance.

7. THE EARLY PAYMENT OF THE YEAR'S SUBSCRIPTIONS IS CONTRIBUTING GREATLY TOWARDS THE SUCCESS OF THE YEAR'S WORK; the Treasurer's Balance Sheet for the year ending 31st December, 1879, audited as usual by two specially qualified unofficial members, shows a balance in hand after the payment of every liability. The amount invested in the New Three per Cent. Annuities being £930. 13s. 5d.*

The Council have to record the receipt this year of the Institute's first legacies.

* £150. 19s. 3d. has been invested since the 1st January, 1880, now making £1,081. 12s. 8d. invested.

8. The arrears of subscription are now as follows :—

	1872.	1874.	1875.	1876.	1877.	1878.	1879.
Members	1	1	1	4	1	2	8
Associates	0	0	0	0	4	1	10
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	1	1	1	4	5	3	18

Meetings.

MONDAY, December 1, 1879.—“Physiological Metaphysics.” By Professor NOAH PORTER (President of Yale University, United States).

MONDAY, January 5, 1880.—“The Druids and their Religion.” By J. E. HOWARD, Esq., F.R.S.

MONDAY, January 19.—“On the Organ of Mind.” By Rev. J. FISHER, D.D.

MONDAY, February 2.—“Late Assyrian and Babylonian Research.” By HORMUZD RASSAM, Esq.

MONDAY, February 16.—Lecture, on Professor Clifford’s Life and Works. By Rev. C. LLOYD ENGSTRÖM, M.A.

MONDAY, March 1.—“Religious Benefits arising from the Recent Progress of Science.” By Professor STOKES, F.R.S. (Lucasian Professor of Mathematics, Cambridge, and Secretary to the Royal Society).

MONDAY, March 15.—“On the Evidence of the Later Movements of Elevation and Depression in the British Isles.” By Professor HUGHES, M.A. (Woodwardian Professor of Geology at Cambridge).

MONDAY, April 5.—“The Nature of Life.” By Prof. H. A. NICHOLSON, M.D., F.R.S.E. (Professor of Natural History at St. Andrew’s University).

MONDAY, April 19.—“On the Religion and Mythology of the Aryans of Northern Europe.” By R. BROWN, Esq., F.S.A.

MONDAY, May 3.—“The Life of Joseph. Illustrated from sources External to Holy Scripture.” By Rev. H. G. TOMKINS, M.A.

MONDAY, May 10.—“On the Data of Ethics.” By Professor WACE, M.A.

TUESDAY, June 8.—*Anniversary*.—Address by the Right Rev. Bishop COTTERILL, D.D., at the *Society of Arts’ House*.

MONDAY, June 14.—“Some considerations on the action of Will in the Formation and Regulation of the Universe—being an Examination and Refutation of certain Arguments against the existence of a personal conscious Deity.” By the Right Hon. the Lord O’NEILL.

9. The meetings during this session have been held as usual, and the improvements in the Lecture Room have added to the general comfort.

Publications.

10. The thirteenth volume of the *Journal of Transactions* has been issued.

11. PEOPLE'S EDITION. At a recent Council meeting communications were read from members in India and the Colonies, showing that the London secularist societies are actively supplying those places with pseudo-philosophical and quasi-scientific literature intended to promote scepticism in regard to Religion (translations of such papers into the dialects of India are also circulated), and the Colonial press is being used with a similar purpose. As a consequence many of our correspondents abroad desired that the People's Edition of the Institute papers should be as widely circulated, lists of booksellers being forwarded by some of them with a view to aiding the Council in placing the People's Edition within reach of their neighbours. (English, American, and Colonial correspondents assign as a reason for this, that they find in the papers of the Institute a careful examination of those questions of Philosophy and Science which are said to militate against the truth of Revelation, and which questions are used against it by its active and unscrupulous enemies.)*

It has been felt that any adequate effort on the part of the Institute to occupy the field of work thus offered to it requires special activity and also an increase both of Members and of the People's Edition Fund.

12. GENERAL. The Institute availed itself of the Autumnal Public Meetings to make its organization and objects more known. At Sheffield, among the preparations made by the Institute, previous to the meeting of the British Association, arrangements were made with Messrs. W. H. Smith and the local booksellers, for the sale of the "People's Edition," which was also permitted at the stationery stall in the Reception Hall of the Association. The Institute's publications were specially brought under the notice of all the members of the British Association, and many residents.

* Letters lately received from Members and non-members in the United Kingdom, many Colonies, and also in the United States, urge the great value of the Papers in the Society's Journal, on account of their CAREFUL and IMPARTIAL character; they also contain special references to the discussions; many speak of the usefulness of both, as aids in arranging lectures, and for reference.

It is worthy of note that the careful and well-considered steps which have been taken of late years by the Institute, have in no small degree tended to overcome the prejudice in regard to the Society which once existed amongst many scientific men, and have largely tended to develop those friendly relations which are now rapidly obtaining between the Institute and the scientific world.

Conclusion.

It only remains for those who have the opportunity of aiding in the great cause the Society was founded to advance, whilst thankful for past success, to do their utmost whilst they are permitted the privilege of labouring, as our motto reminds us, *ad majorem Dei gloriam.*

DONATIONS IN 1879.

		£.	s.	d.
LIBRARY FUND.....	J. W. Lea, Esq.....	5	5	0
	L. Biden, Esq.....	2	2	0
	G. Maberley, Esq.	1	1	0
		8	8	0
PEOPLE'S EDITION FUND.	G. Harris, Esq.	10	0	0
	J. E. Howard, Esq., F.R.S. (special purpose)	10	0	0
	L. T. Wigram, Esq.....	10	0	0
	R. H. Gunning, Esq., M.D.	5	0	0
	F. B. Hawkins, Esq., M.D. F.R.S.	5	0	0
	Admiral Nolloth, C.B., R.N.	2	10	0
	Mr. Serjeant Sargood, Q.C.	2	2	0
	Rev. J. C. Hudson	1	1	0
	A. Simcox, Esq.	0	10	0
		£46	3	0

The following Balance-Sheet was then read :—

[The HONORARY SECRETARY (Captain F. Petrie) prefaced the report by a short sketch of the Society's history, from its foundation in 1865—when Mr. A. McArthur, M.P., one of its most zealous supporters, introduced seventy friends as members—to the year 1871, when, the Institute having experienced those difficulties attending many young societies, it was proposed to close its doors, as it had but 171 annual subscribing members and associates, and 29 life members, and upwards of £1,000 liabilities. He contrasted the position of the Institute then (in 1871) with its present position, when it boasted of upwards of 800 members and associates, not in London alone, but in every part of the world, and upwards of £1,000 in the funds, and each year's expenses were regularly paid by the year's receipts; he added that the papers alluded to in the report before the meeting were such as any society would prize, and many in the highest scientific circles now took part in the Institute's work.]

The Right Hon. the Lord O'NEILL.—My Lord Shaftesbury, Ladies, and Gentlemen,—I think it will be admitted that the report of which we have just heard an epitome from Captain Petrie, is, on the whole, a very satisfactory one. (Hear, hear.) The circumstances he has mentioned in regard to the financial state of the Institute are, I think, very satisfactory. (Hear, hear.) It is, doubtless, a humiliating thing that there is no object, however high and heavenly, that we desire to promote in this world, which can be accomplished without the aid of that very low and earthly thing called money (laughter); but since it is so, it is certainly a matter of congratulation that there is upwards of £1,000 to the credit of the Institute now in the funds. (Hear, hear.) There is one other circumstance mentioned in the report which, I think, is also a matter of great satisfaction, and that is the success which has attended the publication of the People's Edition of the Papers of the Institute. (Hear, hear.) The fact that this is circulated in foreign countries, and especially in India, America, and the Colonies, where it serves as an antidote to many pernicious publications, which are sown broadcast in those places, is certainly a matter for great thankfulness. (Applause.) I think it was mentioned in the Report of last year that the same thing very much prevailed in our own country, and that the spread of the People's Edition of our Transactions among the middle and lower classes, as well as among the upper classes, was a matter of great importance, as it was among those classes in particular that works of a pernicious character circulated, whether in the shape of reports in newspapers or, as the Report calls them, "quasi-scientific literature." It was also mentioned in last year's Report that, in order to counteract the effect of such works, there were many persons who made the papers of this Institute the basis of lectures delivered in their particular localities, and I hope that that state of things still continues. (Hear, hear.) I regard that as a very important circumstance. I have now the honour of moving, "That the Report of the Council, now read, be received and adopted and circulated amongst the members and associates."

J. BATEMAN, Esq., F.R.S.—I have much pleasure, my lord in

seconding the motion of my noble friend, Lord O'Neill. I am thankful that he takes so favourable a view of the operations of this Society, especially as it entirely accords with my own. The adoption of this report may be taken as a virtual endorsement of the fact, not only of the importance, but also of the success, of the labours of this Institute. (Hear, hear.) We all know to whom most of the credit attaches for the present position of this Society, which sprang from a very small beginning indeed — my gallant friend (Captain Petrie) on my right hand (hear, hear); but I will not plunge him into premature embarrassment by alluding to a subject which, if he could have his own way, would never be mooted. I may, however, express the hope that he will long be spared to labour in this congenial and important cause. (Hear, hear). The work itself becomes more important every day, as the attacks of the enemy are renewed. I do not think that, although we may beat them back, we shall ever suppress the attacks of infidel science in these days; indeed, there are many passages in Scripture which lead us to expect that the contrary will be the case, and that evil men and seducers will grow worse and worse; but however that may be, it is our duty to do the best we can. (Hear, hear.) There is another view of the subject — namely, that the present age, although very solemn in one of its aspects, may be made to minister to the comfort, or at all events to the enlightenment, of the true believer. This view is not my own view alone; it is the view of one who has honoured us with his presence here this evening, and who I am delighted to see acting as a right reverend prelate of the Church in Scotland. (Hear, hear.)

The resolution was passed *nem. con.*

Rev. F. N. OXENHAM.—I rise to move the following resolution:—"That the thanks of the members and associates be presented to the Council, Honorary Officers, and Auditors for their efficient conduct of the business of the Victoria Institute during the year." I think I should best consult the interests of all present in saying a very few words in moving the resolution I have the honour to propose. I will, therefore, confine myself to one or two observations. We have in our hands a report which tells us of various matters in which the Council are concerned, and in which they have laboured for the good of this Society, and we have, moreover, heard of the financial success which has followed their efforts. We have heard also of one special act of the Council. We are told on the fifth page of the report that the Council took care at the last meeting of the British Association, that the "People's Edition" of the Society's Transactions should be largely circulated. I think that we must all agree that that was a very wise step for the Council to take (hear, hear), because, since I have belonged to this Institute, I have often heard it said: "Oh, yes! this is merely a Society which endeavours to promote the religious view of the Universe in opposition to the scientific view." Now, I think that any of us acquainted with the work of this Society will agree that this is a false statement; nevertheless, there are many persons who hesitate to join us because they say that we are merely endeavouring to put forward our own view as opposed to the scien-

tific view. I apprehend that the one object of this Society is to show that the reasonably religious view of the Universe is substantially the same as the truly scientific view. (Hear, hear.) Therefore I very much welcome the statement that the Council is trying to circulate, in large numbers, the "People's Edition" of the Transactions of the Society, because it tells us amongst other things the real object of the Society, and will lead people to understand what that object is, namely, to show that science is the handmaid of religion, and is always by all reasonable and religious people treated as such. If I might venture to make one suggestion in moving this resolution, it would be *à propos* of what has already been brought out as to the circulation of our transactions in foreign parts. I think that that circulation will be most valuable in India (hear, hear), and I have no doubt that all who know anything of India will agree with me on this point. It is unhappily the case that the faith of the educated natives is being gradually undermined. We have taught them that their own faith is worthless and groundless, and have given them nothing effectual in its place. We have left them to suppose that Christianity is what it was called by a high official not long ago in a pamphlet circulated amongst the educated natives of India,—“the divided and decaying creed of Europe.” When this is the case, it is valuable that the Papers of such a Society as this should be sent out to show that on strictly scientific grounds our religion is to be maintained. (Hear, hear.) I hope the Council will turn their attention towards the claims of our fellow subjects in India upon this point. I will not detain the Society by any further observations, but will simply move the resolution that has been put into my hands.

Rev. C. F. DEEMS, D.D. (of New York).—My lord, ladies and gentlemen,—I am aware of the proprieties of the occasion and of the intense interest with which you are looking for the Address about to be delivered by the right rev. prelate who is to follow me, and I shall therefore occupy your time but a few moments—indeed, I esteem it a great privilege to do so for one minute. It might, perhaps, be said, “It is all very well to call on a gentleman from America—three thousand miles away—to second a resolution which praises the conduct of the officers of a Society meeting in London;” but that joke, like many another we are accustomed to hear, falls before the fact, and the fact is that you have an Honorary Secretary who is so indefatigable, that I really believe there are more people in America who, month by month, know of the proceedings of the Victoria Institute than you can find in the City of London. (Hear, hear.) I therefore have great pleasure, on behalf of my friends and associates in America, in seconding this resolution. The ideas which I had thrown together for this occasion have been stolen by the speakers who preceded me. I was going to allude to the remarkable moral phenomenon which has come up in our day. There was a time when men who rejected the doctrine of a personal God, and who rejected the doctrine of a revealed book, were content to do so and to stay there. They did not move; they had no motive for moving; but, somehow, we have lived to see

the day of the propagandism of infidelity. (Hear, hear.) We have lived to see the day when those who deny our Lord have caught the missionary spirit of the apostolic clergy, and they are parading their work so adroitly, so wisely, so consistently, and so powerfully, that it behoves us all to do what we can to meet and to answer them. (Hear, hear.) Therefore I rejoice with the gentlemen who have preceded me in calling attention to the People's Edition of your Transactions. In my own country, as in this, there are young men who seem to think that all the brains and all the learning are on the side of scepticism; that there are few great minds on the side of Christianity, and this impression is constantly made. The fact is that the self-conceit of scepticism is something absolutely sublime. There is a man in your city whom I have heard speak, and he boasted that in fifteen years he had collected a congregation of 500 people. He was boasting of this to a clergyman whose church holds 2,000, and is packed every Sunday. He said, "I have succeeded in getting 500." "Only 500," said the other? "Yes," was the response; "but you know I am so far advanced that you cannot expect I should have large crowds." That is simply an indication of the temper and tone of these people. I rejoice in the issue of your People's Edition, because the able Papers read before your Society thus get into the hands of our young men, and they see that the brains, the masculinity, the manhood, and the scientific incisiveness belonging to this great question are on the side of the Cross of our Lord and Saviour Jesus Christ. (Applause.) As I have heard it said, the religion that is not scientific is no religion at all for men of reason; and I may add that the science that is not religious is no science at all for men who have immortal souls. (Hear, hear.) Therefore I desire to urge you to do what you can to circulate your Papers widely, and in my own country I shall redouble my efforts on my return. I know that a select circle of *savans* rejoice in what we have done elsewhere, and there are many who rejoice that the language and statements of Scripture are being shown to be not only Biblical, but scientific, statements.—As an American, I am probably not fully aware of what may be considered due to the English sense of strict propriety, and I should like to know whether you would think it wrong if, in the presence of his lordship, I were to say a word or two about the Earl of Shaftesbury. We graybeards in America have heard of the Earl of Shaftesbury ever since we were boys, and when he came in to-night I expected to see a very venerable gentleman, probably somewhat decrepid; but I assure you my heart leapt with joy when I saw his lordship come on the platform, and I saw that he had in his eye, and his walk, and tone the promise of many days of useful labour when, it may be, you and I shall have passed away. (Hear, hear.) In my own church, the evening I came away, I noticed that the only man I was asked to see in England was the Earl of Shaftesbury; and I rejoice that I have lived to see him. Why? Because he is a man who has devoted the power of his social position, and the rare business capabilities which God hath given him, to the side of the Cross,—(applause)—and when hundreds of your nobility

will be forgotten, the Earl of Shaftesbury will live in the hearts of thousands of people, fulfilling what the Apostle has said—"Your labour is not in vain in the Lord." (Applause.)

The resolution was agreed to.

A. McARTHUR, Esq., M.P., in responding, said :—I shall follow the good example that has been set by preceding speakers in not taking up much of your time, as we are all anticipating the pleasure we shall derive from the Address, to which we hope to listen in a few minutes. I should have been glad that some other member of the Council had been asked to discharge the duty that now devolves on me, but I believe that one reason why I have been called upon is that I have been, although unavoidably, a very irregular attendant at your meetings, and, therefore, very little of the thanks here offered can come to me. (A laugh.) Perhaps another reason is to be found in the kind reference our Secretary has just made to myself as one of those who took an active part in the foundation of this Institute. (Hear, hear.) It is, however, only right it should be known that your Lordship is one of the very first who took an active part, and who became our President, giving to the Institute the great advantage of your name and influence in the good work we desired to do. (Applause.) I should not like to forget the name of another early friend, one who is no longer with us—Mr. James Reddie—who was our first Secretary, and who rendered invaluable service, and was the very life and soul of the Institute at its commencement. (Hear, hear.) When he died, it was feared that all would go wrong; but in the good providence of God we got our present Secretary (hear, hear), and reference has already been made to the valuable service he has rendered. I remember that at one of our first meetings I was considered very sanguine when I expressed a hope that we might live to see the day when we should have 800 or 1,000 members. I am delighted to find that we have now got up to 800, and I believe the time is not far distant when we shall get up to the 1,000. (Applause.) On behalf of the Council, I beg to thank the meeting for the way in which it has received the resolution. I may say, in reference to the Institute itself, that I can fully endorse most of what has already been said. Allusion has been made to the fact that infidelity is at the present moment exerting itself very powerfully. We cannot deny the fact; but I do not regard it in the same light that some people do. I think that life of any kind is better than stagnation; I think the truth is mighty, and that it must and will prevail, and that Christianity has nothing to fear from the attacks of infidels by whom it may be assailed. (Hear, hear.) The design of this Institute is not to oppose science; it is the very reverse. We rejoice in the progress of science; but we all know that a great many scientific theories are propounded at different times as indisputable facts, and one of the chief objects of this Society is to investigate any new scientific theory, and to ascertain how far it will stand examination. We have no fear whatever that true science and true Christianity will ever be antagonistic, but rather the reverse. We believe that this

Institute is doing good work, not only in the defence of Christianity, but also in promoting the best interests of science. It has already far surpassed our most sanguine expectations, and I trust it will continue to prosper, and that, if we are spared for another year, we shall be able to report even a more satisfactory state of things. (Applause.)

The PRESIDENT.—I have now to request that the Bishop of Edinburgh will be good enough to give us the address he has been so kind as to prepare.

The Right Reverend Bishop COTTERILL then read the following annual address:—

*ON THE RELATION BETWEEN SCIENCE AND
RELIGION THROUGH THE PRINCIPLES OF
UNITY, ORDER, AND CAUSATION.* By the Right
Rev. Bishop COTTERILL, D.D., F.R.S.E.

MY LORDS AND GENTLEMEN,

I WILL not venture to question the judgment of the Council of your Society when from time to time they invite others of its members, besides those whose time is largely devoted to scientific pursuits, to deliver its Annual Address. Yet when they claim, as they justly may, the co-operation of those of us who cannot presume to speak with authority on any special branch of science, you will not expect from us the kind of aid which is so effectually rendered by the eminent scientific men who take a large part in the work of your Institute; you will allow us to speak from our own point of view, and of those aspects of the question of the Relations between Religion and Science with which our minds are most familiar.

In addressing you, therefore, on the present occasion I do not propose to undertake that, which perhaps is the proper duty of one selected to deliver this Address, *i.e.* to bring before you the present state of the great question, commenting on the latest discoveries or speculations which directly or indirectly may seem to affect it. I will assume that I shall be allowed to take a somewhat different, and in one sense a wider scope, and to discuss some fundamental principles, which have in my judgment a very important bearing on the purposes for which this Institute is founded.

1. In a paper which I had the honour of reading before your Society two years ago, I examined the Relations between Scientific Thought and Religious Belief in one particular direction. It appeared to me, that in pursuing one of the primary objects of this Institute,—I mean, investigating scientific questions “with the view of reconciling any apparent discrepancies between Christianity and Science,”—a preliminary question ought never to be overlooked; viz., what ground there is for the “popular notions as to the authority of scientific thought, and its right to control and dictate to the intellect.” For, in discussing these apparent discrepancies, whatever they may be, there is some danger, if not of ourselves supposing, yet of allowing others to suppose, that if we fail in discovering the true solutions, we have to choose between Faith and Reason, and balance, one against the other, the realities of a spiritual world, and those of the world of Nature which is no less truly God’s. I therefore thought it necessary to point out, that the claim, too often tacitly implied, if not expressly asserted, that Science is a tribunal before which Religion is on its trial, whether it is or is not in accordance with Reason, is wholly untenable; and that neither on the plea of being the teacher of necessary truth, nor on that of establishing any principle contradictory of the Divine Will in the Universe, is Science at all competent to interfere with Religious Belief. Since that time a work has appeared,* in which the author has investigated, with singular acuteness and power, those claims on the part of Science which I then challenged. Although his line of argument is different from mine,—for he has discussed fully and with much skill the philosophical aspects of the question,—and though on some points his reasoning seems to me not conclusive, yet the practical results of Mr. Balfour’s argument so entirely coincide with those which I urged as essential to truth, that, as my subject to-day is cognate to that which I then discussed, I will first confirm the conclusions of that paper by a brief quotation from this work of an original and independent thinker.

2. Having observed that many believers in Religion, however widely they differ practically from unbelievers, yet agree with them “in thinking that no more certain warrant for a creed can be found than the fact that Science supports it; no more fatal objection to one than the fact that science contradicts it”; the result being “that it seems to be assumed that

* “A Defence of Philosophic Doubt: being an Essay on the Foundations of Belief.” By Arthur James Balfour, M.A., M.P. London. 1879.

the logical relation which subsists between the doctrines of actual Science and of actual Religion is a fact of transcendent theological importance," he continues * (pp. 302, 303) :—

"I might insist on the evil done by such a state of things, both to religion and to science, but at this moment I wish rather to enter my protest against the principle from which the evil itself ultimately springs. Has Science any claim to be thus set up as the standard of belief? Is there any ground whatever for regarding conformity with scientific teaching as an essential condition of truth, and nonconformity with it as an unanswerable proof of error? If there is, it cannot be drawn from the nature of the scientific system itself. We have seen in the preceding pages how a close examination of its philosophic structure reveals the existence of every possible philosophical defect. We have seen that whether Science be regarded from the point of view of its premises, its inferences, or the general relation of its parts, it is found defective; and we have seen that the ordinary proofs which philosophers and men of science have thought fit to give of its doctrines are not only inconsistent, but are such as would convince nobody who did not start (as, however, we all do start) with an implicit and indestructible confidence in the truth of that which had to be proved. I am far from complaining of the confidence. I share it. My complaint rather is that of two creeds [the religious and the scientific] which *from a philosophical point of view*† stand, so far as I can judge, upon a perfect equality, one should be set up as a standard to which the other must necessarily conform."

3. That until the principles here asserted are recognised as the basis of the mutual relations of Religion and Science, the work of reconciling their apparent discrepancies will be both endless and unprofitable, I have no doubt whatever. We, on the Christian side, not only admit, but earnestly maintain, that while the creed of Religion is consistent with Reason, yet it could not be constructed by Reason, and it requires in us a higher faculty, viz., that faith which is "the substance of things hoped for, the evidence of things not seen," to supplement human reason and make the foundations of Religion in our own minds secure. We contend that, on the other hand, Science is in a similar position; that to construct its creed Reason needs to be supplemented by much that is not strictly logical, by a scientific "instinct," an unreasoning and certainly not infallible intuition, which some men possess in a far higher degree than others, and the necessity for which leaves the world in general much more dependent on authority for their scientific belief than men ever are, or have been, in Religion, wherever they have access to Holy Scripture. For there neither is, nor can be, any standard and guide for the scientific intuition, such as the Bible supplies for faith.

4. It is not my purpose, however, to-day to discuss further

* "A Defence of Philosophic Doubt," &c.

† The italics are mine.

this aspect of the Relations between Religion and Science. I have referred to it only to clear the way for another view of these Relations. The objects of this Society have indeed a wider scope than any in which Science and Christianity are regarded as at variance or even divergent. Both are God's gifts, and are intended to be, in different spheres of man's being, means for raising him above the region of mere sense, and educating him for this life and that which is to come. To prove that there is no conflict between them is doubtless necessary; for God is One, and all that proceeds from Him must be in harmony. But for the same reason that assures us that true Science and true Religion cannot be at variance, it also follows that they must have some correlation or correspondency. So far as their various creeds are sustained by Reason, they have more or less common ground, and we might naturally expect that they would be found to sustain each other. It will, I trust, be neither uninteresting nor unprofitable for the purposes of our Institute to examine with some care—so far as my limits will allow—the fundamental principles of this correlation.

5. I shall, perhaps, best explain the question before us by referring to that classification of the several spheres of human thought which in my previous paper I adopted from Fichte, and which is, at all events, sufficiently distinct and comprehensive for our present purpose. In this analysis, the first and lowest mode of regarding the universe is that of *sense*; we may consider (on some accounts at least) the *scientific* view as next in order; in that which we called the *poetic* or *spiritual* mode, the mind looks through nature to unseen ideals of goodness and beauty; the *religious* view sees God in all, and regards the whole universe as of God, and in God, and for God, while the highest of all, which we called the *theosophic*, can only be attained through Revelation, and is the completion and fulfilment of the *religious*, through the knowledge of the true relations of the universe to God, and of God to the universe in the Incarnate Word Jesus Christ. When I speak to-day of Religion, I include in this the latter sphere of thought, for the one is not complete without the other.

In regard to all these distinctions, I pointed out that, "although each higher sphere of thought contains nothing contradictory to those which precede it in order, yet the ideas of the lower do not of themselves direct us to the higher, but they may, in some cases, even seem to be opposed to it;" "some new power is required in order to pass from one phase or sphere of thought to the higher." But it is equally important to observe that, although the lower mode of thought

seems at times a hindrance rather than a help to attaining the conceptions required for the higher, yet it may be, nevertheless, essential to those conceptions, and of great value in their development. Although the acutest perception of the objects of sense is consistent with the absence of all conception of law in nature, and, indeed, what has been called the "crude realism" of the *sense* view of nature often seems at variance with the scientific, and creates prejudices which Science only gradually dispels, yet not only is physical science itself dependent on the trustworthiness of the senses, so far as their powers extend, but it is largely aided by them throughout its whole extent, its conclusions being either derived from, or verified by, the accurate observation of sensible objects. On the other hand, although the conclusions which Science draws from the evidence of the senses may differ widely from those conceptions which belong to the *sense* mode of thought, which confounds subjective perceptions with objective realities, yet it is the very trustworthiness of the evidence which the senses afford that enables Science to correct the conclusions which the senses suggest.* The relation again which exists between the scientific view and the poetic is sufficiently obvious, though it indicates, as indeed the history of man proves, that in order of development the poetic precedes the scientific. For while it does not require Science or law for its own ideas, it seems doubtful if any scientific conception could be formed without the aid of the imagination, which is the active faculty in the poetic mode. Indeed, the subject of the use and abuse of the imagination in Science is one which might be discussed with almost as much profit as that of its use and abuse in Religion. For the substitution of the imagination for the scientific intuition has been the cause of almost as many superstitions in Science as ever have obscured Religion. And it might be easily shown that it is to scientific superstitions on the one side, or to religious superstitions on the other, that the apparent discrepancies between Science and Religion are mainly due. For example, materialism in all its forms is nothing else than a superstition, due to the imagination attributing to matter properties and qualities which Science itself contradicts.

6. Enough, however, has been said to explain the question at issue; that is, what connection there is between the scien-

* Mr. Balfour, in his chapter on "Science as a Logical System," appears to me to have discussed the question to which I here refer somewhat illogically.

tific and the religious view of the universe. My argument to-day must be limited to one aspect of this very large question, which, perhaps, has not received sufficient consideration. It may be thus stated. *The principles which Science is compelled to postulate, without which it could have no existence, which it therefore seeks to trace in Nature, and which, though it never can prove them to be universally true, yet so far as its powers extend it does verify, are common to Science and Religion. Of these principles Religion supplies the only rational and adequate basis; indeed, the only basis that is not contradictory of Science.*

It is obvious that for this argument it will be necessary to consider carefully, and somewhat in detail, what the scientific view of the universe actually is; and, rapid and imperfect as our survey must be, it must be comprehensive in its range.

7. Science, as distinguished from such knowledge as we receive either from the immediate perceptions of the senses, or from intuitive cognitions, may be defined as the knowledge of the relations of natural existences or phenomena. Without admitting that all human knowledge is relative, we must allow that scientific knowledge is by its very nature so limited. It has been formed by observing the common elements in the different phenomena of the universe, and so tracing unity in the diversity of Nature, the One in the Many. And practically, as the actual outcome of such investigations, the scientific mode of regarding the universe means a view of its existences and phenomena, not as isolated objects, but as belonging to a universal order; that order being twofold,—first, the *contemporaneous*, or that in which time is not a factor; and, secondly, the *consecutive*, or the order of succession in time of natural phenomena. We cannot always treat of these two forms of order separately, for they are intimately connected; yet it is important to observe the distinction. It is in the consecutive order, in which time is a factor, that Science attains its highest sphere, viz., that knowledge of phenomena as sequences of cause and effect which enables us to infer, by the process of deduction, particular results from general laws. But throughout the whole range of Science the three following principles will be found to be always postulated,—Unity, Order, and Causation; and these, not as separate principles independent of each other, but the order is assumed to be the expression and manifestation of unity by means of causation, which itself proceeds from the unity, and, so far as it is the subject of exact Science, is identical with continuity.

8. (1.) The simplest form of Science, it is evident, consists in that recognition of common elements in diverse objects

which enables us to classify these objects. And we must observe that even in this very first step in Science, in which law means nothing more than the order of contemporaneous existences, unity must be assumed, before we can assure ourselves that Science is possible. For without unity all knowledge is fragmentary, and order, which is the expression of the relations of the different existences to one another and to the whole, could never be investigated. The order also, which is required to be available for scientific knowledge, must be fixed and determinate in such a sense that its variations will be according to order, and not irregular or promiscuous.

But it is important to observe what is implied in the order which Science recognises in the universe. It involves the idea implied in the Greek word *κόσμος*, that is, the suitable arrangement and adaptation of the different parts of the whole. Without discussing the somewhat difficult question of scientific classification, it is sufficient to say that the order demanded by Science implies a whole so divided and subdivided, with relations between the several parts, that in a complete scientific scheme the exact position of any particular object may be determined with certainty; and any such scheme is truly scientific in proportion as the order is not artificial and technical, but conformable with that which Nature itself indicates. For it must be observed that the order of Nature does not consist of a series of existences differing from one another by imperceptible degrees. Such a universe is quite conceivable, but in it Science would have no place, because natural classification would be impossible. In the universe as it is, while the number of those existences, the differences between which are accidental to the individual, is indefinite, yet the number of different classes of such identities is finite, and the differences between these classes, instead of being infinitesimal, are sufficient distinctly to separate one class from another. To apply the terms of Evolution to the contemporaneous order of Nature, Science proceeds on the assumption that there is a limited number of integrations in Nature; and the office of Science is to determine these integrations with exactness. For example, while the material constituents of this earth and its surroundings are readily recognised even by the senses as different from one another; yet this order, as observed unscientifically, is more or less confused. It belongs to Science to classify them as distinct integrations, and to exhibit each of them as possessing its distinctive character and properties. Chemistry, which investigates the composition of these several constituents, throws further light on the order in the unity of the visible universe, by proving that everything material is

composed of a small number out of some sixty or seventy elements, of which many are of rare occurrence, while some may be traced in other worlds than our own; and not only is each of these elements itself a definite existence, distinct from every other,—a separate integration,—but the substances which are chemical combinations of these elements have the same character, being not uncertain or irregular mixtures, but combinations in definite and fixed proportions. There is no confusion, such as must have been the result of chance, nor yet is there, except in the case of crystallization, that symmetrical or geometrical regularity, which might seem to indicate that mechanical law could have determined the arrangements. Scientific thought, indeed, which in all directions seeks for unity in Nature, its own sphere, suggests that under different conditions from those that exist at present on this earth all these distinct elements might be reduced to one primary element. It seems not impossible that the progress of spectroscopy may lead to some discoveries as to the relation of the molecules of the different elements that might be sufficient evidence of this. Yet this would not bring us in the least nearer the cause of these integrations in the order of Nature, much less would it enable us to explain the properties of the different elements and their combinations. It is hopelessly beyond the power of Science to determine how the unity, which Science is compelled to postulate and endeavours to trace, can be consistent with an order in which the existences are so very different in their properties from one another. Science demands unity, and demands also causes for the differences; but it finds in this part of Nature nothing to satisfy the two principles. Where (we ask) must we look for a rational basis for both principles? Science cannot help us here; it leaves a void which clearly compels us to look for a profounder basis for the unity of Nature than any which Nature can itself provide.

9. The view which Science exhibits in inorganic nature of distinct integrations in its order is illustrated also in living existences; and first of all in the distinctness of these from all other existences. The phenomena which are characteristic of living matter (I use the words of Professor Huxley) are strongly marked off from all other phenomena.* Certain properties distinguish it *absolutely* from all other kinds of matter; “our present stock of knowledge furnishing no kind of link between that which is living and that which

* *Encyclopædia Britannica*. Ninth edition. *Biology*.—T. H. H.

is not." These properties are,—first, the chemical constitution of living matter, as it invariably contains a particular compound of carbon, water, and nitrogen, only found in organic matter, which is the chief constituent of the "protoplasm" of which the organism is constructed. The second distinctive property of living matter is its universal disintegration and waste by oxidation, and its re-integration, not by external accretion, as a crystal increases in size, but by introsusception of fresh and suitable material. The third property is its tendency to undergo cyclical changes ; each individual form, when it has passed through these changes, ceasing to possess the properties of living matter, though continuing and multiplying its existence by its seed or other portions of itself, which, in their turn, all undergo the same cycle of changes. No other form of matter whatever (I still quote from Professor Huxley) exhibits these properties, or any approach to the remarkable phenomena of the two last properties. Living matter has indeed other properties peculiar to itself, though not so distinctly marked. Its activities depend more or less on moisture and heat. Complete desiccation is fatal to living matter, as are also extremes of temperature. Besides these, organisation, or the possession of special instruments for special purposes, is usually characteristic of these existences, and is often, even in what we might consider a simple form, exceedingly complicated. And, we may add, in living matter a new idea is introduced into Nature, that of an existence composed of many very different molecules of matter, which yet is one individual.

10. We have, then, here, in the order of the Universe, a class of existences definitely marked off from the rest by the possession of properties, different not only in degree but in kind, from those of other material existences. Science, intent as it is on tracing unity, confesses that it can find "no kind of link" between them. Is there, then, a real break in unity because we cannot find continuity in Nature? If we believe in that rational basis of unity beyond Nature which Religion supplies, we shall not wonder that Science cannot trace the continuity here, when continuity cannot be traced even among the constituents of dead matter. The same remark applies to the distinctions between the main divisions in this general class of living existences. The tendency of the scientific mind, whenever it shrinks from recognising a deeper foundation of the unity and order of the universe than any that Nature can supply, is, in disregard of distinctions which unprejudiced reason recognises as fundamental, to assume that the vegetable, animal, and human types, are all connected

together in a continuous order, and that the apparent gulf between the animal and the vegetable, and the far greater abyss that separates man and the brutes, do not exist. Yet to establish this, it is necessary to neglect indications of a break of continuity which Nature itself suggests,—such as the fact that the animal in all its forms requires nutrition which living organisms alone produce, while the vegetable in all its forms can supply its waste from inorganic matter,—and, further, to argue illogically that because we cannot always distinguish the primary forms of each, therefore distinctions do not exist,—which evolution from a structureless germ contradicts. While the distinctions between the two classes which are more fundamental than those that are merely physical must be neglected for this purpose. The most highly-developed vegetable has no consciousness of its own existence, much less anything resembling intelligence. And if the physical characteristics of man differ less widely from those of the most highly-developed animal than the animal differs from the vegetable; yet reason, with its godlike powers of speech and abstract thought, its apprehension of the beautiful, and its conscience of good and evil, constitutes an essential distinction between the man and the mere animal, to which all the rest of Nature can supply no parallel. Why is Science to be searching for a unity in which these essential differences must be neglected, and violence done to the dictates of reason by denying them? Surely, to the unprejudiced mind, they are in themselves sufficient to prove that the true basis of the unity of that universe in which differences so essential are found, must be sought in Him in whom all things, dead and living, rational or irrational, subsist. A belief in one living and true God supplies a rational basis: nothing else can.

11. The character of that order of Nature which Science desiderates in the inorganic world is very clearly exhibited in the world of organic existences. Indeed, the classification of these existences in the natural histories of the vegetable and animal kingdoms, if arranged according to the relations and connections of the organization of the several forms beginning from the lowest, illustrates, far more precisely than any definitions could explain, what is the meaning both of the order and of the unity of Nature. Without inquiring at present into the causes of the order, it is obvious that from the simplest forms both of vegetable and of animal life to the highest, Nature exhibits an ascending scale,—not that of an inclined plane, but in distinct steps, and these not running upwards all in one series

in the same direction, but branching off in many different directions. The integrations both in vegetable and in animal life are, indeed, by no means so definite as those of the chemical elements and combinations which seem positively to contradict the idea of continuity in Nature itself. Yet that there is not in organic matter a continuous series of intermediate existences connecting the species and genera and higher divisions one with another, and that wide *lacunæ* often are found, are facts which cannot be questioned, however they may be explained.

12. In the contemporaneous order of Nature, animate and inanimate, viewed as a whole, the harmony of the several parts and the adaptation of one to another, have been often noticed as evidences of design ; in other words, as proofs of the unity and order of Nature having its basis in one Supernatural and Infinite Reason. As it would be absurd to attribute this harmony and adaptation to chance, the only kind of explanation that can be given of it by those who deny the necessity for a supernatural foundation for the order of Nature, is that one part of Nature has the power of adapting its forms and existences to the conditions of the other. This, of course, still leaves the question untouched, whence this strange power of self-adaptation is derived, for science and self-causation in Nature are contradictory. To this question I must again refer under the head of the consecutive order of the universe. But this theory of self-adaptation, at all events, can only be true within certain limits, and does not touch the general argument from the harmony of the inorganic world with the vegetable, the animal, and the human existences ; and of all these one with the other. For example, to all living existences,—at least, so far as we know anything of them, and to reason from ignorance instead of knowledge is not Science,—it is essential, first, that there should exist in the universe certain chemical elements, and these in particular combinations ; secondly, that the temperature should be confined within certain definite limits. “Habit,” to use the words of Professor Huxley, “may modify subsidiary, but cannot affect fundamental, conditions.” And what cause in Nature itself can Science assign, or imagine with any probability, either for the necessary existence of these particular elements in the universe, or for the extremes of temperature, in any part of the universe, being confined within the limits which make life a possibility ? In this earth, though the average temperature were to continue exactly the same, yet, if the maximum and minimum temperatures were altered, the whole world would be a desert.

13. Before proceeding to examine the question of the con-

secutive order of the universe, it will be necessary to consider a little the meaning of that word *cause*, which I have used more than once with reference to its contemporaneous order. For there is no part of Nature, as regarded by Science, from which the idea of causation can be excluded, although, strictly, it implies a succession of events. And as much confusion of thought is often introduced into this subject of causation, through ambiguity in the use of the word, it will be well to call attention to certain facts in this part of our general subject which may assist in guiding us. The word *cause*, in reference to the phenomena of Nature, for example, is popularly used in more than one sense. Some of these phenomena are, we know, in a greater or less degree, subjective. An image in a looking-glass, and the rainbow as an arch in the sky, are purely subjective forms. They are effects produced on the eye of the beholder in a certain position by light,—in one instance proceeding from a certain object and reflected in the mirror; in the other, proceeding from the sun and reflected in drops of water. In these cases, Science examines and determines the causes of the phenomena; that is, the reasons why they are to us such as they are. The explanation is a geometrical one, and may be represented by a figure. Colour, again, is subjective in a different sense. There is that in Nature (*viz.*, the different lengths of the light undulations) which is the external cause of the sensations of colour, although the sensation itself is purely subjective. Science proceeds a step further in the succession of physical causes by the explanation now generally accepted, *viz.*, that in the retina there are three kinds of nerve-fibres, the excitations of which give respectively the sensations of red, green, and violet; the combinations of these in different proportions producing the sensations of every shade of colour. But the cause of the colour-sensations being produced by these nerves, or of the union of sensations of red and green (for example) being yellow, science cannot explain. It must be observed that, in every process of causation, there are really three elements,—the antecedent, the consequent, and the *reason of the sequence*. And the causation is completely known only when all three are known. When, as we shall find is the case with physical energies, the consequent is the continuance of the antecedent in another form, the whole causation is explained. But this Science cannot prove to be the case in the transition from a physical impression to a sensation.*

* When we pass from the objective to the subjective, from the *non ego* to the *ego*, sometimes, as in the case of colour, there is no congruity whatever

Such considerations lead us to look for some basis of the general idea of causation more comprehensive and more profound than any of the various meanings of the word. We may, I think, confidently assert that there is no idea that can satisfy the mind, or that is sufficient to connect together the various modes of causation, and to underly them all, and give meaning and reality to them all, except that which is implied in *reason*. Science, just so far as it is the exponent of reason, compels us to look to this as the basis of all sequences of cause and effect; and certainly no reason can be an adequate basis for all that there is in Nature, except that which is infinite.

14. Thus far, then, we have traced in the contemporaneous order of the universe the three principles, Unity, Order, and Causation, all of which it is necessary for Science to postulate in its investigations into Nature. There can be no doubt that these principles are common to Science and Religion; for all Religion begins in the belief in the existence of One almighty, infinitely wise, and omnipresent God, above all, through all, and in all. That the Being of God is an adequate basis for these principles is self-evident, and we have found sufficient proofs that such a basis cannot be discovered in Nature itself; in fact, a basis in Nature would be a contradiction of the very principles which are supposed to be based on it; for Science assumes the order in the unity to be the result of causation. But if anything in Nature could be the basis of causation, it must be itself uncaused. Yet Science assumes, as a principle necessary to itself, that every existence and phenomenon in Nature has a cause. To suppose, for example, that the atoms

that our minds can discover between the antecedent and the consequent. In the case of form, of which the mind receives knowledge by touch as well as by sight, the case is different. And our reason rebelled, when we were told, as we were told in some unphilosophical books on Optics, that the inverted image on the retina was set on its feet again by the mind correcting the mistake! If that were so, undoubtedly Idealism would be the only possible philosophy. But it is absurd to suppose that there need be such complicated mechanical apparatus to produce an impression of the form corresponding to the object, if the sensation represented something totally different. Again, in regard to sound, we could not conceive it possible that the sensation of a treble note could be produced by a long wave, or that of bass by a rapid vibration. Yet here, again, why a particular form of wave should produce the sensation which recognises what we call the tone or *timbre* of a voice or instrument is only partially explained by saying it is due to the harmonics. In light there seems nothing whatever, in the present state of our knowledge, that would indicate any correspondence between the different colours of the spectrum and the comparative lengths of the light undulations.

are self-caused is not only unprovable, but is a contradiction of Science; for if those things of which all Nature is composed have the source of causation in themselves, it cannot be assumed that anything whatever in Nature is the subject of causation.

15. (II.) But all these conclusions will be more clearly illustrated in the examination of the scientific view of the consecutive order of the universe. In this we have to deal with those laws of Nature, as they are called, which represent the order in which certain phenomena or existences follow one another in succession. Here, again, Science is compelled to postulate that there is an order, that events or phenomena do not follow one another promiscuously; and further, that there is a unity in the order, and that both this orderly succession and the variations in it are the result of sequences of cause and effect. Science also assumes a unity in all the apparent diversity of these sequences, and continually searches after a connection between the various causes, the effects of which are subjects of its observation.

The confidence that there is an established order in the universe is the only ground on which empirical laws, which cannot be determined as sequences of cause and effect, can ever have the slightest value in Science. In fact, it is the profound conviction in the human mind of order and unity being fundamental principles in the universe, that produces, in those who have not sufficiently considered or apprehended the equally fundamental principle of causation, too much confidence in empirical laws. Indeed, so deeply rooted is this confidence in the order of the universe, that it is a very common belief in the unscientific mind that a law of Nature, instead of being an order due to causes which, under other conditions, might produce another order, is an independent entity, possessing some power of causation in itself. Of all the *idola* which have imposed on the understanding of man none is more irrational than this false notion of law. But it is not sufficiently realised, I think, that even in regard to dynamical laws, which rise far above the category of those that are merely empirical, it is necessary for Science to make assumptions which require some basis outside Nature itself. To exhibit this we must briefly examine the history of the development of Science in this direction.

16. The most familiar instance of the progress of Science from empirical laws to dynamical—I mean that which we have in the Science of Astronomy—is also the most instructive. How the unsystematic order of the heavenly bodies observed by ancient Astronomers was by the genius of

Copernicus expounded in the true system of the universe; how this system received further exposition by the three phenomenal laws discovered by Kepler; and how these empirical laws were exhibited by Newton as necessary results of a universal law of gravitation, are facts too well known to require more than the briefest notice. The assumption of the very simple law that the force of gravity is proportional to the product of the gravitating masses directly and inversely to the square of the distance between them, enables Science, by a mathematical process, not only to determine the order of the motions of the heavenly bodies, but also the perturbations of that order, and by accurate observations to verify the conclusions; and it has enabled mathematicians not only to explain phenomena already observed, but even to discover the existence, and determine the conditions, of others not yet observed. It is obvious that a general law of this kind has an authority which no merely phenomenal law can possess. Its discovery—or rather, I should say, its application—is a far higher act of human reason; its accuracy may be tested to an almost unlimited extent by the aid of mathematics; and we cannot but accept the law as a part of the established order of the universe which governs a very large class of secondary and phenomenal laws, and the determination of which is thus a long step in the direction of the interpretation of that order. But, observe, one step and nothing more. If gravitation is the cause of many effects in the order of the universe, what is the cause of gravitation? We cannot be surprised that the natural feeling in the scientific mind is that some cause must exist in Nature itself. Newton himself considered that it was impossible for any one “who has in philosophic matters a competent faculty of thinking,” to allow the possibility of action at a distance, such as gravity seems to imply. Yet none of the hypotheses, as yet suggested to account for gravity, except that of Le Sage, has any claim whatever to be a scientific exposition.* However, this only leaves us with a still more difficult question, viz., what can be the cause in Nature of *ultra mundane* corpuscles flying about in all possible directions, in infinite numbers, and with enormous velocity? Sooner or later, it seems, we must get beyond Nature. A hypothesis of all this *ultra mundane* energy, of which only an infinitesimal part affects Nature at all, looks very like a confession of this truth.

17. However, there is a more fundamental question still, to which I must briefly refer. It is well known that all the mathe-

* *Unseen Universe*, Article, 140-141.

mathematical investigations, by which from Newton's time the results of the law of gravitation have been determined, are founded on three Laws of Motion, as they are called. What are these? Are they self-evident axioms which reason cannot question without self-contradiction? or are they assumptions necessary to Science, which it verifies, so far as it is able, within the limited range of our experience, from the agreement with observation of the conclusions made on that assumption? The fact that the truth of these laws was so long questioned and so slowly apprehended by the human mind, sufficiently indicates that they are not self-evident identities. Let us take the first and simplest of these laws. A body at rest will continue at rest, and a body in motion will continue to move with the same velocity in the same direction, unless acted on by some extraneous force or cause of motion. In other words, it continues in the same state as regards motion, unless there is some cause of change of state. Now the principle of continuity, which is assumed here, to those of us who are familiar with it in the dynamical problems of the universe, and with the necessity of it to all scientific investigation, may appear almost self-evident. But if we should be asked on what grounds we have this conviction, independent of the very incomplete evidence that Nature supplies, we certainly could not answer, as we must with regard to a mathematical axiom, that it expresses an identity. The existence of a state and its continuance are two totally different ideas. We must look further for the reason why we assume continuity. Religion points us to a sufficient and rational basis, viz., that Nature subsists in One Who is eternal and unchangeable, and both its continuity and its changes have their adequate cause in Him. Is there any other?

18. This principle, in fact, involves a second, viz., that in Nature there is no self-causation. The second law of motion, which has sometimes been called "the law of independence," affirming that the effects of forces, or causes of motion, are under all circumstances equivalent to those causes, enlarges this view. The result of the various causes acting together can be neither more nor less than if they acted separately. Whether the particle on which they act is at rest or in motion does not affect this. Neither the state of the body, nor the combination of the causes, alter the law of causation. In other words, matter is merely inert or passive. There is no power in it either to generate motion or to change motion. We are driven, therefore, to look for an original cause of motion out of the material universe. And if of motion, how much more of life, sensation, consciousness, intelligence? For it is absurd to suppose that matter cannot generate motion in itself, and yet

that it can generate these, which reason recognises as much higher and further removed from the category of material substance.

Thus Science is compelled to assume the negative principle that in Nature itself there is no initial source of causation: a principle which is common to religion also, pointing as it does to one primal source of all causes in the Being of God.

19. There is no doubt, however, that this question of causation, and with it also the relation between Science and Religion in regard to causation, has till our own time been somewhat obscured by the unscientific use of the word force, as if it were a reality in itself like motion its effect. Force is no doubt a very convenient word to use when we understand its meaning. But that force has an objective existence can never be proved, and it is not only an "unfruitful" idea, but one apt to lead into error. Dr. Carpenter, I observe, in a late Essay on "The Force behind Nature," challenges this view, and protests against force being treated as a mere creature of the imagination. He grounds his protest on the fact that our senses give us an idea of force in pressure and resistance. But this is to confound the idea which the sense view of nature suggests with that which Science concludes. Our senses suggest that the yellow colour of the primrose is an objective existence in the flower; but Science concludes that the objective reality is something quite different from colour. The sensation of pressure is quite familiar to us; so is that of colour. But what in each case is the physical antecedent of the sensation?*

20. The history of the modern discoveries which have led to the present use in scientific researches of the idea of energy which is measured by the work done, instead of that of force which is measured by quantity of motion, I assume to be sufficiently known. The theory of the correlation of all

* One danger attending the popular use of the word "Force" is, that some not only consider force as a real entity, but almost deify it. They invest it with mysterious attributes, and when they speak of the First Cause, conceive of some primal force which is the source of all the various forces in Nature. Dr. Carpenter does not mean this; for in his essay (which originally appeared as an article in the first number of the *Modern Review*) he quotes with approbation language of Sir John Herschel, who speaks of force as "indisputably connected with volition, and by inevitable consequence with motive, with intellect, and with all those attributes of mind in which personality consists." And he himself deems it "absurd and illogical to affirm that there is no place for a God in Nature, originating, directing, and controlling its force by His will." Yet the very title of the essay, "The Force behind Nature," illustrated as it is by a steam-engine working the machinery of a cotton factory, appears to me calculated to mislead, and to obscure the true idea of the relation of God to His universe.

physical forces, followed by the discovery of the mechanical equivalent of heat by Dr. Joule, and by the molecular and atomic theories, has opened to Science even a wider field than was opened by Newton's use of the law of gravitation. In this new development of Science a principle is accepted which was recognised by Newton as an interpretation of his Third Law of Motion, but which it remained for modern Science to propound in the present form of *conservation of energy*; viz., "that in any system of bodies whatever to which no energy is communicated by external bodies, and which parts with no energy to external bodies, the sum of the various potential and kinetic energies remains for ever unaltered." This is really only another form of that principle of continuity which we found in the First Law of Motion, though in this modern form it is more than ever apparent that the continuity cannot be accepted as a self-evident axiom. Indeed, this law of the conservation of energy is as luminous an instance as could be found anywhere, of Science being compelled to assume a principle which it can never absolutely prove, but which it verifies as far as it can by observation of the results obtained on the assumption. It cannot be proved as a proposition in Euclid is proved.* The difficulty of proving it experimentally is even greater than that of proving the First Law of Motion by direct experiment. Strong indirect confirmation of its truth can be obtained, and whenever the law can be brought to the test of experiment it is found true. But what is it (we may ask) that in the absence of anything approaching complete proof satisfies the scientific mind as to the universal truth of the law? Undoubtedly the conviction that permanence or continuity is a fundamental principle of the universe; or, as Religion would express it, that the universe subsists in God.

21. But this law of the conservation of energy, which is the result of further insight by science into the consecutive order of the universe, is followed by another law which, to the unscientific mind, appears like a contradiction of the former, viz., the *dissipation of available energy*. While the conservation of energy points to permanence, this indicates a process of dissolution; that is, unless it should be checked (as Clerk Maxwell has shown to be possible) by the interposition of intelligence. I notice this because, though not directly bearing on my present argument, it both strengthens it and nearly affects the general question of the relation between Science and Religion. Were it not for this second law, which indicates that the present visible universe has had a beginning

* See *Conservation of Energy*, by Balfour Stewart.

and must have an end, the scientific principle of continuity might seem to mean that the universe is eternal, and subsists in God, in the Pantheistic sense, as belonging to His Infinite and Eternal Being. But we learn, not only that the permanence which it has in its Creator is consistent with its being subject to cyclical changes, but that its order and its causations, if left to themselves, must terminate; which is the strongest conceivable proof that the origin of these is not in Nature itself. In fact, this law of dissipation is the very interpretation of the law of conservation that Religion as a whole requires. The first religious view of the existences of the universe is, "He hath made them fast for ever and ever, He hath given them a law which shall not be broken":* which is also the first scientific view. The profounder religious view, the theosophic, is, "They shall perish, but Thou shalt endure: as a vesture shalt Thou change them, and they shall be changed: but Thou art the same, and Thy years shall have no end."† Or, to use the singularly exact language of the Apostle Paul,‡ "The Creation was made subject to vanity"; that is, to instability and liability to change and decay; and this (he adds) for some special purpose on the part of Him who made it subject; as if Divine intelligence (as Science itself indicates) might have prevented this, if some higher purpose had not intervened.

22. But it is especially in reference to *causation* that this new scientific development illustrates my present argument. It was impossible, until the transformation and conservation of energy were discovered, to explain clearly the strict and proper meaning of causation in the physical universe. Modern Science, however, enables us to interpret this very definitely indeed. If the cause is the energy A, the effect proper is the sum of the energies a_1 , a_2 , a_3 &c., into which, by impact or any other action, the original energy is transformed. For example, if one body impinges on another, the original energy is changed,—partly into those of the resulting motions, partly into heat. And the sum of these resulting energies is exactly equal to the original energies, and is its only proper effect. But suppose that the body struck is on the edge of a table or a precipice, and the two bodies fall on the ground, then their kinetic energies, when they strike the ground, are greatly increased; but this is merely because the effect of the collision has been to convert potential energy into kinetic. Or suppose that the body struck contains some explosive substance, the

* Ps. cxlviii. 6 (*Prayer Book version*).

† Ps. cii. 26, 27.

‡ Rom. viii. 20.

effect of the percussion is then vastly greater than the initial energy; but this is because the blow has disturbed the unstable equilibrium of the molecules of the chemical mixture, and the proper effect of the initial cause, though it remains unaltered, is quite lost in the incidental effects. In this case also, what we may consider as potential energies are suddenly changed into the kinetic energies of elastic gases. Another well-known case of a small initial cause resulting, from a similar reason, in effects far beyond those properly due to it, is seen in the spread of fire. A lighted match falls on a curtain, and a whole city is burned to the ground. This instance is sufficient to prove that in the case, not only of those substances (such as explosive mixtures) the chemical stability of which is very small, but of those also the chemical stability of which is considerable, the complete results of the initial cause often consists of two totally different kinds of effects;—first, of the effects proper, which are equivalent to the cause; and, secondly, of effects due to energies transformed or set free from their potential form, which bear no definable proportion to the original cause.

23. Such instances are sufficient to prove how much ambiguity there is in this subject, and how necessary it would be, in any Science of causation in Nature, to distinguish between the sequences of cause and effects when the latter are nothing more than a continuity of the transformed cause, and are exactly equivalent to it; and when the effects are those which result from the transformation of potential into kinetic energies. The transformation of itself does not necessarily imply any expenditure of energy to produce it; but, whether this be the case or not, it is evident that, as there is no determinable relation between the initial cause and the ultimate result, the effects of causation in Nature, so far as sequences of this sort occur, are absolutely incalculable; and that, however the whole system of animate and inanimate existences may be limited by the law of the conservation of energy, it is, nevertheless, unscientific and indeed absurd to regard the universe as a piece of mechanism, the consecutive order of which could be determined as a problem in dynamics.

24. For it must be observed that into terrestrial phenomena (at least) this kind of indeterminate causation enters very largely, because the physical changes amongst these phenomena are in a great measure due to the changes of chemical combinations which are acted on by the various energies of heat, electricity, magnetism, actinism, and such like. The question of chemical equilibrium and the comparative stability of chemical combinations has attracted some attention in recent

times, but the question, as a whole, is not within the range of exact science.* Clerk Maxwell succeeded in tracing a connection between some of the empirical generalisations of chemistry and the laws of the conservation and dissipation of energy. But it is evident that nothing short of the absolute stability of chemical structures, which would be fatal not only to all life, but to all the variety of Nature, could make sequences of cause and effect in physical phenomena on this globe, in all cases or even generally, determinable. And this consideration leads to the remarkable conclusion that, whilst Science is compelled to postulate both order and causation for its investigations, it never can possess the power, in many of the phenomena of Nature, to prove that the order is due to the causation; for the results of the causation, instead of being definite and orderly, are, so far as we can understand them, and to an extent apparently undefinable, quite indeterminate. And yet Science would contradict itself, and, in fact, could have no foundation, if the order and the causation had not some common basis. One Divine Reason, underlying at the same time the order and the causations, can alone supply a sufficient basis for both.

25. I would call attention, in passing, to the confirmation of this truth, of Reason being the basis of the whole system of the universe, that is afforded by the view of causation which we have been considering. Science, at all events at present, can give no explanation of the comparative stability and instability of the different constituents of the material universe; and yet on this the order of Nature very largely depends. If the arrangements of the energies in the chemical combination of hydrogen and oxygen in water, for example, or in carbonic acid gas, which supplies food to plants, were less or more stable than they are, or if the atmosphere were a chemical combination at all, stable or unstable, the present system of organic life would be impossible. It is, indeed, with reference to organic life that the considerations I have suggested are of most importance. The relation of living matter to physical energies is one, all must allow, of insuperable difficulty. Living matter has powers of adopting, transforming, directing, and applying, those energies which are not only quite unintelligible to us, but which have no parallel in dead matter. Our knowledge of this fact is, however, not scientific knowledge. It is a fact of which it is

* See paper on "Chemical Equilibrium," by M. M. Pattison Muir, *Nature*, April 1, 1880).

impossible for Science to find the cause in Nature; for even if the functions of life were proved to be connected with magnetism or any other physical energy, that would simply indicate, as in the case of sensation, the antecedent to the effect, not the reason of the sequence. And that life is an ultimate fact in Nature is confirmed by the researches of Science, which can discover no origin of life except living matter itself. And all we can say as to the relation of cause and effect in this sphere of Nature is that the phenomena of life are the results of continuity, but since it is the very characteristic of living matter to call physical energies into active operation, and to spread as a fire spreads from the smallest initial cause to an extent unlimited, this whole sphere is one which lies entirely beyond the range of exact Science.

26. But though Science in its highest form, as determining exact sequences of cause and effect, can have no place here, yet in its lower office of investigating by observation the consecutive order of phenomena, it has more trustworthy guidance here than in inorganic Nature. As one characteristic of living matter is that it is the subject of cyclical changes, the question of consecutive order necessarily belongs, to some extent, to all scientific researches into organic existences. And in the cyclical changes of all these existences there is a phenomenal law of order, originally observed by the poet Goethe, and in modern times more distinctly defined in what is known as the Law of Evolution, the truth of which may be tested almost without limit, and which holds, in the organic world, nearly the same position as the law of gravitation holds in the inorganic. And this law is so entirely in accordance with the principles of the contemporaneous order observed in Nature, that though no doubt it is impossible to prove its universal truth, or even to verify it as a dynamical law may be verified, yet it commends itself with almost irresistible force to the scientific mind as a general expression of the order of Nature, and to the religious mind also (as it seems to me) as having its basis in Him Who is everywhere the Author of the same order. I am convinced that the more the law itself is carefully studied and clearly understood (and its study, apart from the obscure and repulsive terminology which has been introduced into this branch of Science, is as interesting as it is instructive), the less liable will the mind be to be carried away by those premature and unscientific conclusions which, by the world in general, are often confounded with the law itself.

27. The law, as it is observed in individual organisms, where we can trace it throughout the whole process, is (we must remember) simply the order of the changes through

which every such organism passes from its initial structureless germ to its complete development. It is the same law in the vegetable and the animal, in the apple-tree and the elephant, in the sparrow and the human body. It does not in the least account for the differences between these existences, or give any explanation of them, much less is it a *cause*, in any proper sense of the word, of their being what they are. It only affirms that the operation of the different causes, to which the development of the organism is due, must follow a certain order. The causes themselves, if we consider the case of an individual existence, are obviously twofold.

First, the antecedent life, or lives, of which its own life is the continuity.

Secondly, in a subordinate and very limited degree, the environments or conditions of the organism during its development.

The first of these is undoubtedly in all cases the dominant cause. It is not only contrary to all experience that the derived existence should not be identical in kind with its antecedent or antecedents, but it would be inconsistent with the principle of continuity. But for this cause to produce its effect, certain environments or conditions are essential to the normal development. The absence of these, or any defect, or even excess in them, may render the development imperfect or abnormal, or even prevent it altogether. The limits of the effects that can be produced on the development of an individual organism by the alteration of its environments is a subject on which little is known with accuracy; indeed, these effects are generally so small,* that it is only by observing the accumulation of the effects, after many successive generations, that any approximation can be made to a scientific treatment of the subject. This, as is well known, has an important bearing on a much larger question than that of the consecutive order of the cyclical changes of an individual existence: viz., whether it is possible that, through the accumulated effects of environments, there may have been an evolution of the different types of organic life somewhat analogous to that of the different stages of development in the individual. This generalization assumes that, besides the law of continuity, which determines that each succeeding genera-

* The instance that at first sight seems the most startling is that which is afforded in the natural history of bees,—of the queen bee being developed by additional food and heat (especially the former) from the larva of a working bee. But as the working bee is an undeveloped female, this is merely the case of a complete normal development requiring a certain amount of food and heat. There is a similar instance, I am informed, in the natural history of the *termites*, or white ants.

tion shall resemble that which preceded it, another class of causes, from generation to generation, may gradually modify this resemblance, and, it must be observed (for this is absolutely necessary to the theory), modify it continuously in the direction of evolution, and also in such a manner that the new types produced through these modifications shall be each of them a distinct integration. For the theory is, that the result of the process is the present highly-developed and accurately-defined contemporaneous order of the organic world.

28. The question at issue, we must remember, is not whether the process through which this order has been established followed the law of evolution,—as much as this might, I think, be inferred from the characteristics of Divine and Reasonable order, and is, indeed, indicated by Revelation itself in the Scriptural account of creation,—but whether the causes of the process can be traced in Nature itself. And even if there should be reason to suppose that the order of Nature has been determined, to a large extent, by conditions such as those which Mr. Darwin and his school consider sufficient, the question would still remain,—Whence does living matter derive the extraordinary power of adapting its forms to these several conditions, and especially of so directing all the successive infinitesimal modifications produced by environments, that by these modifications alone the whole of the order could be evolved. The evolution of the Ascidian from the Moner is, in fact, more unintelligible, than that changes should be produced in the higher orders of animals, unless some unknown power, such as that by which the embryo grows in the womb, should have been the cause of the development. For, however environments may aid development, and the law of evolution may limit it, they can effect nothing whatever of themselves. I have elsewhere* suggested that the analogy of embryology itself points to the probability of a period of genesis of Nature, during which other powers were in operation than those which we can trace in Nature in the present condition of the earth. But, indeed, notwithstanding Professor Huxley's late very positive assertion † that it is impossible for the scientific mind any longer to question the sufficiency of known causes for the evolution of organic forms, the evidences of continuous progress *in the direction of evolution* (which certainly the hoof of the horse and other cases to which he refers are not), are at present so de-

* *Church Quarterly Review*, July, 1878, on *Evolution*.

† In a lecture delivered at the Royal Institution last March, entitled "The Coming of Age of the Origin of Species."

fective that they can only derive any weight at all in the question from the supposed necessity of Science tracing at the same time both the order and the causation.

29. However, I am not now discussing, nor do I intend to discuss, the subject of any discrepancies between science and religion: both affirm the same fundamental principles, and must also hold that these principles have a common root. Science assumes them, and must do so as necessary to itself; and it endeavours to prove its assumptions to be true by the agreement of their results with its own observations. Religion derives the same principles from its belief in one Infinite and Almighty Intelligence, in Whom they all subsist, and Who is the basis of them all. And it confirms its belief by the evidences of order and design which Nature exhibits. Often, indeed, as we have found alike in the Unity, the Order, and Causation of the universe, it is absolutely impossible for Science to discover the connecting links or prove the principles from Nature. As the wise man said, — “It is the glory of God to conceal a thing.”* But it is no part of Religion to question the evidences which Nature gives of these principles so far as Science is able to interpret it; nor is it any part of Science to imagine that it has discovered all the causes at work in God’s universe, as if there might not be many far more powerful and active than any which our very limited experience and faculties apprehend. Meanwhile, Science itself teaches us quite enough of the infinite complexity of the causes at work in Nature, and of the indeterminate character of their effects, to prove that their operation not only cannot preclude, but even demands the action of supreme and infinite intelligence for the ultimate result. This (to use the words of Professor Jevons) “must have been contained in the aggregate of the causes, and these causes, so far as we can see, were subject to the arbitrary choice” (I should say, are subject to the Will and Reason) “of the Creator.”†

30. And this leads us to another truth, in which all these principles, whether regarded from the scientific or the religious point of view, meet and coincide. It is a common notion that the effect of the scientific view of the universe, as compared with those which our senses give us, is to get rid of its mysteries, and make the whole intelligible. Religion, on the contrary, is imagined to be full of unintelligible mysteries, and its condemnation, with superficial minds, is, that it cannot

* Prov. xxv. 2.

† *Principles of Science*, ii., 462.

be understood. It is accepted by those who are ignorant of Science, its adversaries maintain, because they are not familiar with the solutions of the difficulties of Nature which Science supplies. But so far is this from being true that the effect of Science is to lead us to more serious difficulties and more incomprehensible mysteries than any of those which it solves. The proof of this I must assume here ; but I will use the words of one who will not be suspected of any prejudice in favour of Religion. Speaking of ultimate scientific ideas, Mr. H. Spencer* says :—

“The explication of that which is explicable does but bring out into greater clearness the inexplicableness of that which remains behind. . . . Objective and subjective things” the man of science “ascertains to be alike inscrutable in their substance and genesis. In all directions his investigations eventually bring him face to face with an insoluble enigma ; and he evermore clearly perceives it to be an insoluble enigma. He realises with a special vividness the utter incomprehensibility of the simplest fact considered in itself.”

The complete result then of our argument is, that as the principles of Unity, Order, and Causation, which Science assumes, have no adequate and rational basis in those things which Science can investigate, and as in all cases in which Science traces the principles to the utmost range of its own powers, it is brought to that which to the human understanding is incomprehensible † ; therefore we must conclude, from the teachings of Science itself, that the ultimate basis of all cannot be other than an existence incomprehensible to the human mind.

31. This, however, as our previous investigations have shown, by no means lands us in agnosticism, any more than Science itself does. Science has been found to point continuously in the direction of One infinite and almighty Intelligence as the only explanation of the principles it requires. That which these principles demand is what we know as reason. Indeed, apart from all other evidence of this, since reason is mani-

* *First Principles*, second edition, p. 66.

† The universe is infinitely wide ;
 And conquering Reason, if self-glorified,
 Can nowhere move uncrossed by some new wall
 Or gulf of mystery ; which thou alone,
 Imaginative Faith ! canst overleap
 In progress towards the fount of Love,—the throne
 Of Power, whose ministers the records keep
 Of periods fixed and laws established, less
 Flesh to exalt than prove its nothingness.

fested in man, the highest existence known to us in the universe, this at least must be found in the ultimate cause of the universe. And if we ask still, why in One Who must, it seems, from the very teachings of Science, be incomprehensible, we venture to speak of the human attribute of reason,—the voice of Religion answers (and we are now outside the sphere of scientific thought, and must have Religion for our guide, if we would have any at all), “God created man in His own image, in the image of God created He him.”

32. It is not, of course, possible for me now to follow out the argument which I have indicated as to the relations between Science and Religion, or it would not be difficult to prove that it would lead to results of great religious value, and illustrate some of the profoundest mysteries of Faith. But, though I have already trespassed too long on your patience, I must in conclusion call attention very briefly to one application of the argument—of overwhelming practical importance in the present day—which, I confess, most weighed with me in choosing for my address to-day this investigation of some very intimate relations between Science and Religion. It is impossible to doubt that just now the tide of unbelief is setting with almost unprecedented force against the very foundation of all Religion, the Being of God. In itself there is nothing in this either surprising or discouraging. Atheism is the logical conclusion of all forms of infidelity, and it is well that the infinitely momentous question should be brought to its real issue. Men, indeed, vastly deceive themselves when they imagine that if they deny the existence of God they are at the bottom of the pit. There are already symptoms more than enough that there is a depth below this, and that those who are taunting rationalists and deists with not having carried their principles to their logical conclusions, will soon find out that of all systems the most illogical is one that demands morality, truth, and justice without God.

But cannot Science give us some aid in our attempts, by God's help, to stay the plague? Of late years there has been, largely owing, I believe, to the efforts of this Society, a greatly improved understanding on both sides of the relations between Science and Religion. The present outbreak of Atheism assumes a flimsy disguise of Science; but, in reality, it has no scientific basis. It assumes that scientific conclusions can be proved, and are therefore to be believed; that the existence of God cannot be proved, and therefore is not to be believed. Such fallacies deceive those who are willing to be deceived; but they must disappear if once exposed to the light. But meanwhile I know that the feelings of many of those who are

endeavouring to stem the tide of evil is that a literature, specially directed against the present phase of unbelief, and adapted for the classes who are most in danger from its sophistries, is still much needed. I would venture to suggest that in a matter of such vital importance as the best method of dealing with Atheism, there is nothing that we may with so much advantage study for our guidance as the example of the first inspired preachers of Christianity to the world. The heathen world, with which St. Paul, for example, had to deal, was, at heart, Atheistic, even more than it was idolatrous. Æsthetic feelings, national prejudices, and traditional usages were in favour of the old heathen system; but at the root of much both of the sentiment and of the philosophy of heathenism there was unbelief in any true and living God. We find, however, that in addressing the heathens, the Apostle argues *from* the existence of God, and he asserts confidently that men know not only that there is a God, but also sufficient of God to recognise that idolatry is a contradiction of His being. But when we examine his language closely we find that there was always present to his own mind as the ground of this assumption, one particular evidence of the being of God, to which he expressly refers as absolutely and completely sufficient. Whether he addresses uncultivated Lycaonians or Athenian philosophers, or is writing to Romans of their heathen fellow-countrymen, he always appeals to the visible universe as affording proofs of the eternal power and divine attributes of God, quite sufficient for reasonable man. It is not to be supposed that this great Apostle, who, to use the vulgar phrase, was certainly "abreast of the questions of the day," knew nothing of the Atheistic speculations of the Epicurean philosophers whom he addressed at Athens, or of those of the Epicurean Roman poet, which are the very type, if not the origin, of the Atheistic theories of certain modern physicists. But he evidently considered that such speculations did not touch the question at all. Atoms or no atoms, the universe could only be the result of Divine Power and Divine Reason. We cannot but conclude from St. Paul's language that he considered this witness to God absolutely unassailable. He speaks of God's Being, not as something that may be discovered, but as a manifest truth, known to all, though they may suppress and keep down their knowledge so that it fails to produce in them its proper effects. He does not say that it requires some special gift of faith in order that God's eternal power and divinity may be traced in His works; he asserts that men are without excuse if they do not clearly recognise these. We must not infer

from this that there is not also in man an intuitive cognition of God by conscience and by faith; but that of which he speaks as in itself sufficient is, undoubtedly, a logical process. From the principle that there can be nothing in Nature without an adequate cause,—a principle necessary to all scientific investigation,—Reason concludes that the cause of the phenomena and order of Nature must be the eternal power and infinite wisdom of God. However immediate the inference may appear, it is the result of a process, the several parts of which the logical faculty can discuss. And since, according to the Apostle's teaching, the inference is not only legitimate, but one that man's reason cannot reject without self-contradiction, the result of such discussion ought to be to make the conclusion more apparently and obviously certain.

There can be no doubt that Science has a most direct bearing on the several parts of this logical process. We have found in our brief survey that Science pours a flood of light, not only on the order of natural phenomena and existences, but also on questions of causation. All the principles assumed by Science in Nature require that which is supernatural. And if the conclusion from Nature was recognised by the heathen world then, may it not now be made even more apparent to the minds of men in the far clearer light of modern Science? It appears to me, I confess, that we shall not faithfully fulfil the trust committed to us in God's gift of Science, unless we so use it as, at all events, to expose the folly of those who say, "*There is no God,*" and thus, by God's help, save those who are being deceived by the sophistries of such men from sinking into the horrible pit of darkness and despair which Atheism has opened.

Rev. ROBINSON THORNTON, D.D.—I beg to move, "That our best thanks be presented to Bishop Cotterill for the Annual Address now delivered, and to those who have read Papers during the session."—It is my very pleasing duty to express what I am sure is the feeling of all present, the great satisfaction we have experienced in listening to the very eloquent, very cogent, and very lucid discourse with which we have just been favoured. (Hear, hear.) May I say that there is another thing besides its eloquence, cogency, and lucidity which I strongly admire, and that is that it contains no little spice of the aggressive. (Hear, hear). For a long time in our conflict, as we have had to struggle against the infidel tendency of the age, we have been apt to be too apologetic; we allowed our opponents to maintain that science and common sense were mainly on their side, and that we had only a little bit of the two on ours. But the right rev. prelate is not con-

tent with this easy-going method; he attacks our enemies on their own ground. (Hear, hear.) He says, "Science and common sense are both on our side; on yours there is nothing but a baseless, unintelligible, and never-ending mysticism, and it is you, not we Christians, who are leading mankind astray." I am not quoting Bishop Cotterill's words; but I think I am doing no injustice to the tendency of his very admirable discourse. I am very thankful to find we can afford to be aggressive, and not only so, but that we have amongst us one who can conduct that aggressiveness in such an admirable manner. (Applause.) I am sure I am only expressing the feeling of all present in tendering to him our most hearty thanks for his able address, in which he has fought the unbelievers with their own weapons, and exposed the fallacies they are in the habit of setting forth as though they possessed the entire force of law. (Applause.)

D. HOWARD, Esq.—I have very great pleasure in seconding this resolution. I do myself most heartily thank his lordship for what has been to me the very keen enjoyment of listening to the Annual Address—an address very tempting to comment upon, but for this fact, that there is so much in it on which one could comment that it would be unsafe to begin. (Hear, hear.) I am sure we shall all look forward most eagerly for the time when we shall be able to see it in print, when the gaps which the exigencies of time have caused in it will have been replaced, and we shall have the satisfaction of reading, not only that which we have heard to-night, but that which we have not yet heard. Such Papers are of infinite value for every one of us. Very many problems which have puzzled us have been explained, or have been brought out into clearness and light by the Papers read before the Society, and most emphatically is that true of the Paper read to us this evening. This Paper is valuable because it shows us that we can afford to let those things which are perplexities to us, be; and that we may wait with patience, knowing how well some of the problems put before us have been explained away, and that if we are content to wait, the time may come when they will all be explained. And not only this, but we should remember that we do not exist for ourselves only, and that we ought to do our best to spread widely the knowledge that there is a true side of the question as well as the other side. We cannot venture to imitate our antagonists in their self-conceit, which, as has been truly said, is beyond all expression, but we can at any rate show them that there is sounder and clearer thought, and more real science on our side—the side of truth—than on theirs. (Hear, hear.) Do not let us be ashamed of our colours, do not let us wear our Christianity as a kind of secret to be kept only for Sunday use, and hidden carefully when science comes out; but rather let us carry our banner in front and fight well for the standard. (Applause.) Do not let us think the truth will suffer. Truth is eternal. Let us hold fast on the truth ourselves, and do our best to get those who have lost their hold once more to layhold upon it. (Applause.)

The resolution was then carried by acclamation.

J. A. FRASER, Esq., M.D., I.G.H.—It is now my duty, as well as my privilege, to be permitted to move our thanks to one whom I may well call one of our very oldest friends. (Applause.) Of the few pleasures we meet with in the evening of life, none is greater than to be able to see and recognise old faces and old friends, and it is with the greatest pleasure, I am sure (although it is said that public bodies have no hearts), that every heart here, in its individual, if not in its corporate capacity, will respond to a proposition which says how very grateful we are to Lord Shaftesbury for his kindness in again meeting us here, and devoting to the work of this Institute a portion of the time upon which such great demands are made by his very numerous daily, and I might almost say, hourly avocations. (Applause.) We find his lordship coming among us year after year, and we hope again on many occasions yet to meet him among us when the opportunity will permit of his attendance. (Hear, hear.) It is, therefore, with great pleasure that I have to move:—"That the thanks of the meeting be presented to our respected President." (Applause.)

T. K. CALLARD, Esq., F.G.S.—I have great pleasure in seconding the resolution, and I would only add long may the life of our President be spared, and may he preside over our annual meetings for many years to come, with all that vigour of mind and body in which we see him this evening. (Applause.)

The resolution was carried with applause.

The Right Hon. the EARL OF SHAFTESBURY, K.G., President.—Allow me to say that often as I have thanked you very sincerely for the vote you have just been pleased to repeat, you must allow me to observe that I really cannot see by what right I continue to occupy the position I have now the honour to hold. Unhappily for myself, I have not had the leisure to become a man of science, it would have given me much pleasure indeed to have devoted my heart and mind to studies that might tend to the benefit of the human race; but I have been called to another sphere, and have not had leisure except to pick up some of the knowledge obtained by others, and to enjoy it in such a way as might best advantage me. But to occupy my present position is, I think, a little beyond the right to which I might lay claim, and I have only this consolation: I was among the first who founded this Society. (Applause.) I remember that the first meeting we held was attended by about six persons. It was held in a back room in Sackville-street, where my good and excellent friend Mr. Mitchell delivered, not the "annual address," as it was the primary "address," and ever since then I have been connected with the Society. (Applause.) Then we were a small body, and new support was valuable; but now you have assumed gigantic proportions, quite capable of holding your own and keeping it against all the rest of the societies in London. I do not think I am fit to hold position, because there are men of vastly superior attainments, to whom the honour is more justly due. We were at the time I have spoken of entirely on the defensive, and I remember that the one great reason given for the foundation of the Society was that we wished to uphold and

obtain fair play for *revealed truth*. It was not that we wished to take up one party more than another; we wished to have *truth* fairly considered, and not overpowered by the great names attached to scientific societies. We would not allow young men to stand up and state opinions opposed to revealed truth without an effort to meet them. You have now, however, assumed an entirely different position. You have ceased to be on the mere defensive; you are on the aggressive, and the idea which occurred to me on hearing the address of the right rev. prelate was that Christianity is essentially aggressive in every aspect. (Hear, hear.) It is practically aggressive, spiritually aggressive, and if it is not aggressive it is quiescent and will do little or no good in the world. (Hear, hear.) I maintain that this Society has now assumed a position from which it may attack the stronghold of infidel science. It may hold its own before the rest in London. It has been the means of producing a series of volumes and a number of papers of the utmost possible value, which have brought it into relation with many countries in Europe, and with many great and enterprising minds in America. God grant we may have many such societies as this, who shall become a great ecumenical council—the highest order of ecumenical councils—and maintain the truth of God's Word, showing that the harmony of religion and science is as complete as that of the soul and body. (Hear, hear.) Having said this, and having thanked you for the way in which you have received me to-night, I have to ask you to consider very seriously whether some great and powerful name should not in future attach to the post I have the honour to occupy. (No, no.) My friends on my left have both alluded to the shortness of life, and, looking at it from that point of view, it is not likely that I can occupy this chair very long. I was reminded of this at a public meeting the other day by one who said: "We had better make the most we can of his lordship, as it is not likely we shall have much more of him." (Sensation.) All I can add is, that if I can be of any use to this Institute for another year, please God I may be spared, here I am. (Applause.) I am very much obliged to you.

[The members, associates, and their friends then adjourned, and refreshments were served.]

ORDINARY MEETING, JUNE 14, 1880.

H. CADMAN JONES, ESQ., M.A., IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced :—

LIFE MEMBER :—W. Peek, Esq., London.

MEMBERS :—The Rev. Prebendary W. Anderson, M.A., Bath ; Peter Redpath, Esq., Montreal.

ASSOCIATES :—Rev. A. Poole, Masulipatam ; Major MacGregor, 29th Regiment, Worcester.

Also the presentation of the following Works for the Library :—

“Proceedings of the Royal Society.”	<i>From the same.</i>
“Proceedings of the Royal Geographical Society.”	<i>Ditto.</i>
“Proceedings of the Royal Geological Society.”	<i>Ditto.</i>
“Proceedings of the Warwick Natural History Field Club.”	<i>Ditto.</i>
“Proceedings of the American Geographical Society.”	<i>Ditto.</i>
“Haeckel on Evolution of Man.” By Prof. Dawson, F.R.S.	<i>Ditto.</i>
“The Early Renaissance.” By Prof. Hoppin, D.D.	<i>Ditto.</i>
A Pamphlet. By the Rev. T. Kirkman, F.R.S.	<i>Ditto.</i>

The following paper was then read by the Author :—

*SOME CONSIDERATIONS ON THE ACTION OF WILL
IN THE FORMATION AND REGULATION OF THE
UNIVERSE.* BY THE RIGHT HON. THE LORD O'NEILL.

1. **T**O treat fully of this subject is a task which I have no idea of attempting. My only aim is to examine a few of the arguments lately promulgated by some physicists with a view to upset the doctrine held by Christians, that the Universe was first called into existence, and has ever since been governed, by a personal and conscious Deity. I have little hope of bringing forward anything that is not already familiar to the members of this Institution ; but for the sake chiefly of those outside who may read its publications, I feel it to be a great privilege to raise one more voice, however

feeble, in defence of our Faith, and contribute, as far as in me lies, to the refutation of an assertion which is frequently and with great confidence repeated in various quarters, that the scientific, and even the clerical, world is fast drifting into unbelief.

2. It would be my wish to keep aloof as much as possible from the personal, and to deal with arguments rather than with their authors. It will not be possible, however, entirely to avoid the mention of names; but when compelled to do so, I hope to say nothing that could give reasonable offence to any one.

3. Objections to believing that the Will of a Supreme Being is a factor in the changes and mutual interactions which take place among the various parts of the universe are generally founded on "the Reign of Law," this term, "law," being applied metaphorically to the physical world, whereas in its primary signification it is concerned with beings who can choose whether they will obey or disobey it, taking, of course, into account the consequences of obedience or disobedience. The term, as applied to physical results, is sometimes objected to as misleading; but, for my own part, I do not see why it should not be used, if we keep in mind the distinction between inanimate matter and beings endowed with will. When this distinction is overlooked, confusion may doubtless ensue. Now, granting a Creator (and on that subject I hope to say something presently), there is nothing in the prevalence of physical law that is not perfectly consistent with the belief that that Creator originally prescribed the laws, and now governs the world in accordance with them.

4. Dr. Tyndall, in his Address at the Midland Institute in Birmingham, in 1877, observes that while, in a variety of ways, we can distribute the items of a never-varying sum (the sum, namely, of the forces of nature), no creative power is placed in our hands. "The animal body," he says, "distributes, but it cannot create." In a masterly paper by Mr. Porter, the President of Yale College in the United States, read at this Institute on December 2nd, 1878, it is contended that the animal body has more than a distributive power over the forces of nature—that it has a power (of course within limits) of directing as well as distributing—of unlocking at pleasure the potential energy stored up in the nerves, which no mere machine can do. This is a circumstance which indeed appears to be fatal to Dr. Tyndall's doctrine that the animal body is a mere machine, but it need not prevent us from holding, with him, that whatever powers the animal body may possess, creative power at all events does not belong to it. And the

only remark I have to make upon this is, that our belief in the creative power of God is not affected by it in the slightest degree. No one would say that because man has no creative power, therefore God has none.

5. Again, Dr. Tyndall says, in the same address, that the principle of conservation of energy in nature "leaves no nook or crevice for spontaneity to mingle with the necessary play of natural force." Holding, as he does, that man can *distribute* force—that any one (to take his own example) can raise his arm whenever he chooses—he cannot but admit that *man's* will, at all events, is, or may be, concerned in the distribution of force. Does he mean, then, to deny to God a power which he concedes to man? Very possibly he does. For in so far as he has explained himself on the subject of the Deity, he appears to deny to Him personality, and therefore will. But we must take leave to differ with Dr. Tyndall in this matter until he offers some better proof than I, for one, have been able to find in his writings. Perhaps, however, there is a more recondite meaning in his assertion that there is no room for spontaneity in the play of natural force. He asserts that the animal body, including that of man, is a mere machine, and that the actions which seem to us spontaneous are really the result of movements in the brain produced by a physical necessity. This view has been satisfactorily disproved by many, and among them by the President of Yale College, in his paper already alluded to. But the only thing that need be said about it now is, that the arguments by which Dr. Tyndall supports it are altogether founded on material considerations, and lie in a field that is quite apart from the world of pure spirit, nor can they affect our views with regard to it one way or the other. It is true that Dr. Tyndall rejects the idea that there can be such a thing as pure spirit. "Divorced from matter," he says, in his Belfast Address, "where is life to be found? Whatever our *faith* may say, our *knowledge* shows them to be indissolubly joined." (*Belfast Address*, page 54, 1st ed.) But what is this "knowledge" which he says shows life to be indissolubly joined to matter? It is simply *ignorance*. All that can be said is that our senses do not give evidence of life not joined to matter. And this is ignorance, not knowledge. Believers in Revelation, however, have evidence of it in abundance, but of another kind. And whatever Dr. Tyndall may think, there may be more things in heaven at least, if not on earth, which are not dreamed of even in his philosophy. Christians, who hold that God is a spirit, can see nothing in "the play of natural force" to militate against the hypothesis of divine

spontaneity mingling with it, whether as creating or directing it. They who assume, with "the foolish body" mentioned in the Psalms, that there is no God—*i.e.*, no such God as Christians believe in—can, of course, allow to Him neither spontaneity nor any other attribute. But it is easier to make such an assumption than to prove it.

6. The law of conservation of energy, as recently established, is but a further instance of the reign of law to which the physical universe has been long known to be subject. Under the name of conservation of *vis viva*, it has been known, in a more restricted form, since the time of Newton; only it was supposed that in cases of collision *vis viva* was irrecoverably lost. Now it is believed that it survives in the form of heat. But how does this make it more difficult to believe in the action of spontaneity on the part of the Divine Being than it was before? We believed in the uniformity of the course of nature before this additional instance of it was brought under our notice; and the general uniformity of nature is that which is supposed by some to militate against the supposition that a Deity intervenes. "Has this uniformity ever been broken?" asks Dr. Tyndall, in his Birmingham Address. And he answers, "Not to the knowledge of science." This is, of course, a sufficient answer in Dr. Tyndall's mind, inasmuch as he acknowledges no other teacher than science. But even if science were our only teacher, its ignorance on this point would be no argument. That science does not know of any breach in the uniformity of nature, is a circumstance which surely does not prove that there has never been such. Science, at best, can reach no further than to the *existing* universe. It can tell us nothing about its commencement. It cannot even tell us whether it had a commencement or no. It will probably be admitted that the chief indications to be found on this subject are from geology, and these point to a commencement, at all events, of terrestrial life, in that the farther we go back in time the lower and fewer are the organisations found in a fossil state. And what greater break in the uniformity of Nature can be well imagined than the commencement of life? If terrestrial life had a commencement, there can be no great difficulty in believing that the whole universe had a commencement also.

7. It has been well observed by Mr. Eliot Howard, in a paper read before this Society on December 3, 1877, that science and faith part company at the first verse of the first chapter of Genesis, inasmuch as science knows nothing of a "beginning." Here another teacher than science enters upon the scene, and vouchsafes to us instruction in matters with

respect to which science is mute. It is the fashion with some scientists of our day to entirely ignore Scripture—to treat it as if it were so completely beaten out of the field as not to be worth even a thought. I fearlessly say that the Scriptures come to us with a strength of evidence and an authority so great, that no man has any right to ignore them, or to view them otherwise than as an important factor in forming his opinion on these subjects. The facts cannot be got rid of, that their teaching has civilized and elevated a great portion of mankind; that, taking in the whole time since Christianity was first introduced, the great majority in the most civilized countries of the world have received it as of divine origin; and that in that majority are to be found a Newton, a Leibnitz, a Euler, and a Descartes. With respect to Newton, Dr. Tyndall, in his Belfast Address, says, “that the very devotion of his powers, through all the best years of his life, to a totally different class of ideas, not to speak of any natural disqualification, tended to render him less instead of more competent to deal with theological and historic questions.” I think we may fairly ask, if this remark be justly applicable to Newton, what guarantee can Dr. Tyndall give that it is not also applicable to himself? It is a remark which is capable of being retorted. And I believe it will generally be thought that Newton was at least as good a theologian as Dr. Tyndall.

8. While on this subject, I would take the liberty of making a short quotation from Dean Mansel’s *Limits of Religious Thought*, in which are enumerated the topics which require to be well considered and weighed before any man can have a right to ignore the Scriptures. These are:—“The genuineness and authenticity of the documents; the judgment and good faith of the writers; the testimony to the actual occurrence of the prophecies and miracles, and their relation to the religious teaching with which they are connected; the character of the Teacher Himself, that one portrait which, in its perfect purity and holiness and beauty, stands alone and unapproached in human history or human fiction; those rites and ceremonies of the Elder Law, so significant as typical of Christ, so strange and meaningless without Him; those predictions of the promised Messiah, whose obvious meaning is rendered still more manifest by the futile ingenuity which strives to pervert them; the history of the rise and progress of Christianity, and its comparison with that of other religions; the ability or inability of human means to bring about the results which it actually accomplished; its antagonism to the current ideas of the age and country of its origin; its effects as a system on the moral and social condition of subsequent

generations of mankind ; its fitness to satisfy the wants and console the sufferings of human nature ; the character of those by whom it was first promulgated and received ; the sufferings which attested the sincerity of their convictions ; the comparative trustworthiness of ancient testimony and modern conjecture ; the mutual contradictions of conflicting theories of unbelief, and the inadequacy of all of them to explain the facts for which they are bound to account." (*Limits of Religious Thought*, p. 173.)

9. It would be interesting to know how many of those who ignore Revelation, or who undertake to pronounce Christianity a mere fable, have carefully, patiently, and candidly weighed all the matters here enumerated by Dean Mansel, before coming to the conclusion that Christ's teaching, and the teaching of the Bible about Him, is certainly untrue. I say "*certainly* untrue," because nothing short of absolute certainty could exempt from guilt the men who are persistently endeavouring to persuade mankind that the God in whom Christians believe does not exist. On the other hand, to look upon this as absolutely certain is to look upon themselves as infinitely better judges than the many equally renowned men who believe and have believed in a God that has vouchsafed to reveal Himself to man—an estimate of their intellectual powers and superior knowledge which will scarcely be endorsed beyond their own circle, however great those powers and that knowledge may be admitted to be.

10. But to return to our immediate subject. The argument against an intelligent personal Creator of the universe which seemed to be supplied by the extension of the principle of conservation of *vis viva* to the more general one of conservation of energy, may be supposed to assume some such shape as this,—*vis viva*, considered as mechanical, that is to say, as belonging to molar motion, may be lost. Two bodies devoid of elasticity, coming together by virtue of their mutual attractions, are both deprived of sensible motion provided their masses are equal. Until comparatively lately it was supposed that in such a case the motion was entirely lost, and therefore a force banished from the universe. And if a force can cease to exist, there is no reason why a new force might not be originated, as was formerly supposed to be the case when a limb was put in motion by an exercise of the will. But it is now found that the motion extinguished in the collision of two equal non-elastic masses survives in the heat which immediately pervades them, and which is caused by, or rather consists in, a rapid motion of their molecules. And the connection of this molecular motion with the previous molar motion is brought

into the strongest light by the quantitative relation existing between them, which is expressed by saying that *a weight of one pound, falling through a height of 772 feet, generates an amount of heat sufficient to warm a pound of water one degree Fahrenheit, and that in lifting the weight so much heat exactly disappears.*

11. My main object being to make it appear that the new doctrine of conservation of energy does not conflict with the belief that a personal Deity is the Creator and Director of the universe, it would be out of place, as well as beyond the limits of my knowledge, to call in question that doctrine itself. It may be as well, however, to mention that the quantitative relation between molar and molecular motion is not yet looked upon by all scientific men as indubitably proved. Mr. Porter, President of Yale College, to whose paper I have already more than once alluded, says in p. 85 of that paper:—"We question very much, indeed, whether the experiments have been conducted with mathematical exactness, or whether the laws have been formulated with scientific precision, or, as Tyndall phrases it, whether 'the inter-dependence' between the several factors has 'become quantitative—expressible by numbers.'" We may let this pass, however, as having little or no bearing upon religion, if the view I would advocate be correct. What I would at present observe is, that the argument derived from the principle of conservation of energy, as extended to molecular motion, will be found, when duly examined, to leave the belief in a Creator and Director of the universe altogether untouched. That principle, granting it to be established, shows that in the universe, *as constituted*, energy is neither lost nor gained. *Kinetic* energy may be, and constantly is, either diminished or increased. But when it is diminished, the quantity deducted is stored up as *potential* energy, while its increase is accompanied by a corresponding deduction of potential energy, so that the sum of the two, *i.e.* the total of the energy existing, remains unaltered. This, under the name of conservation of *vis viva*, has been known, so far as molar motion is concerned, since the days of Newton, as already observed. But I am not aware that it was ever looked upon as strengthening the arguments of unbelievers derived from the general uniformity of nature. Why, then, should the extension of the same principle to molecular motion be so looked upon? It is only another instance of that general uniformity of inanimate nature which was already fully acknowledged. If it was thought previously that man could originate force ("*creation* of force" is, I believe, rather a new expression), I am not aware that this was ever looked

upon as an encroachment on the province of the Deity as Creator of the world. Still less could the extinction of force be so looked upon. But however this may be, the true inference from the application of the principle to molecular motion is, that *man*, and *à fortiori* other animals, cannot originate or extinguish force, or (if the expression be better liked), cannot create or annihilate it; but not that *God* has no such power. Before the latter inference could be drawn, it must be assumed that there is no Creator, which is the actual question in dispute. And this is, in fact, the assumption which underlies all the arguments against belief in a personal Creator that are founded upon the uniformity of nature.

12. Dr. Tyndall, in his Belfast Address, calls the will of a Deity, *caprice*; which, with those who do not exercise much thought, might pass for an argument. In this meeting it is unnecessary to say that Christians do not ascribe caprice to the God in whom they believe. They hold that "the Judge of all the earth will do right"—will act on principles of right and justice. They believe, with St. Paul, that in justifying repentant sinners, He does not act on a mere impulse of mercy, but that He is both "just, and the justifier of him which believeth in Jesus" (Rom. iii. 26). And St. Paul says again: "Is God unrighteous, who taketh vengeance? God forbid; for then how shall God judge the world?" (Rom. iii. 5, 6). That is to say, He punishes, not for the mere gratification of His anger—in other words, not from caprice—but on principle, and with a regard to justice. The assertion, therefore, of Dr. Tyndall, that "science demands the radical extirpation of caprice," may be assented to. But it is a glaring fallacy as applied to the God of the Christian. Dr. Tyndall asserts throughout—asserts, but, so far as I can see, never proves—that science leaves no room for will. Nature, he says, is uniform, therefore will is excluded. Here we have a major premise and a conclusion; but where is the minor premise? By his own admission, the will of man can interfere in the distribution of the forces of nature. This he can do by the power which, within limits, he has over matter: and his power over matter external to himself is exerted through his bodily movements, and these movements are effected by the efforts of his will. Thus, in the last resort, material forces are distributed through the power of mind over matter. And if the mind of man has power over matter, much more may the Divine mind have such power. This *à fortiori* argument can only be met by denying that there is a Divine mind—the *petitio principii* already referred to. Thus it is, I think, fairly made out that there is no reason to ques-

tion the power of God to interfere in the *distribution*, at least, of natural force. To question this would be to question either His existence or His superiority to man, who, it is admitted, can do the same. And if God can exert a power thus far over matter, who shall undertake to say it must stop there? who shall deny to Him a creative, as well as a distributive, power over it? They only who assert that creation is in itself impossible—an assertion which we have to consider presently.

13. In the mean time I venture to quote the words of the Bishop of Edinburgh (Bishop Cotterill) in a paper read before this Institute on February 4, 1878, in which he endeavours to show that Will *must* have played a part in bringing about the present state of the universe. Referring to Mr. Herbert Spencer's account of the doctrine of evolution, which sets out from the hypothesis that all matter was once homogeneous, the Bishop observes:—"Something must have determined the variety of forces; it cannot have arisen from the mutual action of the parts, for the structure is by supposition homogeneous. If the universe should be supposed infinite and homogeneous, and, for example, the forces acting on it the mutual attraction of each particle, every particle would then be acted on by equal and opposite forces, and no change whatever could take place. If it were finite, the only effect could be the concentration, and, so to speak, the crystallization of the whole mass. The variety of nature necessarily implies the introduction of some other element besides that of uniform law. One arrangement may by its heterogeneity of structure and its different forces be developed into another yet more varied, with nothing but law to direct it; but that which is homogeneous can never become varied by law alone. Variety itself thus points to a higher origin than law."

14. If we assume that the shape of the homogeneous mass was spherical, which seems the most natural supposition, this reasoning seems quite conclusive. A homogeneous structure, whether infinite or finite, could, on that supposition, never become differentiated by any inherent power of its own. If infinite, it must be *in equilibrio*, and there would be nothing to disturb its equilibrium. If finite, it would, supposing attractive forces to prevail, concentrate itself through the mutual attraction of its parts, or (if repulsion should prevail) would disperse itself through space, but still there would be nothing to differentiate one part from another. The fact, therefore, that they *are* differentiated proves that something more than mere law has acted upon them; and what can this be but Will?

15. In fairness, however, we should not overlook Mr.

Herbert Spencer's account of the causes which, as he conceives, produce differentiation in a homogeneous aggregate. He enumerates, in his chapter on the instability of the homogeneous, several examples of it both from mechanics and from chemistry. It is not necessary to follow him through those examples; but if I do not mistake, they all seem to me to be chargeable with one notable defect, namely, that they all presuppose a differentiation of some kind, and therefore are not cases of a departure from a primitive homogeneous state at all. For instance, in the case of water in a state of complete quiescence, and of equal density throughout (supposing this possible), he says: "The radiation of heat from neighbouring bodies, by affecting differently its different parts, would inevitably produce inequalities of density and consequent currents; and would so render it to that extent heterogeneous." But surely the radiation of heat from neighbouring bodies presupposes, first, that there are bodies separate, and therefore differentiated, from the water; and secondly, that these bodies are hotter than the water—another differentiation. And again, he instances the oxidation of metal when exposed to air or water as an example of the change from homogeneity to heterogeneity. But this again presupposes a difference already existing between the metal and the air or water which acts upon it. The same defect seems to run through all his examples: but inasmuch as he afterwards gives a general explanation as applicable to every case, we need no longer delay upon the particular examples, but proceed to consider that general explanation. His words are these:—"The instability thus variously illustrated is obviously consequent on the fact that the several parts of any homogeneous aggregation are necessarily exposed to different forces—forces that differ either in kind or amount; and being exposed to different forces they are of necessity differently modified. The relations of outside and inside, and of comparative nearness to neighbouring sources of influence, imply the reception of influences that are unlike in quantity or quality, or both; and it follows that unlike changes will be produced in the parts thus dissimilarly acted upon."

16. Here Mr. Spencer divides these supposed forces into two classes: those that differ in kind, and those that differ in amount. It is at once evident that in a homogeneous whole there could be no forces differing in kind, for the simple reason that if there were the aggregate would not be homogeneous. For the same reason there could be no forces differing in amount, except from differences of distance. Bishop Cotterill says, in the paper lately referred to, that if we sup-

pose the homogeneous universe to have been infinite, no change could take place in it, because all the forces would neutralize each other. Mr. Herbert Spencer says the same thing (p. 429), and for so far there is no difference between them. The only hypothesis, therefore, about which a question can arise is that of a finite homogeneous universe. In such a case there would not be equilibrium; but supposing attraction to prevail, a general tendency to concentrate. If the shape be supposed spherical, and the force the attraction of gravitation, the tendency of each particle would be to move in a straight line towards the centre. For if the sphere were divided into two parts, one of which is a smaller sphere, whose radius is the distance of the particle from the centre, and the other a spherical shell surrounding that smaller sphere, this outer shell would exert no effective attraction on the particle, as is well known, and the inner sphere would attract it towards the centre in the same way as if the attractive powers of all its particles were collected at that point. The latter, then, being the only effective force acting upon each particle, the tendency of all would be to move in straight lines towards the centre of the universe. Thus Bishop Cotterill's observation, that the only effect would be the concentration of the whole mass, is strictly true on these two hypotheses, namely, that the universe, when homogeneous, was of a spherical shape, and that the only force exerted on the particles was that of gravitation. If the shape be supposed irregular, or if other forces following different laws from that of gravitation be supposed to have acted, differentiation to a certain extent might follow through the play of natural force, and without the intervention of will. But such suppositions as these are perfectly gratuitous; and it is evident that in making them at all we are out of our depth. If we suppose the universe to have been created homogeneous, we thereby acknowledge a Creator, and the intervention of will; if, on the other hand, we suppose the universe to have existed from all eternity, to speculate upon its original shape or nature involves an evident contradiction; for how could it have an original nature or shape if it had no origin? Seeing, then, that the effect of making suppositions on such subjects is to involve us in contradiction and uncertainty, the safest and most rational course seems to me to be to accept the biblical account of the origin of the heavens and of the earth, which, to say the least, is not less probable in itself than any other conjecture which philosophers have ventured upon, and which, moreover, has come down to us with a warrant and an authority which no man has a right to despise.

17. But to go back for another moment to the observations of Bishop Cotterill on Mr. Spencer's view respecting the original homogeneity of the universe. I have said that on the supposition that its shape was spherical, and gravitation the only force acting on its particles, the Bishop's conclusion would be correct, viz., that nothing but will operating upon it could have produced the variety which it now exhibits. But inasmuch as it is impossible to prove the correctness of these suppositions, we are not warranted in asserting that will *must* have acted. All that I have undertaken to show, and all that need be shown is, that will *may* have acted; in short, that Dr. Tyndall has no ground for his assertion that no nook or crevice is left for spontaneity. For this it is sufficient that the universe, if it ever was homogeneous, *may* have been spherical in shape at the same time, and that the force or forces acting on its particles *may* have observed the same law as that of gravity. In truth, I believe we might go much further, and say that if the universe was once homogeneous and finite, it is not only possible, but highly probable, that it was at the same time of the shape and nature here supposed, and therefore proportionally probable that the variety now existing has been the result of will. The fact more than once alluded to by Mr. Spencer that nebulous matter precipitated from a resisting medium would acquire a rotatory motion which would lead to further changes need not be considered in this connection, inasmuch as precipitation necessarily presupposes two different kinds of matter, the precipitant and the precipitate, whereas our present hypothesis is that only one kind of matter was in existence.

18. I had occasion, near the commencement, to allude to Professor Tyndall's denial of free-will to the human race, but it would carry me beyond the limits which I have assigned to myself were I to enter upon that subject, however interesting in itself. My object is to make it appear that the chief arguments made use of to the effect that there is no room for the operation of the Divine Will are without foundation; and I only mentioned human will for the purpose of observing that the arguments against its freedom being drawn from material considerations are wholly inapplicable (be they sound or unsound) to a pure spirit, such as we Christians believe our God to be. We are, therefore, at liberty to describe the will of God as "spontaneity," whatever we may think of the will of man.

19. In reference to the will of the Deity acting on matter, it will not be irrelevant to state what my friend, Professor Jellett, of Trinity College, Dublin, in his Donnellan Lectures

for 1877 on the *Efficacy of Prayer*, specifies as the essential difference between a miracle and an ordinary occurrence. According to him it is this—"that in the case of a miracle there is an immediate transition from a volition to an external result." By an external result he means a change external to the being or person by whom it is caused. Such a change cannot be effected by man except through the movements of his own body, caused by an exertion of his will ; and a change so effected, however wonderful, is not a miracle. But we believe that an exertion of the Divine Will can produce results without any corporeal intervention ; and when such is the case, the result is properly called a miracle. To use Professor Jellet's own words—"You cannot cause a pebble to rise from the ground, however earnestly you may desire it, without the intervention of your body ; you cannot affect the mind of your fellow-man, however strongly you may will it, without the intervention of your body. Thoughts the most burning, until they are clothed in words, or find some other bodily expression, have no power beyond the individual in whose heart they are formed. So it is with the work of man. But it is otherwise with the work of God. There a mental antecedent *is* followed by an immediate external consequent" (*On the Efficacy of Prayer*, p. 39). And again he says :—"Notwithstanding some asserted phenomena (meaning, we may presume, those of mesmerism), it does seem to be a natural law that man's will, without the intervention of man's body, is powerless upon the external world. But we have no right to extend this law to the Divine volitions ; nor, indeed, could we do so consistently with any system of Theism which prescribes action at any time to the Divine Being. If a divine volition cannot be followed by an external consequent, it is hard to see how the Deity, unless corporeal, can act at all, or could have acted at any time. Only an Epicurean theology would be possible under such a limitation" (*Ib.*, p. 56).

20. We have now to consider Mr. Herbert Spencer's arguments against the doctrine that there is a personal and intelligent Creator of the universe. He ultimately reduces them all to one, namely, that founded upon the persistence of force ; but as he first gives them separately, it will be most convenient to take them in the order in which he has laid them down in *First Principles*. They are chiefly founded on :—1. The implied self-existence of the Creator. 2. The Indestructibility of Matter. 3. The Continuity of Motion. 4. The Persistence of Force (Part I., p. 31, and Part II., chapters 4, 5, and 6). Speaking of creation by external agency, he makes the following preliminary remark :—"Alike in the rudest creeds and in the cosmo-

gony long current among ourselves, it is assumed that the genesis of the heavens and the earth is effected somewhat after the manner in which a workman shapes a piece of furniture" (p. 35). As holding the belief of a Christian I must protest against this statement as unfair. No assumption whatever is made by those who receive "the cosmogony long current among ourselves," viz., the account contained in the Book of Genesis, with respect to the manner in which the universe was called into existence. And if they did make any such assumption it certainly would not be the one specified by Mr. Spencer in this passage. Their belief is that Creation took place in a manner which, whatever it may have been (for this they do not profess to know), was at any rate *totally unlike* that in which a workman shapes a piece of furniture. I cannot, in exposing the unfairness of such a representation of the belief of Christians, use clearer language than that of Mr. Spencer himself, who writes thus in the very next page with respect to it:—"Though it is true that the proceedings of a human artificer may vaguely symbolize to us a method after which the universe might be shaped, yet they do not help us to comprehend the real mystery, namely, the origin of the material of which the universe consists. The artisan does not make the iron, wood, or stone he uses, but merely fashions and combines them. . . . The production of matter out of nothing is the real mystery, which neither this simile nor any other enables us to conceive; and a simile which does not enable us to conceive this may just as well be dispensed with." True, it may as well, nay, *ought* to be dispensed with. Only instead of believers in "the current cosmogony" being called on to dispense with it, it is *they* who are entitled to call on their opponents to dispense with it as representing their belief. The simile has been used not by believers, but by their antagonists, in order to turn the doctrine of Creation into ridicule, and on the part of believers I would take this opportunity of distinctly repudiating it. I do not mean to accuse Mr. Spencer of intentional unfairness. He may not have been the original inventor of the simile of the human artificer. It has served Dr. Tyndall also more than once as a weapon of attack upon the Christian religion, especially in his Belfast Address. But with whomsoever it may have originated, Mr. Spencer's own remarks, just quoted, ought to have saved him from so misrepresenting the Christian doctrine of Creation.

21. After the little prelude which we have had under consideration, Mr. Spencer proceeds to something which looks more like an argument, although I hope to make it appear that

it is not a conclusive one. "Those," he says (p. 35) "who cannot conceive a self-existent universe, and who therefore assume a creator as the source of the universe, take for granted that they can conceive a self-existent creator. . . . But they delude themselves." That any thing or being should be self-existent he had a little before pronounced to be impossible, because inconceivable. His words are (p. 31): "Self-existence . . . necessarily means existence without a beginning; and to form a conception of self-existence is to form a conception of existence without a beginning. Now, by no mental effort can we do this. To conceive existence through infinite past time implies the conception of infinite past time, which is an impossibility." Surely, the weakness of this argument is at once apparent. It contains the latent assumption that whatever we are unable to conceive is in itself impossible—an assumption whose falsity is nowhere more clearly brought out than in the present instance. For if we are unable to conceive infinite past time, we are just as unable to conceive finite past time; and if the argument were sound in the one case it would be equally sound in the other—that is to say, if infinite past time be impossible, because inconceivable by us, finite past time is impossible for the same reason. Therefore past time is neither finite nor infinite, which is a glaring contradiction. Mr. Spencer's argument against self-existence, and so against a self-existent Creator, being thus, as I believe, shown to be fallacious by its involving a contradiction, the objection to the universe having been created by external agency, which he has built up upon it, falls to the ground.

22. Mr. Spencer's next argument against the doctrine that the universe was created is derived from the supposed indestructibility of matter. This he calls a "physical axiom." But if we adopt his description of physical axioms, we must, I think, arrive at the conclusion that these are different from all other axioms, or rather, that they ought not to be called axioms at all, but should be denoted by a different word. An "axiom" is generally the word used to express a self-evident proposition—a proposition so evident that (according to the etymology of the word) an opponent in argument has a right to *demand* assent to it. But physical axioms, according to Mr. Spencer, are of quite a different character. He describes them as follows:—"There are necessary truths in physics, for the apprehension of which . . . a developed and disciplined intelligence is required; and before such intelligence arises, not only may there be failure to apprehend the necessity of them, but there may be vague beliefs in their contraries. Up to comparatively recent times, all mankind were in this state

of incapacity with respect to physical axioms, and the mass of mankind are so still. . . . But though many are incapable of grasping physical axioms, it no more follows that physical axioms are not knowable *à priori* by a developed intelligence than it follows that logical relations are not necessary because undeveloped intellects cannot perceive their necessity" (p. 176 of *First Principles*).

23. Now I venture to think that, in this passage, Mr. Spencer overlooks the distinction between "necessary truths, knowable *à priori*," and "axioms." Many truths are knowable *à priori* which, so far from being self-evident, require a long series of arguments to satisfy the mind that they *are* truths. To call such *à priori* truths axioms seems a new and misleading application of the latter term. The 47th Proposition of the first book of Euclid is a necessary truth, knowable *à priori*, and therefore is an axiom in Mr. Spencer's sense of the word; yet so far from its being self-evident, forty-six propositions have to be proved (after the axioms have been stated) before the intellect can have become sufficiently "developed and disciplined" to see its necessity. Much more is this the case with the more advanced truths of geometry. Surely then we are justified in asserting that physical propositions which "all mankind" (including the most learned) were incapable of seeing until recently, and which the mass of mankind are still unable to recognise, even when plainly set before them, have no pretension to be classed under the head of axioms. The importance of this remark will be seen in the sequel, when we shall have to consider propositions which are propounded as possessing the two characteristics of axioms, namely, self-evidence and incapability of proof, but which in fact only possess the latter.

24. One of these physical axioms (to use Mr. Spencer's phraseology) is the indestructibility of matter. He says (*First Principles*, p. 177): "Conceive the space before you to be cleared of all bodies save one. Now imagine the remaining one not to be removed from its place, but to lapse into nothing while standing in that place. You fail. The space which was solid you cannot conceive becoming empty, save by transfer of that which made it solid." Now, the only way in which I, as an individual, can reply to this argument is by saying that my intellect is not sufficiently "developed and disciplined" to be able to recognise this as a physical axiom. Mr. Spencer would, no doubt, say that this is owing to my having imagined, previous to the attainment of better scientific information, that bodies could be in great part annihilated by combustion, or that water could be made to boil

away by the application of heat sufficiently great for a time sufficiently long. He would probably say that my mind had become familiarized to the idea by the apparent destruction undergone by matter in circumstances of this kind. But what circumstances could familiarize the mind to the negation of an axiom? What circumstances could make any man believe that quantities equal to the same thing are unequal among themselves? or that four and one added together could result in any other number than five? Nothing, in short, can familiarize the mind to the denial of an axiom.

25. That there is something inconceivable about the annihilation of matter may be conceded. But I think it will be found, on examination, that it is not annihilation itself that is inconceivable, but the manner of it. That the thing itself is not inconceivable seems sufficiently manifest from the fact that the scientific world in general (with but few exceptions) has always believed that God could both create and annihilate. I say "but few exceptions," because I believe that even now a very goodly portion of our men of science recognise a personal Creator of the universe, notwithstanding some very confident assertions to the contrary. Witness the many men of scientific renown who belong to this Society, if there were no others. To say, therefore, that the creation and annihilation of matter are in themselves unthinkable is to pay but a poor compliment to such men. But I believe it to be quite true that we cannot conceive *how* this could take place; and I cannot help strongly suspecting that they who rely so much on the argument from inconceivability frequently confound these two ideas.

The action of gravitation through space is inconceivable, and yet it is an undoubted reality. Mr. Spencer has himself shown (*First Principles*, p. 60) that the hypothesis of its acting by means of an æther which extends throughout space brings us no nearer to a conception of the mode of its action, because the æther itself must be supposed to consist of atoms infinitely small in comparison to the intervening spaces; otherwise it would not be imponderable. "Instead then," (he goes on to say,) "of a direct action by the sun upon the earth without anything intervening, we have to conceive the sun's action propagated through a medium whose molecules are probably as small, relatively to their interspaces, as are the sun and earth compared to the space between them; we have to conceive these infinitesimal molecules acting on each other through absolutely vacant spaces which are immense in comparison with their own dimensions. How is this conception easier than the other? We still have mentally to

represent a body as acting where it is not, and in the absence of anything by which its action may be transferred ; and what matters it whether this takes place on a large or a small scale?" Now, taking into account, what all must admit, that the action of gravity at a distance is an undoubted fact, notwithstanding that the mode of its operation is inconceivable by us, it appears that the creation and annihilation of matter may also be real facts, although we are unable to form a conception of the *how*.

26. But not only the inconceivability of the manner in which a circumstance takes place, but the inconceivability of the circumstance itself, may be quite consistent with its possibility. For this we need go no further than the fact noticed a short time ago, that finite and infinite time are both alike inconceivable, and yet one or the other, if not both, must necessarily be a reality.

27. Mr. Spencer's third argument is founded on the continuity of motion. "Like the indestructibility of matter," he says, "the continuity of motion, or, more strictly, of that something which has motion for one of its sensible forms, is a proposition on the truth of which depends the possibility of exact science" (p. 180). Then, after instancing the movements of the planets, whose velocity, though variable, owing to the ellipticity of their orbits, preserves a constant mean value, as also the vibrations of the pendulum, which, "with speed now increasing and now decreasing, alternates between extremes at which motion ceases," he asks, "What, then, do these cases show us in common? That which vision familiarizes us with in motion, and that which has thus been made the dominant element in our conception of motion, is not the element of which we can allege continuity. If we regard motion simply as change of place, then the pendulum shows us both that the rate of this change may vary from instant to instant, and that, ceasing at intervals, it may be afresh initiated. But," he adds, "if what we may call the translation-element in motion is not continuous, what is continuous? If, watching like Galileo a swinging chandelier, we observe, not its isochronism, but the recurring reversal of its swing, we are impressed with the fact that though, at the end of each swing, the translation through space ceases, yet there is something which does not cease; for the translation recommences in the opposite direction. . . . The truth forced on our attention by these facts and inferences is, that the translation through space is not an *existence*; and that hence the cessation of motion, considered simply as translation, is not the cessation of an *existence*, but is the cessation of a certain

sign of an existence—a sign occurring under certain conditions” (pp. 183, 184). He then explains the difficulty about the principle of activity continuing at the extremities of the vibration, although at those points the pendulum would offer no resistance to the hand, by observing that its activity is then latent, as proved by the fact that it forthwith begins to pull in the opposite direction; and adds, “Here, then, is the solution of the difficulty. The space-element of motion is not in itself a thing. Change of position is not an existence, but the manifestation of an existence. This existence may cease to display itself as translation; but it can do so only by displaying itself as a strain. And this principle of activity, now shown by translation, now by strain, and often by the two together, is alone that which in motion we can call continuous” (p. 187). Without further quoting Mr. Spencer’s words, the conclusion at which he arrives at length is, that the continuity of motion is known to us really in terms of force, and that the principle of activity just described involves the postulate that the quantity of force is constant. This force, in the case of the planets, is the sun’s attraction, and in that of the pendulum it is the earth’s attraction. There is a very short formula to be found in elementary works on dynamics, occupying not so much as one line on the page, which, unless I greatly mistake, teaches very concisely all that Mr. Spencer has here said. It shows, when closely examined, at what parts of its path the motion of a body acted on by any force increases or diminishes, at what points it attains a maximum or a minimum, where it changes its direction, and, if it ever ceases, at what part of its path it does so. It also shows that its kinetic and potential energies are complementary, and make up together an unvarying sum, and that all this can be true only on the supposition that the coefficient of the quantity expressing the force remains constant throughout.* That coefficient, in the cases brought forward as examples, is the gravitating force exerted by the unit of mass at the unit of distance, and is, in fact, that “existence,” or “principle of activity,” which, as Mr. Spencer expresses it, “is alone that which, in motion, we can call continuous.” The upshot of it all then is, that the sun’s attracting power, in the case of the planets, and the earth’s attracting power in the case of the pendulum, are assumed to undergo neither increase nor diminution during the time that the bodies respectively affected by them are the subject of observation or calculation. The ground of this assumption has now to be considered;

* See Appendix.

which brings us to Mr. Spencer's fourth and last great argument against creation, derived from the persistence of force.

28. This principle he describes as "the ultimate of ultimates" (p. 169). It cannot be proved experimentally, because this could only be done by weighing or measuring, in which processes it must be assumed, before any result can be relied upon, that both the force of gravity and the quantity of the matter which constitutes the weight, remain unaltered. Neither can it be proved *à priori*, because it is the most general of all principles, and while it comprehends all other principles, is itself contained in none (*First Principles*, pp. 192 B and 192 C, 3rd ed.). Since, then, it cannot be proved either experimentally or *à priori*, it must, he argues, be an axiom. Now, what I have already said about the alleged axiom that matter is indestructible applies equally to this. I cannot myself see it to be an axiom, because I persuade myself that I can very well conceive its contradictory to be true. I can conceive terrestrial gravity to diminish, just as I can conceive the caloric resident in a heated body to diminish by radiation. It is generally believed that solar heat is gradually diminishing from that cause. Why, then, should it be inconceivable that solar or terrestrial attraction might in some similar way diminish? Let it be remembered that the question before us is not whether this be a fact or no, but whether it is *thinkable*—whether it can be mentally pictured; for if it can, its contradictory is not an axiom. As to the fact, Professor Challis has shown that gravitation can be accounted for on the hypothesis of a reaction of the atoms of which matter is composed against æthereal pressure. If that be the actual cause of it, it appears to me that the attraction of any particular mass, such as the sun or the earth, would not diminish or increase, because, according to his theory, the atoms always continue to be of the same size and shape (being absolutely incompressible), and there seems to be no reason why the pressure of the æther upon them, and consequently their reaction against it, should alter. But whether this be so or not, the contrary is as conceivable as it is that heat should radiate. It should be observed that the theory of Professor Challis, although it is, if true, an important advance in hydrodynamical science, does not in the least vitiate what has been said by Mr. Herbert Spencer as to the inconceivability of the *manner* in which gravitation acts, owing to there being always intervals between the atoms of the æther. Professor Challis distinctly says of this æther, that it is "itself atomically constituted" (*Transactions of the Victoria Institute*, vol. XII., p. 7); and more fully he says in the

Philosophical Magazine for September, 1876 (p. 173), "The æther, being assumed to be susceptible of variation of density, must be conceived to be atomically constituted, because we have no experience of variation of density and pressure which is not the result of atomic constitution. But for the purposes of physical research, it suffices to regard the æther as a *continuous* substance, and apply calculation to it as such, just as the air is treated mathematically in hydrodynamics, although it is known to be composed of discrete atoms." Thus, Professor Challis, while treating the æther as continuous for convenience of calculation, declares that it, in fact, consists of discrete atoms, like the air. There is, therefore, nothing in the view adopted by him which at all militates against Mr. Herbert Spencer's remark, that by supposing the intervention of an æther we are brought no nearer to the conception of action at a distance than we were without that supposition, because the atoms of the æther itself are at distances from each other which are very great when compared with their magnitude. Since, then, we cannot conceive any mode by which gravitation produces its effects, surely it would be taking a great deal upon us to accept it as an axiom that its amount can never vary. Unless we knew its mode of action, we could not possibly assert this even as a fact, much less as an axiom. If we did not know it to be a fact that a heated mass gradually loses its heat, it seems to me that there would be quite as much reason in pronouncing upon the invariability of its heat as upon that of its attracting power. If one power of matter can be subject to variation, why not another; especially when both are believed to act through the same medium, viz., the æther?

29. It might perhaps be said in reply, that even the supposition of a gradual diminution of the attracting power of the sun or the earth would not be inconsistent with the persistence of force, because that power might be dissipated, as heat is believed to be dissipated, but never actually lost. But the question which is now being dealt with is the persistence, or rather the invariability, of the attractions of the sun and of the earth upon bodies to which their attractive force can reach; for it is by examples drawn from these that Mr. Spencer illustrates his principle. To admit that these forces may be dissipated would be to admit that the conservation of energy is not an established principle; for then the kinetic and potential energies of a planet or of a pendulum would not be complementary, the unit of force which is assumed in dynamical calculations to be constant being no longer so. Thus, Mr. Spencer's principle of the persistence of force would not only

cease to be an axiom, but would be actually untrue. The supposition, therefore, that the force is dissipated in the cases which we have been considering, so far from favouring Mr. Spencer's view, would be fatal to it. It would assume that the attractions of the sun and of planets may alter, whereas Mr. Spencer's position is that they cannot alter, for that if this were supposed possible all dynamical calculations and all astronomical predictions would be uncertain.

30. But it may be asked—Why, then, is the constancy of the unit of force so confidently assumed, if it be true that it is not an axiom, and yet that it cannot be proved either *à priori* or by experiment? The answer is, that there are various kinds and degrees of proof; and there are degrees of probability which amount practically to certainty. Most of us must remember the instance given by Bishop Butler of this very high degree of probability, viz., the confident expectation entertained by all that the sun will rise to-morrow. No proof of this can be given which would lead to absolute certainty, and yet all our arrangements for the future are based on the assumption that each day will be like those which precede and follow it. Mr. Spencer would say that this necessarily follows from the persistence of force, which causes the earth to revolve uniformly on its axis. But as the persistence of force is the principle actually under discussion, we cannot accept it as demonstrating to an absolute certainty the recurrence of a terrestrial day. We are practically certain of such recurrence, but we have not the certainty of demonstration. Now, I believe that we have a similar kind of certainty of the persistence of force, derived from our experience, which enables us to assume for practical use the consistency of the unit of force, and to believe that it neither has varied nor will vary in the course of any time with which we have to do, unless it should at any time seem good to the great Creator of all things to alter or annihilate it. And this I believe for the following reasons:—

31. Force is known in dynamical reasoning simply as a commencement or change of velocity, the mass remaining the same. Metaphysically, we believe that every change has a cause; and, therefore, that when the velocity of a moving body commences or changes, there must be some cause for the change, and to this unknown cause we give the name "force." But this cause does not enter into the mathematical process. All that is there taken account of is the velocity, or change of velocity, produced in a given time. Now, since velocity is a function of time and space, and force is a function of velocity and time, the elements, and the only elements, whereby we

can judge whether a force varies or no are time and space. If we can ascertain that the portions of each of these, in which a certain amount of velocity is produced, are equal, we are entitled to say, in Mr. Spencer's language, that the force has persisted. Now, this is to be ascertained by measurement. Space is measured by a bar (we will suppose) of a certain length, and time by the vibrations of a pendulum or balance. If two portions of space are covered successively by the measuring bar, we say they are equal; and if two portions of time are occupied successively by a vibration of the pendulum or balance, we say they are equal. In doing so, however, we assume that the bar has not altered in length between the two space-measurements, either by extension or compression, or by gain or loss of matter; and that the force of gravity, or the elasticity of the springs (according as a clock or a watch is used), has not altered between the two time-measurements. What, then, is our ground for these assumptions? Not, surely, that such variations are inconceivable; for I persuade myself that I, for my own part, can very well conceive them, if a sufficient cause were to occur; but, in the first place, because we know of nothing to cause these quantities to vary, which makes it at least very probable that they did not vary between the two measurements; and in the next place, because bars of different materials and different degrees of compressibility could not give (as they do) the same result in the successive measurements unless their length were invariable; and the improbability, on any other supposition than that of the constancy of the forces, that a clock and a watch should give the same result in successive trials (the former being acted on by gravity, and the latter by forces quite independent of gravity, viz., the main and balance springs) is next to infinite. Greater still is the improbability that variations in both these standards of measurement (the space-standard and the time-standard) should take place together, and in such proportions that it should be impossible to detect the slightest difference in the total effect.

32. It is by reasoning of this nature that I, for my own part, have convinced myself that force is persistent, and not from any inherent impossibility that it should be otherwise. I am reluctantly obliged to instance my own power (or rather powerlessness) of mental conception in this matter, because when we are called upon to admit any proposition to be an axiom, the appeal is to each man's understanding, and to that alone. And unless I much mistake, I am not the only person in the world who cannot see the axiomatic character of the principle of the persistence of force. Granted a sufficient

cause, such as the will of a Creator, and there are, I am sure, many who will see no absurdity in the supposition that the unit of force might be altered, however certain they may feel, from experience, that it has undergone no change since the universe was formed. Mr. Spencer, it is true, looks upon the hypothesis that the universe was ever formed as itself inconceivable, because it is equally inconceivable with that of the destructibility of matter. This view has, however, I should hope, been already sufficiently considered in this paper, and I need not go back upon it.

33. If this principle of the persistence of force, which, according to Mr. Spencer, is the ultimate of ultimates, not only including the indestructibility of matter, the conservation of energy, and the equality of action and reaction, but extending to all circumstances, historical, moral, and social—if, I say, this principle be not an axiom (as I hope has been shown), the great argument of that writer against belief in a personal Creator of the universe falls to the ground. Hence the vast importance of carefully examining into the alleged axiomatic character of the principle. The foregoing considerations have reference chiefly to force in the ordinary sense of the word, *i.e.* dynamical force; partly because it is the kind of force on which I have bestowed the greatest amount of thought, but chiefly because all that the author says about historical, moral, and social forces is professedly deducible from the dynamical principle (*First Principles*, p. 429, edit. 1875), and therefore must stand or fall with it. I am quite prepared to have many defects, and even errors, pointed out in what I have said. I can sincerely assert that I have ventured upon the foregoing remarks with the utmost diffidence, at the kind request of our Secretary, and shall thankfully accept any corrections or criticisms that may be made upon them. But whatever errors I may have committed in detail, I think the main conclusion for which I contend is still made out, namely, that the recently established principles (if they may be looked upon as established) of conservation of energy, persistence of force, and others akin to them, are unwarrantably and without reason pressed into the service of unbelief by men of science. The principle that kinetic and potential energy are complementary, which is one form of the persistence of force, can go no farther than to show that the algebraic sum of the forces of the universe *has not been known* to change. The inference that it *cannot* change is quite illogical, and it is on this unwarrantable inference that the whole structure of scientific unbelief rests.

APPENDIX.

As some readers might wish to know the formula referred to in the text (sec. 27), I may state that it is, in its most general form—

$$\Sigma mv^2 = 2\Sigma.m\int(Xdx + Ydy + Zdz) + C \quad (1)$$

in which m denotes the mass of some one of the bodies or parts of the system, v its velocity, X , Y , and Z the resultants of the forces resolved along the axes of co-ordinates respectively, Σ the sum of like quantities (for instance, Σmv^2 is the sum of the products of the masses multiplied each by the square of its velocity—called also the sum of the *vires vivæ*), and C a constant quantity to be determined according to the value of Σmv^2 at some determinate position of the system.

This equation takes different forms for different cases. In that of a planet revolving round the sun, where the mass of the planet may be taken as the unit, and the mass of the sun as immensely great, when compared with it, it is shown in

books on physical astronomy that $Xdx + Ydy + Zdz = -\frac{\mu dx}{r^2}$,

where μ is the sum of the attractions of the sun and planet, and r the distance of the latter from the former, or, more strictly, from their common centre of gravity, which is, *quàm proxime*, at the centre of the sun. Hence $2\int(Xdx + Ydy + Zdz) =$

$\frac{2\mu}{r} + C$. The left-hand number of equation (1) is evidently in

this case $MV^2 + mv^2$, where M and m are the masses of the sun and planet respectively, and V and v their respective velocities round the common centre of gravity. Now, we know that the quantities of motion MV and mv are equal; therefore

$V = \frac{mv}{M}$. And if we suppose $M = mn$, n being a very large

number (in the case of Jupiter, the largest of the planets, in which n is smallest, it is 1,048), this equation becomes

$V = \frac{v}{n}$. Hence $MV^2 + mv^2 = mv^2\left(1 + \frac{1}{n}\right)$, in which $\frac{1}{n}$ may be neglected without sensible error. Thus equation (1) becomes in

the present case, $mv^2 = \frac{2\mu}{r} + C$. This is the kinetic energy of

the planet at the part of its orbit where its velocity is v , v being variable. If we take $m=1$, and suppose v' the velocity at

nearer apsis, where $r = a(1 - e)$ (a being half the axis major of the planet's orbit, and e the eccentricity of the same), we have $v^2 = \frac{2\mu}{r} + C$, and $v'^2 = \frac{2\mu}{a(1 - e)} + C$, whence, subtracting, we have

$$v^2 - v'^2 = \frac{2\mu}{a(1 - e)} - \frac{2\mu}{r}. \quad (2)$$

Since $a(1 - e)$ is the least value of r , it is evident that v'^2 is greater than v^2 , except when the planet is at the nearer apsis, and then they are equal. At any other place $v^2 - v'^2$ is the kinetic energy lost since the planet was at the nearer apsis, and which, as it will be regained on its return thither, is the potential energy. Now, if v^2 be put to the right-hand side of equation (2) (its sign being of course changed), we learn that $v^2 + \frac{2\mu}{a(1 - e)} - \frac{2\mu}{r} = v'^2$, that is to say, that the sum of the kinetic and potential energies is constant, and equal to the maximum kinetic energy. The maximum potential energy is at the point where r is greatest, because $\frac{2\mu}{r}$, the quantity to be

subtracted from the constant $\frac{2\mu}{a(1 - e)}$, is then least. It is therefore at the point where $r = a(1 + e)$, *i.e.*, at the remote apsis. After this point has been passed, the potential energy diminishes, and at any point in the return half of the orbit both kinds of energy are of the same amount as they were when the planet was equally distant from the sun in the former half.

In the case of the pendulum vibrating through small arcs, equation (1) takes the form $v^2 = -2g \int s ds + C$, where s denotes the variable distance of the pendulum at any point during its oscillation from the lowest point (that distance being measured on the arc which it describes, and g being the constant force of gravity). Performing the integration, we have $v^2 = -gs^2 + C$. If we denote by s' the distance of the point where the motion ceases, $v' = 0$, and we have $0 = -gs'^2 + C$, whence $C = gs'^2$. Substituting this in the equation $v^2 = -gs^2 + C$, and subtracting, we get the equation

$$v^2 = gs'^2 - gs^2. \quad (3)$$

This is the actual kinetic energy at the distance s . It vanishes at the greatest distance s' , since there $gs'^2 - gs^2 = 0$, and it increases as s decreases until $s = 0$ (*i.e.*, until it reaches the lowest point), when it is greatest, being equal to gs'^2 . If now we remove gs'^2 to the left-hand side of the equation, we have $v^2 + gs^2 = gs'^2$; and as gs^2 is the difference between the

kinetic energy at any distance s and the maximum kinetic energy, it represents the potential energy. We learn, therefore, from this last equation that the sum of the kinetic and potential energies is constant, and equal to the kinetic energy when the latter is greatest. After the pendulum has passed the lowest point of the arc, s changes its sign, and the pendulum ascends on the other side until it reaches the distance $-s'$, when the motion again ceases; and if we do not consider the resistance of the air or the friction between the pendulum and its support, it will vibrate back and forwards without limit of time. The change in the sign of s and s' makes no difference in the formula, as s^2 and s'^2 are still of the same sign.

Assuming in all this the invariability of the unit of gravitating force, the theorem that the kinetic and potential energies make together one unvarying sum has no more to do with religion than has the statement that if I am travelling with a view to reaching a certain distance, the space I have already travelled and the distance I have still to travel make together a constant sum, namely, the whole distance. By assuming the invariability of the unit of force, I need scarcely say I do not mean "assuming that it *cannot* vary," but "assuming that, under ordinary circumstances, it *does* not vary."

The CHAIRMAN.—I need not ask whether I am to return the thanks of the meeting to Lord O'Neill for his exceedingly well-reasoned paper. His lordship has invited corrections and additions, but I am only afraid that the debate will drop still-born on account of the general agreement, which I am sure there will be with what he has said. I would call particular attention to his having so strongly brought out the principle that we ought not to consider a thing impossible because we cannot conceive how it can take place. The simple fact of a stone falling to the ground is inconceivable as regards the "how," and Lord O'Neill has brought out strongly that no philosopher has ever been able to give a satisfactory explanation of it. I have not read the investigations of my friend Professor Challis; but it is well known that the action of gravity at a distance perplexed no less a mind than that of Sir Isaac Newton; and it is to ordinary faculties perfectly inconceivable how one body can act upon another through space. While we know by our every-day experience that this kind of action does take place, it ill-befits us to say we will not believe in a thing because we cannot see how it is possible. If any member present has any of those corrections or remarks to make which Lord O'Neill has so modestly invited, the Society will be glad to hear them.

Mr. D. HOWARD, F.C.S.—I am afraid it would require considerable boldness to attempt corrections of Lord O'Neill's paper; but there is

much in it that offers an extreme temptation to comment on, although I do not think that I at least could improve a paper that is so clearly and lucidly put. There are, however, one or two things I should like briefly to call attention to as being, in my opinion, very important, and which I only touch upon, on the principle of commending what has been said to the careful re-reading of those who have heard the paper read, and to the careful perusal, also, of those members of the Institute who, although not present, will receive a copy of the paper. I would first refer to the immense importance of what has been so well put, as to conceivability not being a measure of knowledge. It is perfectly true that the discipline of human intelligence is of immense value; and it is true that the opinions of men like Tyndall, Huxley, and Herbert Spencer, are of great value in proof of the positive of matters coming within their own line of thought. If Huxley, Darwin, or Professor Tyndall say they can conceive a thing, we may well consider that the thing is probably conceivable; but to conceive a negative is so extraordinary that one can hardly imagine how these able thinkers can suppose that the inability to do so disproves anything. It has been well put in the paper that the later propositions of Euclid are not less true because they require a trained intellect to appreciate them. Surely most of us have had schoolfellows who have shown an utter inability to understand the propositions in the first book, and who, in fact, have gone far to disprove them, if it be true that inability to conceive a thing can prove a negative. There are many people who are totally unable to conceive the differential and integral calculus; but this does not amount to anything like a disproof of the propositions involved. On the contrary, we should rather be disposed to say of them that the fact that other people can conceive these things proves that such things are; and why, I ask, should we not apply the same argument to those unbelievers who say they are unable to conceive the existence of a Divinity, and that, therefore, there is no Divinity? I should say, "Does not this prove the imperfection of your faculty of conception, rather than the non-existence of a Deity?" A man may have the keenest ear for music, so as to be able to detect a subdivision of a semitone, which nine people out of ten are utterly unable to perceive, but that does not prove that he has a correct eye for colour, as he may be colour-blind. I have known men who are unable to perceive the difference between green and red—who were such excellent musicians, that they could readily detect a difference between two sounds that was far beyond my perception. To put it in this way: as a man affected with Daltonism can conceive no difference between red and green, so there are people who are affected with a spiritual Daltonism which prevents their being able to conceive of the Creator. Do not let us forget the statement that if any man will do His will he shall know. The close connection between the action of the will and the power of the intellect is one of those things that are far beyond our ability to understand, and which cannot be measured by our powers of understanding. I am very glad the paper read to-night has so clearly and

forcibly worked out one particular point by showing that the argument as to continuity of force does not depend on the observations of a trained intellect. It is not so very long since the doctrine of continuity of force was discovered. Surely there was accurate thought before then. It is simply like the question of the indestructibility of matter which has for long engaged human thought, namely, whether matter did not exist from infinity, a defined quantity of matter which chemistry declares to have always been the same. A piece of wood does not vanish into nothing because you burn it, but simply becomes gaseous, the same weight of matter remaining at the end of the process as at the beginning. The doctrine of the quantitative estimation of the forms of matter has infinitely promoted the modern knowledge of chemical and physical science; but has this in the smallest degree shaken the Christian faith? I really cannot see that it has done so; on the contrary, the Christian faith has survived unchanged. The modern chemist is neither more nor less a Christian, although he believes that the quantity of matter is for all practical purposes the same at all times. Why, then, should the doctrine of the conservation of energy and of a defined quantity of force being the same for all practical purposes, have the slightest effect on the Christian faith? We are not more or less atheists or more or less Christians, because we believe that when the diamond is heated to a certain degree it becomes carbouic acid, which we cannot see, and ceases to be carbon; and we are not more nor less believers, because a piece of charcoal becomes dissipated into carbonic acid, leaving very small traces behind. The fact is that we are simply obliged to come back to this point, that a great many modern scholars will not believe, and they cannot believe because they will not. There is such a thing as the will, and this will, which is denied by some of these men of science, is, after all, exerting the most extraordinary force over their own convictions. These scholars are themselves governed by the will they deny, and the very denial of their will is a proof of that will which brings them so to exercise their minds as to deny the will by which they are at all times influenced.

Rev. Professor DABNEY (of Virginia, U.S.A.).—I wish to add my modest word of obligation for the paper read this evening. I confess myself very much instructed by it. I also wish to express the great gratification with which I have heard the declarations that have been made, that the power of conceiving a proposition is not really necessary to its truth. I was reminded by what I heard, of the emphatic way in which the great Dr. Parr put this fact before the mind of a conceited young theologian who was advancing a scheme of theology of which this proposition was somewhat the corner-stone,—that nothing was to be believed except what was conceivable. As the anecdote goes, the old doctor said, "You, sir, must perforce have the shortest creed of any young gentleman in the kingdom." And I think that the more widely we extend our knowledge of theology, philosophy, and physics, the more must we comprehend and believe things which otherwise are beyond our comprehension. A gentleman in this room, to whom I listened with much satisfaction, suggested a protest which has more than once arisen in my own

mind on the important subject of this paper. Scientific writers are never tired of using expressions of contempt for theology—witness, Professor Huxley. They tell us that science—real exact science—is the knowledge of the facts of observation, and then comes the point against which I wish to raise my protest. When they endeavour to define what they mean by facts of observation, they limit definition to the observation of facts and sensations. Now, if they define science as the knowledge of facts, and observation as the observation of sensations, they have the game in their own hands ; but against this I do most vehemently protest, and I would endorse the remark that has been made with so much justice this evening, that we cannot construct any system of knowledge. The knowledge of the observed facts of motion and dimension and sensation, implies a knowing agent. I defy any of these physical philosophers to go on without making that admission. As knowledge implies a knowing agent, you cannot construe sensations without the admission of the *ego* receiving the sensation. Now, I must ask myself a simple question, raised by what I have heard in the discussion in this paper, as to the ultimate effects of consciousness. There is a relation between the cognition of the *ego* which perceives and the sensation perceived. The answer given by my common sense is, that I must be conscious of my recipient power in order to receive. I am ready to say that all exact science is the science of observed things ; but when we speak of observations we should also include the observer. These are the primary elements of our knowledge. The accurate knowledge of ourselves is *à priori* the condition before our perceiving that which is outside ourselves. With regard to the doctrine of spontaneity, when Professor Tyndall calls my attention to an optical phenomenon, am I not immediately conscious that he is exercising spontaneity in the construction of his experiment and the selection of its means ? I know that I have spontaneity ; but then I know that light is refracted. Having recognised the subjective facts, the recognition of which is *à priori* essential to the recognition of the objective facts, we are led to take a similar view before enforcing the arguments of this paper. Does not universal experience teach us that the evolution of spirits is perpetually modifying the laws of physics ? Every origination motion, as far as our knowledge goes, is traceable to an act of spontaneity. Now, according to the spirit of inductive physical science, what is the probable conclusion ? Why, that the first motions also originated in a spiritual act of spontaneity. The soldier, for instance, hears, and possibly sees, the cannon-ball hurtling through the air. The question is asked, what propels it ? The physicist will say, the expansive power of a fiery gas. Well, what liberated that power ? The spark applied to it. What applied the spark ? The detonative power of the friction match. What produced that detonative power ? The action of the lanyard spring. What liberated the lanyard spring ? A human finger. What moved that finger ? Would you say the word of command of the sergeant of the gun ? What moved the tongue to give the word of command ? The will of the sergeant. This is a very homely instance, but I hold it is a fair one, and if you reflect upon and

examine it, you will say it is a good explanation of a fact coming within human experience as to originative motion, which is the evolution of spirit. To what, then, shall we trace the grand system of motion we see in the material universe? It is curious that we so seldom hear in these recent speculations any reference to the fact that grand old physical philosophers like Newton, Leibnitz, Galileo, Torricelli, and all that great school, who created modern physical science, recognised inertia as an essential attribute of all matter. They held that the nature of matter is inert; that if it be in a state of motion it has no power of self-rest; if in a state of rest it has no power of self-excitement. If this be true must we not go outside of matter for the origination of motion? The argument put thus seems exceedingly short and simple—so simple, indeed, and so short, that it almost produces a feeling of indifference when we seem to imply the charge that learned men overlook it. Then, I think, the practical mind will rest, and derive another simple confirmation of the thesis of this important paper—"You must recognise will in the universe." It has been well said that force implies substance on which it acts; that you must go outside the material substance to find the origin of force. Spirit moves matter, and it is the Infinite spirit that moves this vast universe.

Rev. S. WAINWRIGHT, D.D. —If I understand the last speaker aright, he contends that there must be such a thing as will, because he is conscious he possesses it. Huxley asks us to demonstrate this proposition, to demonstrate that consciousness, and the speaker has given us many reasons that come admirably near doing so. To refer to the paper, the writer says, "What greater break in the uniformity of nature can be imagined than the commencement of life?" I would have preferred the sentence without the last two words. He then continues, "If"—I would have preferred the word "since,"—"terrestrial life had a commencement, there can be no great difficulty in believing that the whole universe had a commencement also." Now, science makes it certain that there was a time, to use Professor Tyndall's words, in his Midland Address, "when there was nothing living on our planet," and a temperature at which no life was possible. Huxley affirms that whatever there is in the living being there is in the dead, and he calls it protoplasm, and tells you that living protoplasm is never produced except under the influence of living protoplasm, I think we have a right to ask how the first piece of protoplasm acquired life. On his own showing there was therefore a time when life was not in action in matter; and all the assumed eternity of matter, and all the "inheritance of laws," &c., will not enable those men of science who deny the existence of a Creator, to account for the phenomena that they themselves assert to have been produced in the inorganic world. Tyndall speaks of the atoms that were eternally falling, and that when they ceased to fall they began to think; but without life there could be no thought. Again, there must have been a beginning of the atoms, of their motion, a beginning of the process whatever it was, out of which the inorganic generated the organic. Science at present knows nothing of this beginning. Writers admit the material on

the one side, and the intellectual on the other, but have not bridged the difficulty which Tyndall admits when he says we may trace the nerve-process and the operations of consciousness, but that to connect the two is beyond his power. I think we are much indebted to Lord O'Neill for his paper.

Rev. J. JAMES.—It seems to me that the difficulties which certain men of science find in their pursuit of science, and their avowed inability to explain some of its patent phenomena, arise from what deprives them of a claim to be true philosophers, viz., that they studiously ignore a large portion of existent phenomena, as being out of their pale. I trust they may some time come to see, what has been so ably put by a previous speaker, that as scientific men they are in the wrong, and are even sinning against science, in limiting, as they do, the investigations of science and the discussions of science exclusively to physical phenomena. I cannot but hope that they will come to see that, as philosophers, they must take into account the phenomena of life and of mind; they will then find no difficulty in acknowledging that there is a power beyond, which is sufficient to account for the existence of life or soul, and mind or spirit; a power which must therefore be taken into account in the endeavour to explain what they cannot now explain. It seems to me that the very name "agnostic" disowns for it all claim to philosophy in the true sense of the word, as taking note of *all* existent phenomena—all objects of human wisdom and knowledge. By that term itself they seem to say, "we refuse to recognise any but self-chosen phenomena," and I think it is a great point for us to insist on, that men of this school of agnosticism, with all their prestige of physical science, are untrustworthy by reason of their acting in this way. I earnestly hope they may have more light thrown upon their researches, and may be enabled before long to acknowledge themselves to have been shortsighted and narrow-minded and unphilosophical, in so far as they have put aside and ignored the psychical and spiritual indications of a Creative and Regulative Power.

Lord O'NEILL.—I have to thank those who have heard this paper, and to acknowledge the kindness with which it has been received on the part of those who have made observations on it. Those observations have been so very much in accordance with my own views, that I really have nothing to reply to. I can only once more thank the gentlemen who have spoken so kindly, and who have made such valuable additional observations on the subject; and I may add, with regard to Dr. Wainwright, that I accept the corrections he has made as to my way of expressing myself. He has quite caught my meaning. When I spoke of the commencement of life, I meant it as an example of the commencement which might be joined to everything else. If we believe in a commencement of life, we must believe in a commencement of everything. There is nothing that calls for any further observations on my part.

The meeting was then adjourned.

REMARKS BY THE REV. PROFESSOR CHALLIS, M.A., F.R.S.

I CONCUR in all essential respects with the considerations advanced by the Lord O'Neill in his paper, *On the Action of Will in the Formation and Regulation of the Universe*, and am induced to offer the subjoined remarks only in consequence of the references made in Art. 28 to principles on which I have founded a theory of the force of gravitation. The views I hold on this and like questions are given in two communications published in the *Transactions of the Institute* (Vol. XI., No. 42, and Vol. XII., No. 45), and in various productions contained in the *Philosophical Magazine*. My present purpose is to supply some additional explanations which appeared to me to be called for after reading certain statements made in the Lord O'Neill's paper.

It is true, as he says, that I propose to account for gravitation "on the hypothesis of a reaction of the atoms of which matter is composed against æthereal pressure," and for the persistence and constancy of the force by supposing that the atoms are always of the same size and shape. But according to my views this is not the only condition of the unalterability of gravitation. In my researches respecting the characteristics of the physical forces, I have uniformly assumed that all *active* force in nature is exerted by the intervention of the æthereal medium, and all *passive* force is reaction at the surfaces of spherical inert atoms of constant magnitude against pressure of the æther. On these principles I have endeavoured to account not only for gravitation, but generally for the forces concerned in the phenomena of light, heat, electricity, galvanism, and magnetism, together with the atomic and molecular forces whereby the constitution of sensible *masses*, as consisting of an aggregation of atoms, is maintained. In all the reasoning applied to these purposes it is assumed that the æther is a homogeneous substance, composed of discrete atoms all of the same size, but incomparably smaller than the atoms of sensible gross bodies; also that it is susceptible of variation of atomic density, and has the property of pressing against its own parts, and against the atoms of all sensible bodies, in exact proportion to its atomic density. In other words, the pressure is equal to the density multiplied by a constant factor, as is the case with respect of air of given temperature. There is, however, this essential difference, that with respect to air the factor is a quantity measurable by experiment; and a theoretical reason for it is derivable, as I have endeavoured to show (*Phil. Mag.*, 1859, pp. 401-404), from the mutual action between the æther and the aerial atoms. But with respect to the æther, the factor must be absolutely constant, inasmuch as it expresses the intrinsic elasticity of the æthereal medium, and there are no antecedent physical conditions whereby this elasticity can be altered. From this argument I draw the conclusion that the persistence of physical force depends wholly on the essential qualities of the atom and on the constancy of the elasticity of the æther, and that these are underiv-

able conditions, generated and maintained by the Will and Power of the Creator of the Universe. It never occurred to me to imagine the existence of any power which could prevent the Originator and Upholder of these conditions from withdrawing them, or altering them, at His will.

I now proceed to the main purpose of the remarks, which is, to meet the argument, accepted by the Lord O'Neill, by which Mr. Herbert Spencer maintains that the consideration of what is called "action at a distance" is not got rid of by the action of the æthereal medium assumed to be atomically constituted in the manner already stated. In the first place, I do not admit that any argument respecting the relative magnitudes of the atoms of the æther and the spaces separating them can be drawn from the imponderability of the æther, because I hold that the weights of all bodies are due to the action of the æther upon them, and consequently that neither weight nor non-weight can be predicated of the constituents of the æther itself. The æther, for instance, does not gravitate towards the mass of the sun, because it is by the intervention of the æther that the sun attracts. Thus the argument for the reality of action at a distance based on the supposition that the æther is imponderable falls to the ground.

In my scientific productions, published in the *Philosophical Magazine*, I am wholly at issue with Mr. Herbert Spencer and most modern physicists as to the possibility of one atom of matter acting upon another by mere emanation of force, without the intervention of mediate substance, and in this view I am supported by the recorded opinion of Newton, who thought that no one competent in philosophy could entertain such an idea. I have in fact argued, I think with some success, that all the physical forces recognised by experiment, including the molecular forces by which the atoms of sensible bodies are held together so as to constitute masses, are effects of mutual actions between the æther supposed of invariable intrinsic elasticity, and atoms supposed to be inert, movable, and of constant spherical form and magnitude, and that on these suppositions the effects admit of being ascertained by mathematical calculations. According to these premises the action of one atom on another is shown to be produced by means either of propagated vibrations or of currents of the æther, so as to exclude action at a distance. It may, however, be urged that such action must still take place between the atoms of the æthereal medium in order to account for its pressure. To meet this objection it occurred to me, in my first speculations on the nature of physical force, that as the law connecting pressure with density in air of given temperature might be shown to be the result of mutual action by pressure between the aerial atoms and the æther, the same law might be supposed to be produced in the æther itself by like action of another æther of still greater tenuity; and so on *ad libitum*. This idea of *successive æthers* which, probably, would be received with favour by those who adopt materialistic views, I shortly afterwards discarded; and in place of it I now propose the following theory, which, I think, may be considered to give a reasonable account of the origin and character of physical force. To render the theory intelligible I begin with an illustrative instance. The production of phe-

nomena of sound may be traced, by experiment and mathematics, from agitations of the air to the action of the generated vibrations on the auditory nerves; and the sound as to *quality*, *intensity*, and *pitch*, results from the character of the initial disturbance. But these are *non-material*, or *spiritual sensations*, in exact co-ordination and correspondence with their immediate material antecedents, but in essence they are in quite a different category. The same kind of argument applies to *light* as produced by vibrations of the æthereal medium. Hence it follows that physical science, as understood by indications of the senses, is concerned with *non-material* as well as *material* entity. Just so, after we have derived the material conditions of the action of physical force from the qualities of the atoms and the æther as above defined, we have not reached the essential quality of force. To do this we must take account, as has just been illustrated, of non-material as well as material essence. We must admit that the production and maintenance of those primary conditions from which it is the province of mathematical reasoning to show that the action of physical force flows, are due to the operation of *Mind*; the conditions, namely, of the permanence of the qualities of atoms, of the constitution of the æther and its intrinsic elasticity, and as depending thereon, its pressure, and law of pressure. *Intelligence* was employed in designing the qualities appropriate to the intended purposes; *Will* and *Power* were required for giving them existence, and are also constantly exercised in maintaining their effects. Our own consciousness tells that will and power are concerned when we move our limbs, which we are enabled to do by means of the control, limited by the conditions of organization, which our Creator has given us over the physical action of the æthereal medium. "In Him, we live, and *move*, and have our being." These views exclude action at a distance, and at the same time assign its truest meaning to the law of the Conservation of the Energy of the Universe, the word energy in this acceptation not having the mechanical meaning assigned to it by modern physicists, but being a definite expression of the exercise of spiritual power.

REMARKS BY THE REV. PREBENDARY IRONS, D.D.

IF there be any truth in the rumour referred to by the noble Lord who has favoured us with this paper, viz., "that the scientific and even the clerical world is fast drifting into unbelief," the fact cannot be attributed to any scientific or critical successes thus far achieved against the Christian position, but to other and distinct causes. After the experience of the last few years, we are justified in saying that the confident anti-Christian assertions of *literati* and experimentalists have been met and examined, and that the ingenuous fearlessness of educated Christians (specially shown in this Institute) has fearlessly silenced the offensive pretensions to "enlightenment" to which the quasi-scientific had accustomed the last generation. Bishop Cotterill's papers, by their careful and analytical

character, will sufficiently indicate this. Still there is no doubt that the controversy between faith and unbelief has now reached a special kind of crisis, which Lord O'Neill's paper this evening intimates. Men of high intelligence, like Professors Huxley and Tyndall, are, of course, aware that the secret of life and primary motion actually lies beyond science. The acknowledgment is made, in sufficiently mystified terms at times, but it is made. Thus Professor Tyndall says :—"Divorced from matter, where is 'life' to be *found*?"—(as if he ignored the whole region of *thought*),—forgetting for the moment that Professor Huxley's "protoplasm" is quite *dead*, or "divorced from life" as he might express it, and therefore life exists somewhere beyond the protoplasm. Again, he says, "the animal body distributes, but it cannot create"; availing himself of the here somewhat ambiguous and invidious term "create"; for what he calls "distributing" is, in truth, the *originating* of a new form of motion. And also when he so speaks of an "animal body," or "the animal body," he does not mean a dead animal, but a living one; and it had been better, therefore, to say so, and frankly admit, that the "life" is what makes the distinction. A truthful philosophy shrinks from all needless ambiguity.

I would point out, once more—for it is far from the first time),—that the defenders of truth are not unfrequently ensnared, in the use of abstractions furnished by their opponents. As one example of this, a sentence may be given, as quoted by our paper to-night. The animal body,—sect. 4 (*i.e.*, the live body),—"has a power of unlocking at pleasure the *potential energy* stored up in the nerves,"—which, in the language of common sense, just means, that a *living body* sometimes acts, and always *lives*. With a similar ambitiousness of phrase, Dr. Tyndall says that the "principle of conservation of energy in Nature leaves no nook or crevice for spontaneity to mingle with the *necessary* play of natural force,"—a mere truism; while, on the other hand, the great Cambridge writers of the *Unseen Universe* maintain that "force is a name for nothing," and that the word "force" had better be dropped, there being "no such thing"!—*Unseen Universe*, 4th edition, p. 104. Under which circumstances even Professor Tyndall would be at a loss to "distribute" force, or give it its natural "play."

This principle of the "conservation of energy," which has found such ostentatious expression of late, really implies very little more than we used to mean by the "uniformity of Nature" (as the Psalm says it, "He hath given them a law which cannot be broken"). This "energy," or "life in itself," as the Pentateuch puts it, being an original constituent of the physical universe in certain departments, is singularly imagined by Professor Tyndall to be a difficulty in the way of Theistical interference; the fact being that it is really a part of the Theistical hypothesis of creation. It reconciles what might seem mechanical with what we perceive to be vital phenomena. It may even be part of the "uniformity of Nature" that it has non-uniform action dispersed largely, and eluding precise detection. Certainly it does not preclude independent causation from without,—though the suggested exclusion of "force" would imply that.

But the question which cannot, in the long run, be evaded, is that which is raised under the term "spontaneity," and it lies, I believe, immediately before us. Is there in the universe no "originating"? This is not a question that will bear to be superficially disposed of. Our own responsibility, as moral beings, is no less involved in it than the Divine origination and government of all things; nor can we ultimately defend the one without the other. Theologians, as well as philosophers, have too long turned aside from considering what the idea of creation or origination implies, when contemplated in the past (as "before the world began"), or, when contemplated now, in the intelligent agent of variously limited power. The universe has abundant signs now of veiled power,—a being that quickens. It is this that we have to contemplate. Pre-phenomenal power, with the "contingency" really involved in its acting with any freedom, must be re-considered from the very root of the subject. There is no modesty or reverence in refusing to examine it. "Kinetic and potential energy," as they are called—(that is, an energy that *moves*, and an energy that is *able to move*),—open the whole question in physics; as really as "responsibility" opens it in the region of thought. That which has to be accounted for is the *beginning* of any change (whether there be known materials for the agent to act on or not). Too long have current and inherited theories as to "necessity," "fate," and "prescience" been stumbling-blocks in the way of the approach of the scientific mind—the Cliffords and the Spensers—to the truths of our Divine Religion. We cannot, *e.g.*, in any true philosophy, separate between the *reality* of agency in some cases, and not in others, on the ground that some agents are more powerful than others, or than the Highest or Supreme Agent who transcends all. Real agency, operating *de novo*, whether in the regions of thought, or in the field of the phenomenal, must be estimated in one and the same philosophy; and I differ widely, therefore, from one section (18) in tonight's paper, which says, "We are at liberty to describe the will of God as spontaneity, *whatever we may think* of the will of man." The former is, perhaps, the *more* difficult; as Billuart says, it is the "hardest knot in all theology." The truth is, that man who is "made in the image of God," has common cause herein with the Divine Father. We are not at liberty to ignore our human spontaneity. It is vital to religion, to morality, to free thought; and, unhappily, we have been afraid of examining it. Bishop Butler said that it was practically of no consequence which way the question of spontaneity and necessity was decided. But it is the introduction of poison into the system of men's thought when they admit false philosophy. Happily we are so constituted that the sense of responsibility is indestructible in our nature, and the conviction of a retributive justice can never be rooted out of us. They are "facts of human nature." Nevertheless, there is a great wrong that has been done to this generation, in the misdirection of its philosophy of duty by *quasi*-religious theories in harmony with, if not leading to, materialism.

REPLY TO THE FOREGOING BY THE AUTHOR OF THE
PAPER.

I have specially to thank Professor Challis for his kind observations.

Dr. Irons's remarks, like everything that he writes, are of great value, and well worth the consideration of Professors Huxley and Tyndall, and of all who hold their views.

In reference to myself, there seem to be only two points on which any observation is called for.

1. When I said that it is asserted in various quarters that "the scientific, and even the clerical world is fast drifting into unbelief," I had chiefly in my mind the following sentence which I had copied down from a lecture delivered at Birmingham some three years ago (if I am right as to the time) by Dr. Tyndall:—"The world,—even the clerical world,—has for the most part settled down in the belief that Mr. Darwin's book simply reflects the truth of nature." This, I admit, is not necessarily identical with the sentence in my paper, for there are some (myself among the number) who do not see that Mr. Darwin's views, however unlikely to be ultimately established, are utterly irreconcilable with Christianity. But there seems to be much reason for thinking that, at all events, Dr. Tyndall himself, in uttering that sentence, identified Darwinism with unbelief. It is gratifying, however, to learn from Dr. Irons that now, at any rate, "the ingenious fearlessness of educated Christians (specially shown in this Institute) has really silenced the offensive pretensions to 'enlightenment' " to which I alluded.

2. I quite believe, with Dr. Irons, that, in regard to spontaneity of will, "man, who is 'made in the image of God,' has common cause herein with the Divine Father," nor had I any idea of implying (however the words to which he takes exception may be open to such an interpretation) that there is any doubt as to man's spontaneity. I merely meant to say that as the subject under consideration was the will of God, and not that of man, and as we believe God to be a pure spirit, Dr. Tyndall's arguments against man's spontaneity, drawn as they are entirely from material considerations, leave the question of the Divine spontaneity untouched. In section 5 of my paper, referring to Dr. Tyndall's assertion that man is a mere machine, these words occur, viz.—"This view has been satisfactorily disproved by many, and among them, by the President of Yale College," &c.—showing that although I may have used an inconsiderate expression, I do not ignore human spontaneity.

I sincerely thank Dr. Irons for his remarks, and especially for the opportunity he has given me for explaining myself on this important point.

ORDINARY MEETING, MAY 3, 1880.

H. CADMAN JONES, ESQ., M.A., IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following election was announced :—

ASSOCIATE :—Rev. R. Gascoyne, M.A., Bath.

Also the presentation of the following Work for the Library :—

“Fossil Men.” By Principal J. W. Dawson, F.R.S. *From the Author.*

The following paper was then read by the Author :—

*THE LIFE OF JOSEPH, ILLUSTRATED FROM SOURCES
EXTERNAL TO HOLY SCRIPTURE.* By THE REV.
HENRY GEORGE TOMKINS.

TWO or three years ago the members of the Victoria Institute received with kind attention a paper on “the Life of Abraham, illustrated by recent researches.”*

In a work since published † I have submitted to the public the studies which were roughly sketched in that paper, and I have there anticipated much inquiry relating to the Hyksôs and the early Shemitic influence in Lower Egypt which bears directly on my present topic.

N.B.—In the following references, *T.S.B.A.* denotes “Transactions of the Society of Biblical Archæology :” *Zeitschr.* “Zeitschrift für Ägyptische Sprache.” The French edition of Brugsch is distinguished as *Histoire*, the English translation as *Hist. Records* refers to “Records of the Past” (Bagster).

* *Trans. of the Vict. Inst.* Vol. XII. pp. 110 *et seqq.*

† *Studies on the Times of Abraham.* (Bagster & Sons.)

It is my pleasant task this evening briefly to treat in the same manner the story of Joseph given to us in the first book of the Holy Scriptures, and I entreat your "favourable censure" whilst endeavouring to put in small compass some results of those laborious and delicate researches which Egyptologists have given to the student of sacred history.

You will find the chief sources of information indicated in foot-notes. But I must signalise the great value of Dr. Birch's recent edition of Wilkinson's *Ancient Egyptians* and of Brugsch-Bey's *History of Egypt** (now made available to the English reader).†

I must also call attention to a very able and valuable work by the Abbé Vigouroux,‡ whose writings have only become known to me (I am sorry to say) within a year past, since the publication of my book before mentioned.

It is not my intention to enter largely on critical argument. The old impeachments of the history as incongruous with the details of Egyptian life have been answered by Ebers and others. Still it is no less a profitable study to lay the story as it has reached us side by side with the monumental records and pictures, and thus to become familiar with the substantive evidence. Afterwards those who wish to inquire into the divergent theories of analytical critics will find themselves in a fair position to begin that task.

The subject before us now is not only more frequented than "the Times of Abraham," but far less complex and difficult. There is not that interweaving of the races and destinies of Elam, Babylonia, Syria, and Egypt. The story soon drifts down into the Delta, and it is to Egyptian sources almost alone that we look.

But we must never forget that it is underlaid by all that has gone before.§ The expeditions of Una, the adventures of Saneha, the tide of Chaldean migration, the stream of Phœnician commerce, shocks of Elamite conquest, filtering of Shemitic traffic, and at length the mastery of Hyksôs invaders and overlords of Mizraïm, all have to be taken into account by those who would discern in the twilight of history that background into which the figures of Joseph and Potiphar, of the priest-prince of On and his daughter Asenath, of the Amu immigrants Jacob and his house, so naturally fall, and

* *Hist. d'Egypte.* Leipzig, 1875.

† Murray, 1879. 2 vols.

‡ *La Bible et les Découvertes Modernes.* Paris, 1877.

§ See in addition, on forerunners of the Hyksôs, *Zeitschr.* 1879, 34, &c.

in whose contemplation it seems to me that the thoughtful student finds a delight and clear satisfaction as great as did ever the little child over his mother's picture-Bible.

You will let me refer to my former paper for preliminary matter of the kind just mentioned, and allow me to touch hastily two or three points which lie in our way before arriving in Egypt.

The life of Joseph has been so fully and minutely treated by the Abbé Vigouroux, and an extended examination would so far overreach our allotted time, that I will keep myself to some points of the story least familiar to the student, and trust that, detached though they be, they will fall into their due places in the minds of those learned members of the Institute whom I have the pleasure to address.

The Favourite Son and his Garment.

Rachel was the true destined bride whom Jacob loved and won, and accordingly we find him emphatically calling her "my wife"* in speaking of her sons to their brethren: so also is Rachel alone named in the pedigree in the xlviith chapter of Genesis, "Jacob's wife." It was not a fantastic and arbitrary choice which fixed on her first-born as (if so be) the heir. The father had that right of choice and chose righteously and well. Still in Syria the garb bears witness to the choice.† Such a garment of a favoured son which I have seen exhibited was ornamented with bright perpendicular stripes of different colours.

But whether the Hebrew פָּסִים (*passim*) refers to length, or form, or fringes, or to pieces (as of patchwork) and so to colour ‡ (as pieces of the same would hardly be put together in any pattern) seems hitherto unsettled. The gay clothing of the Amu at Beni-hassan has been thought to exemplify the kind of garment. But many of them wear the same kind of garments. The chief, however, is certainly distinguished, not by colours, but by the shape of his robe, and by its being fringed all down the front, as well as at the bottom. Perhaps some day this great problem may be solved.

Joseph's Dreams.

In the boy's dreams we notice the pastoral work now mixed with agriculture. Not so was it with Abraham and Lot.

* Gen. xlv. 27.

† Roberts, quoted by Thornley Smith, *Life of Joseph*. 5th ed., 12.

‡ Buxtorf.

Sheaves are represented in Egyptian harvest-scenes, very neatly bound and laid on their sides. This illustrates the words, "my sheaf *arose*, and also *stood upright*; and lo, your sheaves *stood*," &c.

In the other dream, "the eleven stars," making with himself twelve, cannot refer to the signs of the zodiac, but we are reminded of the two sets of twelve stars each which Diodorus describes as north and south of the zodiac: Professor Sayce* suggests that east and west would be more correct. "The twelve stars of Martu, or the West," whose names he gives, would be the twelve of Joseph's dream.

Shekhem and Dothan.

Joseph was sent by his father to Shekhem, and thence he was directed into Dothan.

It is worth while to inquire whether the real origin of the name Shekhem or Sekhem, שֶׁכֶם, is to be sought in its ancient sanctuary, for Sekhem in Egypt meant the holiest inner chamber of the Temple;† and, as Ebers has mentioned in this connection, Pa-sekhem was the name of a city in Lower Egypt.

Dothan (or Dothain) is identified by Dr. Haigh‡ with a place mentioned in the Karnak lists of Thotmes III. It is true that Mariette-Bey§ gives Yutah (Jos. xv. 55) but Dothain seems nearer to the Egyptian *Tuthina*, of which the final letter must be dropped, and the T may be equivalent to D. These most important geographical lists bear date not much more than a century later than Joseph, if we are right in placing him towards the end of the Hyksôs period.

Dothan still keeps its ancient name, Tell Dothan, and lies|| on the ancient route from Damascus into Egypt.

Describing the old empty cisterns, contracted towards the top, Dr. Thomson writes: "When peering into these dark demijohn cisterns I have often thought of poor Joseph, for it was doubtless a forsaken cistern (*beer* is the word both in Hebrew and Arabic) into which he was thrown by his barbarous brethren. The *beer* was empty—there was no water in it—

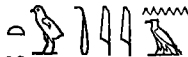
* T.S.B.A. III. 176.

† Brugsch., *Hist.* I. 377, 380, 386. Pierret, *Vocab.* 531. Ebers, *Æg. u. die B.M.* 231.

‡ *Zeitschr.*, 1875, 101.







§ *Listes*, p. 15, No. 9.

|| Tristram *L. of Israel*, 132.



and just such are now found about the site of old Dothan. It is remarkable that, though dug in hard rock, and apparently sound, they are nearly all dry even in winter.”*

The Spicery from Gilead.

Of the three aromatics which the merchants were taking down to Egypt Dr. Ebers † thinks that he has identified two—nek’oth, נֶכְאוֹת, and tsori, צֹרִי—with the *nekpāt* and *tara* which he finds among the constituents of the celebrated incense called κῦφι in the inscriptions of the laboratory at Edfu given by Dümichen. Nek’oth must be the resin of the *As-tragalus tragacantha*, still called naka’at by the Arabs. ‡ Dr. Ebers has also given § from the papyrus Ebers a formula for making Kyphi, in which *nebat*,    from Tahi (north Syria) occurs as an ingredient. This must surely be the same original word as the    *nekpāth* of Dümichen’s Edfu text.

The tsori seems to be the “balm of Gilead,” and the third aromatic, lôt, לוֹט, is supposed to be the ladanum of the *Cistus lālaniferus*, which was introduced into Egypt for cultivation in Ptolemaic times, and before that imported from the East. ||

Spices of Canaan and of Syria are mentioned in general terms in Egyptian papyri, and were largely consumed, both for incense and for embalming, from very early ages.

The Egypt of Joseph.

There seems no sufficient reason to give up the old tradition that Joseph entered and ruled Egypt during the domination of the Hyksôs kings. The latest historians of Egypt, as Birch, ¶ Brugsch, ** Maspero, †† agree in this opinion. Eusebius (c. A.D. 300) †† gives this tradition, and George the Syncellus (c. A.D. 800) specifies Aphôphis as the Pharaoh of Joseph. This name appears in Manetho’s lists, and is supported by the monuments. For it is inscribed on the right shoulder of a statue of Ra-smenkh-ka Mermesha of the XIIIth dynasty

* *The Land and the Book*, 287.

† Vigouroux, *La Bible*, 13.

|| Wilkinson, *Anc. Eg.* II. 404.

** *Hist. d’Eg.* 1875, 175. Eng. ed. I. 260.

†† Bunsen, *Egypt’s Place*, I. 628.

† *Eg. &c.* 290.

§ *Zeitschr.*, 1874, 108.

¶ *Hist. Eg.* 76.

‡‡ *Hist. Anc.* 174.

found at San; and on a sphinx in the Louvre (afterwards dedicated by Menepthah of the XIXth dynasty); and it has been read by Mariette on the magnificent sphinxes of San, unearthed by that great explorer, which bear the features of the Hyksôs king himself.

But almost more interesting is the fragmentary papyrus which yields the tantalizing scraps of transactions between Apapi and the patriot native governor Ra-sekenen,* who began the war of liberation afterwards brought to a triumphant end by Aahmes, the founder of the great XVIIIth dynasty.

The name Apapi, founded on that of the great evil serpent Apap, would seem like a sheer defiance of Egyptian religion. But, strange as it may appear, Brugsch tells us that "many Egyptians living about the time of this king call themselves similarly Apopi, or Apopa."†

It is much to be desired that further evidence be found as to the state of Egypt during the times of the Hyksôs. But already the old impression that everything was overthrown and devastated by the conquerors has been very much modified.

Having treated elsewhere at some length the subject of Semitic influence in very early times in Lower Egypt, and the monumental relics of the Hyksôs Pharaohs, I will not repeat what has been said before.

The great history of Egypt from monumental evidence by Brugsch-Bey has now been given to English readers,‡ and should be carefully studied by all who would form a judgment on the questions before us. We are expecting with impatient hope his promised work, "Bibel und Denkmäler," which may give us new light.

As things now stand I cannot see anything which will not harmonize with the old opinion that the life of Joseph in Egypt fell under the rule of the latest Pharaoh of the XVIIth Hyksôs dynasty. If this be true, it appears that the stern and careworn visage which looks out of the lion's mane of the sphinxes of San must be the face so familiar to Joseph.§

The natural objection that the priest (or prince) of On would be the last person to whose daughter the Hyksôs Pharaoh would ally his favourite minister in marriage, seems to fall away before the accumulating proofs that the alien rulers had become in the main thoroughly Egyptianized. One

* Chabas, *Les Pasteurs*. Brugsch, *Hist.* I. 239. *T.S.B.A.* IV. 263.

† *Histoire d'Eg.* I. 159.

‡ *Egypt under the Pharaohs*. 2 vols. Murray, 1879.

§ See the profile and front face in *Studies on the Times of Abraham*.

of the statues of the Hyksôs is clad in the panther's skin which was the robe of a high order of Egyptian priesthood. Quite to the point is the curious fact adduced by Brugsch* of the foreign Semitic names chosen by a family attached to the temple of Amon at Thebes (much more remote than On) for six generations back from the second king of the restored Egyptian monarchy (XVIIIth dynasty), Amenhotep I. In the sixth generation back he finds the Theban priest bear the name of Pet-Ba'al, "servant of Ba'al," with which we may compare the Ba'al-mohar of a later period.† By the way, this old Egyptianized name, Pet-Ba'al, is the equivalent of Hannibal, and Ba'al-mohar of Maharbal, Phœnician names both.

In fact, quite an amusing fashion had set in of aping the names and ways of the foreigners, just such as in the time of Edward the Confessor had already begun in England, the foreshadow of the Norman conquest.

The same habit sprang up again with fresh vigour in Egypt with Seti I., and flourished under the XIXth dynasty.

"We will simply put the question," writes Brugsch,‡ "if those foreign kings were in fact desecrators of the temples, devastators and destroyers of the works of bygone ages, how is it that these ancient works, although only the last remains of them, still exist, and especially in the chief seats of the Hyksôs dominion, and further, that these foreign kings allowed their names to be engraved as memorial witnesses on the works of the native Pharaohs? Instead of destroying they preserved them, and sought by appropriate measures to perpetuate themselves and their remembrance on the monuments already existing of former rulers."

"Zoan (Tanis), the capital of the Egyptian Eastern provinces, with its world of temples and statues of the times of the VIth, XIIth, and XIIIth dynasties, had so little to suffer from the Hyksôs that, on the contrary, these princes thought it incumbent upon them to increase the splendour of their vast temple-town by their own constructions, although in a Semitic style of execution."

In connection with the early intrusion of the Hyksôs leaven, it is worth notice that the name *Baba* occurs in the pedigree of a great Egyptian family of the time of the XIIIth dynasty given by Brugsch, and within the first quarter of the numerous kings of that dynasty. The same name, *Baba*, was borne by the father of Aahmes the captain, who fought against the

* *Hist.* I. 255.

† *Histoire*, I. 142.

‡ *Hist.* I. 255.

Hyksôs in the war of liberation, and by others of the same family attached to the native Egyptian patriot-princes. But Baba is a Typhonian name* of as ill omen to a pure Egyptian mind as Apap, the evil serpent, or Seti, or Pet-Ba'al. We may notice that the name בבאי, Bebaï, occurs in the lists in the books of Ezra and Nehemiah among Hebrew names. Baba, or Beb, is a Typhonian evil genius in the Ritual.

While we are on these Eastern words, I will say a few words on the curious Egyptian names reported to have been borne by Joseph and by Moses.

Chæremôn, quoted by Josephus, tells us that Joseph had the Egyptian name of *Peteseeph* (Πετσήφ),† and Manetho‡ says that Osarsiph (Ὀσαρσίφ) was the original Egyptian name of Moses, and that it was derived "from Osiris, who was the god of Heliopolis."

Now I think these names may be well explained from Egyptian sources. The latter syllable (-seph) is common to the two names, Peteseeph and Osarsiph; it is also the latter syllable of the name Joseph. An Egyptian would not be aware of the significance of the Hebrew name Joseph, but would take notice of the sound, and might well fashion an Egyptian name accordingly. Now the Heliopolitan name Peti-pa-ra, as well as the earlier Pet-Ba'al, and the like, would suggest the obvious and easy manufacture of an Egyptian name for Joseph in the form Pet-Seph. This would be a very appropriate name in the ears of those accustomed to regard Sep or Sap as the especial god of the very region from which Joseph came; for this deity "is a form of Osiris or Horus," says Dr. Birch,§ "principally adored in the Egyptian possessions in Arabia, where he is called 'Lord of the East.' He is supposed to be the entire Osiris before his destruction by Typhon, and is called in the texts of the tablets 'the greatest of the spirits of Heliopolis.'" So that to the Heliopolitans Peti-Sep would be as appropriate a name for Joseph as Pet-pa-Ra (that is, the gift of Ra, Heliodorus in Greek) was for his father-in-law. I may add that the name of this god, Sep or Sap, was familiar in earlier times than those of the Hyksôs kings as "lord of the land of the Sati or eastern foreigners," for he is "figured on a stone tablet of the time of Osortasen II. found at the temple of Wady Gasoos in the desert near Kossayr."||

Now, to turn to the name Osarsiph borne by Moses. It is

* Ebers, *Eg.*, &c. 249. Pierret, *Vocab.* 123. 126; id. *Dict. d'Arch.* 80.

† *Contra Apion.* I. 32.

‡ *Ibid.* I. 26, 29.

§ Wilkinson, *Anc. Egyptians*, III. 234.

|| *Ibid.* Pl. lvi. fig. 2.

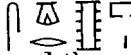
the unaltered name of Osiris in the character above-stated, (Osiris-Sapi)* and we may as well conceive Moses honoured by such a title in Egypt as Barnabas saluted *Zeus*, or Paul *Hermes*, by the Lycaonians.

Tent-seph is an Egyptian female name, occurring in the time of Sheshank I.†

It must be noticed that the two names Potiphar and Potipherah are not (as is commonly thought) identical, for while the latter is founded on the name of the great solar god Ra, especially worshipped at On (*An*) the name Potiphar would rather signify "the gift of Horus" (Pet-pa-Har).

The Prison.

The curious term גֵּיַת הַפִּסְוֶה (Gen. xxxix. 20) has received much attention.‡ Dr. Ebers has shown§ that it may be explained as an Egyptian expression, *bita sohar*, the house of the citadel, at Memphis, where the chief of the guard, or commandant, would reside.

Pierret gives the word  *shker*, *citadelle*, in his hieroglyphic vocabulary ||; and the cognate words in Hebrew (which may be found in Gesenius) seem to show that the root סָכַר, enclose, explains it best. Pierret has referred to the same etymology the name Sokar applied by the Egyptians to Osiris when enclosed in his mummy-case.¶

Potiphar's Office.

On the office borne by Potiphar, as chief of the guard, it is well to read an article by Lieblein, on Egyptian titles of this kind, from the time of Khafra downwards.**

It seems significant that Potiphar is twice noted as "an Egyptian" in Egypt, which would be very natural if the sovereign, and many of the court and citizens, were foreign conquerors.

The Dreams.

The peculiarly Egyptian character of the dreams which Joseph interpreted has been so amply shown that we need not linger here.

With regard to the pressing of the grapes into Pharaoh's

* Ancessi, *Le Redempteur*, &c., 122.

† Pierret, *Voc. Hierog.*, 691.

‡ Malan, *Phil. or Truth*, 184.

§ *Eg.*, &c., 318.

|| 552.

¶ *Dic. d'Arch. Eg.*, 517.

** *Zeitschr.*, 1874, 39; but see Harkavy, *ibid.* 1869 48.

cup, which has been difficult to explain, Sir G. Wilkinson writes:* that "grape-juice, or wine of the vineyard (one of the most delicious beverages of a hot climate, and one which is commonly used in Spain and other countries at the present day)" was among "the most noted denominations introduced into the lists of offerings on the monuments."

The punishment of the "chief-baker" seems to have been decapitation, which was an Egyptian but not a Hebrew punishment,† followed by hanging of the body on a gibbet, as Amenhotep II. hung the bodies of some slain kings of Syria on his galley, and afterwards on the walls of a fortress.

Joseph and the Pharaoh.

The exaltation of one of the Amu, or Asiatic foreigners, to be a great officer of state, might have taken place long before the Hyksôs rule, as the interesting story of Saneha testifies. But of course it would be more likely under the eastern conquerors. "The account in Holy Scripture of the elevation of Joseph under one of the Hyksôs kings, of his life at their court, of the reception of his father and brothers in Egypt with all their belongings, is in complete accordance with the manners and customs, as also with the place and time." Thus writes Brugsch,‡ than whom a more competent witness could not be called.

The Hyksôs domination had lasted (it seems) more than four centuries before the time of Joseph in Egypt. The ruling race received their name in Egypt from *hak* (or *hik*) a chief, and the well-known designation of the nomad hordes of Semitic neighbours of Egypt on the north-east, namely, the Shasu, or Shaua, or Shaus.§

It may be worth notice that the Canaanite of Adullam, whose daughter, Judah, Joseph's eldest brother, had taken to wife, bore the name שׁוּא (Shua).|| LXX. Σαυά, identical with Shaua, one form of the Shasu name. Moreover, one of Judah's sons by this wife was called Onan, אֹנָן which seems the same name as one reading, Anan, of the name of one of the Hyksôs Pharaohs.

By the time of Apapi, the fusion of interests and races and customs would have been much developed in lower Egypt, and

* *Anc. Eg.*, III. 417.

† *Hist. Eg.*, I. 264.

|| Gen. xxxviii. 2 ; 1 Chron. ii. 3.

† *Ibid.* I. 307.

§ *Ibid.* 229.

even the Egyptian Sallier Papyrus gives us to understand that he drew tribute from "all the land," the well-known expression which occurs so often in the Scripture narrative; and that Ra-sekenen, the native Egyptian lord at Thebes, was "only a hak," not a Pharaoh. Thus the difficulty of believing that Apapi could have carried out such universal measures through the hands of Joseph seems to fade away, especially when the stress of famine is borne in mind.

That the Pharaoh was not a mere despot and autocrat seems clear from the expression, "the thing was good in the eyes of Pharaoh, and in the eyes of all his servants,"* and the references to "the house of Pharaoh." This agrees well with the Papyrus, where Apapi sends to Ra-sekenen "a message which his secretaries had advised him."

Chariots and Horses.

One notable addition to the force and pomp of Egypt we find since the days of Abraham. The Pharaoh has chariots, and horses are mentioned as belonging, not only to the court† but to the people.‡ Now, previously to the Hyksôs there is no more evidence of horses in the monuments than in the Scriptures; but in two celebrated inscriptions of the very time now in question, in the tombs of El-kab,§ we find them mentioned:—A young officer's duty was to accompany on foot the Pharaoh Aahmes when he rode in his chariot.

This namesake of the king also captures a chariot of war and its horses in the "land of Naharina," during a campaign of Thotmes I.; and another Aahmes, also seized for the same king "a horse and a chariot of war" in the same country. Thus it appears that horses were introduced from the east into Egypt during the rule of the Hyksôs.

"The greatest honour conferred on Joseph," says Sir G. Wilkinson,|| "was permission to ride in the second chariot which he (the king) had. This was a royal chariot, no one being allowed to appear in his own in the presence of majesty, except in battle."

The Pharaoh in Genesis uses the expression,¶ "Can we find (such a one) as this (is), a man in whom the Spirit of God (is)?" רוּחַ אֱלֹהִים. Some light is thrown on such a phrase, from an Egyptian point of view, by Mr. Le Page Renouf's interesting

* Gen. xlv. 2; xli. 37; l. 4.

† Gen. xlvii. 17.

|| III. 443, note.

† Gen. l. 9.

§ Brugsch, *Hist.*, I. 248, 251, 289.

¶ Gen. xli. 38.

paper on the Egyptian word U , *ka*.* This word, as signifying *spirit*, is applied freely to the gods. In one of the chapters of the Ritual, of extreme antiquity, the *kas* of Osiris, Horus, Suti, Thoth, and other gods, are mentioned as distinct from those divinities . . . "the fourteen *ka-u* of Ra," &c. "In passages like these," says Mr. Renouf, "*ka* has a sense very similar to that of 'Spirit' in Isaiah xi. 5—the Spirit of the LORD shall rest upon him," &c.

"By the life of Pharaoh" was a well-known Egyptian oath. It is curious that Q , *ankh*, means "to swear," "oath," as well as "life."† The accused takes an oath "by the king's life" not to speak falsely. A man swears "by the name of the Pharaoh." A workman in a necropolis had sworn by the name of the Pharaoh, and was reported by an officer to the prefect of the town. It was beyond the competence of the subordinate, he said, to punish the workman for this offence.‡ Thus it would seem that great lords might swear by the Pharaoh without rebuke :

"That in the captain's but a choleric word
Which in the soldier is flat blasphemy."

Certainly solemn and judicial use of oaths was commanded, but perjury and careless swearing were prohibited and punished, and included amongst sins in the Ritual.

It is singularly interesting to find the suspicious words, "surely ye are spies," in the Sallier Papyrus I. in the mouth of Ra-Sekenen, when Apapi's ambassador comes to him. "Who sent thee here to this city of the south? How hast thou come to spy out?"

The kindly fellowship of the Pharaoh "and his house" in Joseph's happiness has a pleasant parallel in the case of Saneha's return to the palace of Amenemha I. from his adventurous wanderings long before.§

The interpreter || serves the same office as the scribe Khiti on the introduction of the thirty-seven Amu to Khnumhotep.

An interesting point arises with regard to the ring of the Pharaoh, *tabba'ath*, טבבצרת, the well-known golden signet-ring with its engraven stone. This was the symbol of authority given by the Pharaoh to Joseph. But the signet,

* *T.S.B.A.*, VI. 505.

† Brugsch, in *Zeitschr.* 1868, 73 ; 1874, 62. *T.S.B.A.* I., 178 ; III. 345.

‡ Chabas, *Mélanges*, III^{me} serie, tome II. 48.

§ *Records* VI. 131.

|| *Gen.* xlii. 23.

תורת, given by Judah as a pledge to Tamar, with its twisted cord, must have been the seal-cylinder of Babylonia, pierced through its length and attached round the wrist in the usual way, which was used by the eastern races, and by them introduced into Egypt, although never very common there.

The religious predilections of Apapi are clearly set forth in the Sallier Papyrus: "The King Apapi chose the god Set for his divine master, and he did not serve any of the gods which were worshipped in the whole land. He built him a temple of beautiful work to last a long time [. . . and the king] Apapi (appointed) feasts (and) days to offer (sacrifices) at each time to the god Sutech."*

This decisive action and the attempt to enforce compliance on Ra-Sekenen, who seems to have declared himself equally an exclusive worshipper of Amon-Ra, the great god of Thebes, led to the war of liberation which that prince began and Aahmes completed.

It is in full accordance with the Papyrus that on the right shoulder of each of the sphinxes which Mariette has recovered from his great temple at San Apapi has engraven his name with the title, "Beloved of Set."†

Mariette considers this XVIIth dynasty of Hyksôs of San to have been Kheta,‡ Hittites, whose especial god was Sutekh or Set.

If Joseph was highly honoured by a Pharaoh of Hittite race, we may well remember the reverence with which his great-grandfather Abraham was regarded, both by the Amorites, his allies, and the sons of Kheth, from whom he bought his "possession of a burial-place" for himself and his posterity. I do not know why we should doubt that Joseph's lineage was known to the Pharaoh.

The details of the ceremony observed when the Pharaoh delegated his authority to Joseph have been much discussed.

The expression in Gen. xli. 40: "At thy mouth shall all my people kiss," may be explained in more than one way in consonance with Egyptian customs; not indeed, as was first thought, that they should kiss his mouth.

Sir G. Wilkinson§ takes it as referring evidently to the custom of kissing a firmân. Before the Pharaoh a subject would kiss the ground.|| The ordinary attitude of submissive

* Brugsch, *Hist.*, I. 239. *T.S.B.A.*, IV. 263. Ebers, *Æg.*, &c., 205.

† Mariette, *Aperçu*, &c., 27, 87.

‡ Ibid. 27.

§ *Anc. Eg.*, I. 294.

|| Brugsch, *Hist.*, I. 86.

attention was that of kissing the hand before the master: "Be seated, thy hand to thy mouth," as Pierret quotes from Pap. Sallier II.*

But Chabas supposes that the phrase indicates the elevation of Joseph to the dignity mentioned in an inscription of the XVIIIth dynasty by the title which he renders as "grande Bouche Superieure dans le pays tout entier."†

It cannot well be doubted that the cry of "Abrek," translated "bow the knee," is the same word still addressed to the camel when he is to kneel.‡

The title translated "Father to Pharaoh" § represents an Egyptian rank, "Ab en Pi-rao," the head of Pharaoh's court.||

The title in Gen. xlii. 6, "the *governor* of all the land" is in Hebrew שַׁלְטָן, *shallit*, only here used in the Pentateuch (again in Ecclesiastes, and in Ezekiel and Daniel). It is the title borne by the first Hyksôs king, whose name is given by Manetho, and inscribed on a statue found by Mariette at Tell-Mokdam, near Tanis: "The good god, the *star* of both worlds, Set Sha(1)ti, beloved of Sutekh the lord of Avaris."¶

It is a true Semitic word meaning "ruler," and might well be delegated to his deputy by a Hyksôs king, who himself assumed the Pharaonic style and titles. The symbol "star," which, in the cuneiform character denoted "god" (and so "lord"), is particularly interesting,** and may well remind us of Balaam's prophecy, "a star shall rise;" and of Joseph's dream, where sun and moon, and "the eleven stars" render homage to his own star.

We have seen an Egyptian name, Peteseph, attributed to Joseph. The Bible gives us the title of honour conferred on him by the Pharaoh. We will not repeat all the explanations of this. Mariette and Lenormant have noticed that Kames, the Theban prince, whose son, the celebrated Aahmes, restored the native Egyptian monarchy, assumed the title Tsaf-en-to, exactly answering to Tsafnath in Hebrew, and which means "Nourisher of the land." ††

Brugsch †† has explained the whole title as follows:—"According to the indication of the monuments, the town of

* *Dic. d'Arch.*, "Bouche."

† XIX. dyn. 14. Vigouroux, *La Bible*, II. 104.

‡ Chabas, *Etudes*, 412. § Gen. xlv. 8. || Brugsch, *L'Exode*, 18.

¶ Ebers, *Ägypten*, &c., 202. Meyer, *Set-Typhon*, 56.

** *Studies on the Times of Abraham*.

†† Vigouroux, *La Bible*, II. ii.

‡‡ *L'Exode*, 17. For other views see Malan, *Phil. or Truth*, and Canon Cook, *Sp. Bib.*, I. 480.

Pitom, the capital of the district of Sukot, had a second name, which it owed to the presence of its god *Ankh*, *he who lives*, and which in Egyptian is pronounced *pāa-ānkh*, the habitation, the dwelling, of the god *Ankh*. Conformably to this name the district of Sukot was called otherwise *p-u-nt-pāa-ānkh*, 'the district of the dwelling of him who lives.' Add to this monumental name the Egyptian word *za*, so well known to designate the governor of a town or a district, and you have the title of *Za-p-u-nt-pāa-ānkh*, 'the governor of the district of the dwelling of him who lives,' which a Greek of Ptolemaic times would render by this translation, 'the nomarch of the Sethroitic Nome.' "

I do not presume to decide where doctors so eminent disagree. Anyhow, it is very clear that the title is Egyptian, and that it will bear without distortion to be done into hieroglyphic, and translated in a very apposite sense. If it be objected to Brugsch's rendering that a nomarch's title would be below the mark of Joseph's rank, it may be replied that he bore other and more inclusive titles besides. The matter is sure to be still further sifted.

The office of lord, *Adōn*, over all the land of Egypt,* is a genuine Egyptian title which Brugsch has only once again found in an old Egyptian inscription, where it is given to king *Hor-em-heb* (*Horus*) of the XVIIIth dynasty, before he came to the throne.

M. Chabas has given a translation of a sepulchral tablet at Turin, commemorating *Beka*, a functionary, probably of the XIXth or XXth dynasty, who bore the titles of superintendent of the public granary, comptroller of upper and lower Egypt. The learned writer compares the offices of this high personage with those of Joseph.

The name *Asenath*, אַסְנַת, is doubtless Egyptian, and has been explained in the sense "throne of Neith," † or "favourite of Neith." ‡ But Brugsch says, § "The name of his [Joseph's] wife, *Asnat*, is pure Egyptian, and almost entirely confined to the old and middle empire. It is derived from the very common female name *Sant* or *Snat*."

Joseph and his Brethren.

We have before spoken of the imputation that Joseph's brethren were spies, and of the employment of an interpreter at court, and of the use of oaths. There is a small detail in

* Gen. xlv. 8.

+ *La Bible*, &c. I. 112.

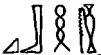
‡ *Sp. Bib.*, I. 479.

§ *Hist.*, I. 265.

the narrative which is at first sight almost amusing. Joseph inquires, "Is your father well, the old man of whom ye spake? Is he yet alive?" And they answered: "Thy servant, our father, is in good health; he is yet alive."

The inverted order, "Is it peace to him? Is he alive?" is very unusual; but it seems also to be purely Egyptian. Chabas* gives us some most interesting extracts from letters written in the time of Menepthah (probably the time of Moses), by a lady in an Egyptian outpost in Syria, to friends at home in the Delta. In these familiar communications, the very phrase in question occurs more than once. She writes: "I am very well off; I am alive;" and again, about a friend: "His majesty's aide-de-camp Setemua is in good plight; he lives; don't trouble yourself about him; he is quartered with us at Tamakhirpé"—the garrison in question.

It is true that the Egyptians thought so much, and with so little fear, of death and things beyond, that to them the question, "Is it peace to such an one?" might not seem to render superfluous the further inquiry, "Is he alive?" Anyhow, this coincidence is to me very pleasing.

The cup of Joseph's divination is worthy of note. The Hebrew word כַּיִן is used only in Genesis in this passage, in Exodus xxv., xxxvii., of the "bowls" of the golden "candlestick;" and in Jeremiah xxxv. of "pots of wine" in the priests' chambers. May it not be identical with the Egyptian word , † *kebh*, applied to the vessels used for libations.

The beautifully-formed vessels of silver, as well as of gold, brought from Phœnicia during the reigns of the XVIIIth dynasty, may well illustrate the probable character of Joseph's cup of silver.

For some interesting remarks on divination by cups we may refer to a paper by Mr. Rodwell in "T.S.B.A." II. 115.

The Long Famine.

Egyptian records have been keenly interrogated for any allusion to the long famine of Joseph's days. Credit is claimed for several governors, from early dates downwards, for provident supply and the saving of life.

At length Brugsch-Bey ‡ brings before us a sepulchral inscription at el-Kab (Eileithyia), which, he is persuaded, bears witness to the measures taken by a local ruler, attached to

* *Melanges*, IIIe serie, tome II., 152; also *Etudes*, 216.

† Pierret, *Vocab.*, 617.

‡ *Hist.* I. 262. *Histoire*, 176, where the original of the chief passage is given.

the court of the patriot Egyptian governor Ra-sekenen, of whom we have spoken. "The inscription," he says, "which exists in the hall of sacrifice of this tomb, on the wall opposite to the door of entrance, contains the following simple child-like representation of his happy existence on earth, owing to his great riches in point of children: 'The chief at the table of princes, Baba, the risen again, he speaks thus: I loved my father, I honoured my mother; my brother and my sisters loved me: I stepped out of the door of my house with a benevolent heart; I stood there with refreshing hand, and splendid were the preparations of what I collected for the feast-day. Mild was (my) heart, free from noisy anger. The gods bestowed upon me rich fortune on earth. The city wished me health, and a life full of freshness. I punished the evildoers. The children which stood opposite to me in the town during the days which I have fulfilled were, small as well as great [I think 'small' may mean grandchildren, H.G.T.], sixty: there were prepared for them as many beds, chairs (?) as many, tables (?) as many. They all consumed 120 *epha* of durra, the milk of three cows, fifty-two goats, and nine she-asses, of balsam a *hin*, and of oil two jars. My speech may appear a joke to some opponent, but I call as witness the god Month, that my speech is true. I had all this prepared in my house. In addition I gave cream in the pantry, and beer in the cellar, in a more than sufficient number of *hin* measures. I collected the harvest, a friend of the harvest-god ['loving the good god'*], I was watchful at the time of sowing, and now when a famine arose, lasting many years, I issued out corn to the city at each famine (or also, to each hungry person).'"

"There ought not," continues the distinguished historian, "to be the smallest doubt as to whether the words of the last inscription relate to an historical fact or not; to something definite or something only general. Strongly as we are inclined to recognise a general way of speaking in the narrative of Ameni (see p. 154), where years of famine are spoken of, here we are compelled, by the context of the report before us to understand the term, 'the many years of the famine which arose,' as relating to a definite historical time. For famines following one another on account of a deficiency of water in the overflowing of the Nile were of the greatest rarity, and history knows and mentions only one example of it,

* See the note *Histoire*, 177.

namely, the seven years' famine of the Pharaoh of Joseph. Besides, Baba (or, if the term is preferred, the Babas, for the most part the contemporaries of the XIIIth and XVIIth dynasties), about the same time as Joseph exercised his office under one of the Hyksôs kings lived and worked under the native king Ra-sekenen Taa III. in the old town of El-Kab. The only just conclusion is, that the many years of famine in the time of Baba must precisely correspond with the seven years of famine under Joseph's Pharaoh, one of the Shepherd kings."

It is worth while to recur to the express statements of the Papyrus before quoted, that the whole land brought its productions to Apapi at Avaris, and that Ra-sekenen was under him as his suzerain. Thus the worthy Baba may well have acted under general instructions from the Delta. He says, "I issued corn to the city." Joseph "laid up the food in the cities,"* that is, "throughout all the land of Egypt,"† "and as for the people, he removed them to cities, from (one) end of the borders of Egypt even to the (other) end thereof."‡ That is, where the food was, thither he gathered the people out of the famine-stricken open country.

An interesting remark is made by Dean Milman § on the agrarian law of the Hebrews. He says, "The outline of this plan may have been Egyptian. The king of that country, during the administration of Joseph, became proprietor of the whole land, and leased it out on a reserved rent of one-fifth, exactly the two-tenths or tithes paid by the Israelites."

Many facile but superficial objections have been urged against the likelihood of the narrative in detail. I have not time to take up these. But some of them have been so well anticipated by Dr. Thomson,|| that I must quote a little by way of example. . . . "When the crops of this country fail through drought or other causes [he is speaking of South Palestine], the people still go down to Egypt to buy corn, as they did in the time of the patriarchs. It has also frequently occurred to me, when passing a large company of donkeys on their way to buy food, that we are not to suppose that only the eleven donkeys on which the brethren of Joseph rode composed the whole caravan. One man often leads or drives half a dozen; and, besides, I apprehend that

* Gen. xli. 48.

† Gen. xli. 46.

‡ Gen. xlvii. 21.

§ *Hist. of the Jews*, I. 231.

|| *The Land and the Book*, 595.

Jacob's sons had many servants along with them. Eleven sacks of grain, such as donkeys would carry, would not sustain a household like his for a week. It is no objection to this supposition that these servants are not mentioned.

Thus, had it not been for the capture of Lot by Chedorlaomer, we should not have known that Abraham had three hundred and eighteen full-grown men in his household; and so, also, had it not been necessary for Jacob to send company after company to guide his large presents to meet Esau, we might have been left to suppose that he and his sons alone conducted his flocks in his flight from Mesopotamia. But it is certain that he had a large retinue of servants, and so, doubtless, each of his sons had servants, and it is incredible that they should have gone down to Egypt without them. On the contrary, there is every reason to believe that there was a large caravan. The fact, also, that the sons themselves took part in the work, and that each had his sack under him, is in exact correspondence with the customs of tent-dwelling shepherds at this day. The highest sheikhs dress and fare precisely as their followers do, and bear their full share in the operations of the company, whatever they may be."

We must always remember that the corn was carried in quite a different thing* (Heb. קְלִי, *k'li*) from that † (שַׂק, *sag*) sack which contained the "provender," and in which each man's money, and the silver cup, were secretly put. The latter receptacle is also called by a third Hebrew name, viz., אֲמַתְחָת, *amtakhath*, ‡ a word never again occurring in Scripture. Yet learned professors put into the hands of "young people" [in the year 1873] such objections as the following: "The whole world suffers from the famine, and is obliged to go to Egypt for corn. This is necessarily involved in the story, for why else should Jacob's sons have chosen Egypt for their second as well as their first purchase of corn? Is such a state of things credible in real life? Again, Jacob sends ten of his sons, each with his own ass, to buy corn. One cannot help asking why he did not send one son at the head of a caravan? What little provision was laid in in this way, however, cannot have gone far towards supporting the whole family, especially if, as we are told, part of it had to be used as fodder for the beasts on the way. And yet the story tells us distinctly that each of Jacob's sons took his own sack with him upon his


* Gen. xlii. 25.

† Gen. xlii. 27.

‡ Gen. xlii. 27, 28, &c.

own ass; else, how could it be said that the cup was hidden, and afterwards found in Benjamin's special sack?" And so on.

The Pharaoh, Joseph, and Jacob's house.

The knotty question of the true inferences to be drawn from the mutual behaviour of Joseph and Jacob's house on the one part, and the Pharaoh on the other, has called forth various attempts at a solution. I cannot but think that a reasonable explanation awaits the reader who looks at the matter as a part of the condition of things under the Hyksôs rule. The plain meaning of "abomination," Heb. תוֹעֵבָה, *to'ēvah*, must be kept (and we may, perhaps, notice that in Egyptian, *tui, tua*, , is "abominable," "detestable.")*

That to the *Egyptians* every shepherd was an abomination was a consideration that would lead to the family remaining in Goshen, where they already were, "the best of the land." If "Egyptians" or "Egypt" (Mizraim) meant the native race, as distinct from the Hyksôs and mixed people of the Delta (as Potiphar was noted "an Egyptian"), then the reasoning is plain, and would prevent Joseph's kinsfolk from being sent up the country.

The Pharaoh, kindly entering into this plan, orders that any men of ability among them should be made superintendents of *his own* cattle. They were no abomination to him, as his whole demeanour towards them plainly testified; and this helps to show that he was of Asiatic race.

Joseph and his Father.

A very curious inquiry it is: what is the real meaning of the words which describe the solemn transaction between Jacob and Joseph at the end of chapter xlvii. of Genesis? "And he (Jacob) said: 'swear to me,' and he (Joseph) swore to him. And Israel bowed himself down to the head of the staff." For I take the sense given by the LXX. and the author of the Epistle to the Hebrews,† namely, *staff*, and not *bed*. It is observable that the Hebrew says "the top of *the* staff," not "of *his* staff." And it has often been referred to Joseph's, and not to Jacob's own, staff. And this explanation has been repudiated, with good reason, if it were supposed that the bowing-down implied a religious act of worship to the head of Joseph's staff.

* Pierret, *Vocab.*, 665.

† Heb. xi. 21.

Nevertheless, it is worth while to inquire whether there was not a solemn interchange of mutual reverence.

The son Joseph obeys his father's behest by swearing to fulfil his injunction to bury him in the Makpelah.

But in making that request Jacob had observed a ceremonial reverence as towards a lord; "If now I have found grace in thy sight," being evidently mindful of the high place of authority held by Joseph, which, indeed, was ultimately manifested by the royal pomp of the obsequies accorded to Jacob.

Whose, then, was "the staff" in question, to the head of which Jacob bowed himself down? If Joseph's, it was the symbol of the high authority of "the lord over all the land of Egypt," the deputy of the Pharaoh, "at whose mouth every one should kiss:" and Jacob might well remember his own old incredulous question—should he, indeed, come to bow down himself to Joseph?

It would be an act of homage rendered in express fulfilment of the Divine prognostic of the dream.

This explanation receives, I think, a new and striking light from the researches of the very eminent Egyptologist, Chabas, who mentions the use of the "head of the staff" (𓏏𓏏)* in making oath, by touching that part of the symbol of authority in token of homage.

The staff of office may be seen in the British Museum, of ebony or other wood, and its head of ivory carved as a papyrus flower. This mutual solemnity of the filial oath of Joseph in the Hebrew manner, and the Divinely-ordered homage of Jacob after the Egyptian form, is moreover the only occasion on which the fulfilment of the dream on Jacob's part is recorded.

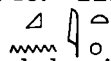
The patriarch had, indeed, blessed the Pharaoh, † who was worshipped by his own subjects as a veritable god.

But here, where no profanation could be supposed, Jacob renders homage to the Pharaoh's vicegerent in the person of his own long-lost son.

Jacob's Death and Obsequies.

The process of embalming has been often described. It is interesting that the Hebrew word used in Gen. l. occurs nowhere else in Holy Scripture except in reference to the

* Pierret, *Vocab.*, 405. † *Cat. of B.M.*, 39. ‡ Gen. xlvii. 7.

“ putting-forth ” of figs in the Song of Solomon, ii. 13. The verb is כָּהַנַּת, *khānat*. Is it an Egyptian word?  Kena-t is given by Pierret* in his “ Hieroglyphic Vocabulary,” and translated as “ colour.” He adds, “ we see the word always written above paintings of *yellow* colour.” Now the prevailing colour of the Theban mummies of the best style, and of their interminable bandages, is a saffron yellow. The word as applied to figs might refer to colour. And the plural כָּהַנִּי, *khintin*, wheat, in Ezra † may well signify originally *yellow*, as wheat is named from colour in many languages besides our own. This may be worth the trouble of sifting.

Doubtless by “ my grave ” (Heb. קֶבֶר, *qēvēr*) “ which I have digged for me in the land of Canaan ” ‡ Jacob intended the special recess in the “ cave,” מְעָרָה, *m'ārāh*, which he had prepared for his own body, as Dr. Thomson has explained the matter.§ It was doubtless “ by faith ” that he was moved to make his command, and this faith not only laid hold of the covenant and promise of God with regard to the land of Canaan, and inspired the pious wish to be “ gathered to his fathers ” in the Makpelah, as well as in She'ol, the unseen world: but Jacob was probably moved by the desire to avoid lying in an Egyptian sepulchre (as Abraham had avoided “ the choice ” of the tombs of the sons of Kheth) surrounded by the “ pomp and circumstance ” of that religion which he repudiated. Joseph’s “ servants the physicians ” may be distinguished from the Egyptian priestly masters of the obsequies, and so (as the Abbé Vigouroux believes) by Joseph’s pious care the observances of the Ritual were avoided, even if Jacob could have been “ subjected to the ordinary treatment of the Egyptians, and embalmed by their embalmers,” which Bishop Harold Browne|| thinks was not the case.

The mourning of “ seventy days ” for Jacob seems to have been the full term for the expression of the utmost honour, as Diodorus states the mourning for a king to have lasted seventy-two days.

Jacob’s express and repeated mention of Ephron, and the sons of Kheth, and the extraordinary honour rendered in the magnificent Pharaonic procession of “ all the servants of Pharaoh, the elders of his house, and all the elders of the land

* *Vocab.*, 624. † vi. 9; vii. 22. ‡ Gen. i. 5; cf. Is. xxii. 16, &c.
§ *The Land and the Book*, 106. || *Sp. Bib.*, I. 234.

of Egypt," with "chariots and horsemen,"—"a very great host"—(מַחְנֵה, *makhaneh*), besides, "the house of Joseph," and the "grievous mourning to the Egyptians" would become more natural in our eyes if, indeed, the royal house of Egypt were themselves "sons of Kheth," as Mariette tells us the Pharaohs of this Hyksôs dynasty were; and as also in so important a sense and degree were the monarchs of the great XIXth dynasty, Seti and his line, worshippers of the Hittite god, Sutekh, as devout almost as Apapi himself.

I do not think this has been duly taken into the account; and, indeed, the greatness and historic importance of the Hittites is only dawning upon us, and their history is awaiting its *vates sacer*, in the person, I hope, of Prof. Sayce. It seems a very just observation, that "Joseph spake unto the house of Pharaoh," and not to the Pharaoh himself, for permission to go up to Khebron to bury his father, because the Hebrew custom of letting the hair and beard grow, and wearing sackcloth, in mourning, would exclude him from the presence of "his holiness." This is one of the very numerous and varied points which display the "Ægypticity," as Ebers says, of the narrative.

So, also, does the age of Joseph at his death. "Joseph died an hundred and ten years old," by which I understand that he had reached *at least* that desired age. Berossus gives a hundred and sixteen years as the ideal length of life.* But among the Egyptians a hundred and ten years was for many ages the desired limit. As instances we may take one of a very early date, another of the XIXth dynasty. The venerable Ptahhotep, who lived in the ancient time of the Vth dynasty, says, "I have passed 110 years of life by the gift of the king."† And in a court poem, addressed to Seti II., the scribe assures him "thou shalt dwell 110 years on the earth."‡ "It is the number of years," writes Pierret,§ "invariably adopted by the formulary of the inscriptions whenever there is asked of the gods the boon of a long and happy existence."

"And Joseph dwelt in Egypt; he and his father's house: and Joseph lived an hundred and ten years."|| We may well notice with interest the statement with regard to his great descendant, Joshua,¶ that he, also, "died, a son of an hundred

* *T.S.B.A.*, iii. 147.

† Chabas, *XIXth Dyn.*, 119.
|| Gen. 1. 22.

† Birch, *Hist. Eg.*, 51.

§ *Dict. d'Arch.*, 308.

¶ Josh. xxiv. 29.

and ten years." He had reached this milestone in his pilgrimage so much desired by the sons of Mizraïm.

"And Joseph said unto his brethren, I die, and God will surely visit you, and bring you out of this land unto the land which he sware to Abraham, to Isaac, and to Jacob. And Joseph took an oath of the children of Israel, saying, God will surely visit you, and ye shall carry up my bones from hence. So Joseph died an hundred and ten years old; and they embalmed him, and he was put in a coffin in Egypt." Doubtless this coffin was a wooden sepulchral chest (Heb. אָרוֹן), such as the Egyptians often used to enclose their mummies.

"And Moses took the bones of Joseph with him,"* which very well accounts for the wild tradition, as it would otherwise seem, of Chæremôn,† that Joseph (Peteseeph) as well as Moses (Tisithen) led the Exodus; and for Manetho's confusion of Moses with Osarsiph, the priest of Heliopolis, if by Osarsiph Joseph was really meant.‡

And under the vast echo of the blessings and curses from the hollow sides of Gerizim and of Ebal lay the bones of Joseph in their Egyptian spicery, carried by his descendants to be buried at length in due season in the very field of his father's possession, where the brave boy had been seeking his brethren when he was sent on to his doom at Dothan.

And there, in a hidden sepulchre, perhaps Joseph still awaits in the flesh his further destiny.§

Much more of course might be added to this sketch of the life of Joseph in the light of external evidence. And I have not taken up our time in argument, but reserved it for discussion.

Remembering the command of all the resources of Egyptian skill in the recording and preserving of historic memorials, possessed both by Joseph and by Moses, on the supposition that the Scripture narrative is simply true, and in view of the never-failing "Ægypticity," ascertained by the minute research of the learned Ebers, and by the familiar mastery of Brugsch, I am quite unable to see cause why this Joseph should, at the bidding of some modern critics, be resolved into a meteorologic mythus, or into an ethnological expression invented to denote "Israel" as opposed to "Judah," in the days of the kings or later; or, in short, into any other than the old historic son of Jacob, whom Jew and Christian have seen in him throughout the ages.

* Ex. xiii. 19. † Jos. *Contra Apion*. I. 32. ‡ Canon Cook, *Sp. Bib.* I. 462.
§ For a careful account of the spot see *T.S.B.A.*, ii. 80.

POSTSCRIPT.

SINCE the foregoing paper was sent to the printer, a friend has sent me an interesting article by M. Ed. Naville in the *Revue Chrétienne* (1878, pp. 65 *et seqq.*), on the Israelites in Egypt, which contains many observations on the history of Joseph.

There is nothing, however, which differs from the views which I have expressed. The eminent Egyptologist believes that both Abraham and Joseph were in Egypt in the time of the Hyksôs Pharaohs, and considers the assertion of the Syncellus, that Joseph was made prime minister by Apophis (one of the last Hyksôs kings), "perfectly conformable with the chronological data."

I have also since procured a paper by M. Chabas, on the use of the walking-staff among the Hebrews and in ancient Egypt, and am much pleased to observe that he has already suggested the same connection between the ceremony of touching the head of the staff in making oath, and the act of Jacob in bowing himself to the head of the staff (that is, of Joseph's staff), as a token of homage, which I have noticed. I cannot but believe that this is the true explanation of the matter. M. Chabas has not remarked that this was the fulfilment of the dream. But this point was not relevant to his inquiry, although so very interesting in ours.

In my paper I have omitted to mention the celebrated Tale of the two Brothers (Papyrus d'Orbiney), which in several points bears so curiously on the story of Joseph in his lord's house. It is carefully treated by Dr. Ebers, who sees in it a striking proof of the "Ægypticity" of the Biblical narrative. A similar view is taken by Brugsch.

The CHAIRMAN.—I have now, on behalf of the meeting, to return thanks to Mr. Tomkins for his very interesting paper. (Hear, hear.) As he has received some correspondence on the subject with which he has dealt, it would, I think, be desirable that he should be invited to read it to us before the discussion on the paper commences; it will probably form a very useful introduction to the discussion.

The Rev. H. G. TOMKINS.—I have received one or two letters which are very interesting, and I think that those present will be particularly glad to hear the letter of M. Naville, who is one of the leading Egyptologists

of the present day,—a gentleman to whom was assigned the very arduous and most honourable task, by the Congress of Egyptologists, held in London, and presided over by Dr. Birch, of editing the great book—"The Ritual of the Dead," or "Book of the Dead"—the great book which treats of the destiny of the soul in the Hades of the Egyptians. (Hear, hear.) I communicated with M. Naville and heard from him about another matter, but I have received from him the following letter, written in English, and dated from Cannes :—

"VILLA AUGUSTA, CANNES, *January 23rd.*

'MY DEAR SIR,

"Accept my best thanks for your two letters, and for your paper on the Life of Joseph, which has been sent to me from Geneva. I have read it with great interest. It is, in fact, the outline of a very learned and useful commentary on the last chapters of Genesis.





"Now, I believe it is necessary that such books should be written. Christians have so often been reproached with their fear for scientific inquiry that it is our duty to show that, on the contrary, we would gladly favour all researches bearing upon Holy Scripture, and face the results at which scholars may arrive. On the other hand, we are to be cautious, and remember that knowledge is a capital which increases every day, but which is most movable. Egyptian and Assyrian scholars are often obliged to destroy what they have built with their own hands. It is therefore most important that a book written on such a grave subject should unite, like yours, sound learning and impartial criticism.

"As you do me the honour to ask for some further information, I must say that there are a few points on which I might add, perhaps, some particulars, but for the unfortunate circumstance of my being without a single book ; I am obliged to quote from memory ; however, you will allow me two or three observations."

[Here follows a critical observation which will be embodied in some detailed remarks on the form of oath referred to in p. 103.]

"I may here say that I have been pursuing this question as to the 'top of the staff' in a very minute manner, and the result of it all is that I believe Chabas was right in thinking that the passage in the papyrus Abbott referred to touching, or bowing to, or coming into some kind of contact with, the top of the staff, which designated the authority of the superior officer who tendered the oath, and I have since seen a most interesting passage in Brugsch's *History of Egypt* quite to the same effect, where the Pharaoh in a royal proclamation, equivalent to a charter, speaks of the people belonging to the Temple 'who are on the top of my staff,' or rather 'who are on the carved flower-knob of my staff.' Of course the expression 'on the staff' is perfectly familiar to English people, and it comes to the same meaning as was the case in Egypt. 'Attached to the staff,' or 'on the staff,' of the commanding officer is a perfectly common expression, and here, in Egypt, we have the beginning of it, and when asked a question as to 'the top of the staff,' we can explain

what is meant by modern usage. 'On the staff of the general' means attached to his authority, and the symbol is the bâton carried by a field-marshal, the sign of his great authority being attached to the top of the bâton in the form of the crown worn by his sovereign. (Hear, hear.) Therefore you must see you have an expression at the present day parallel to that used at the time of Joseph, and I ask why should not the bowing down to the top of his staff refer to the homage rendered to the vice-regal authority vested in Joseph?" M. Naville goes on to say:—

"The other day I came across a picture which reminded me strongly of Joseph and his employment. It is in Lepsius, *Denkm.* iii. 76 and 77, and *Prisse Monuments*, pl. 39-42. It has been taken from a tomb. There you see the King Amenophis III. sitting on his throne, and before him one of his ministers, Chaemha,     who seems to have had a very high position;"—

I was looking at this in the British Museum library the other day, and it is a most interesting tableau, representing all the people present, except the one great officer, bowing down with hands on their breasts, some of them actually flat down, licking the dust, and the others according to their several ranks, in different degrees of abasement; but the one great functionary, who may be likened to Joseph, is standing upright like a man, and there is an officer—some master of the ceremonies—engaged in fastening a royal collar of gold, the gift of the king, round the great officer's neck, just as the collar was put round the neck of Joseph. M. Naville proceeds thus:—

"He is called *The chief of the granaries of the whole kingdom*. Behind him are a great number of officials of different classes, bringing the tribute of the whole land. This man seems to have had nobody above him, as he speaks to the king himself, and he had under his command all the tax-gatherers and all that concerned the granaries. Besides he has this strange title, *The eyes of the king in the towns of the south, and his ears in the provinces of the north*; which implies that he knew the land perfectly; and that, like Joseph, 'he had gone throughout all the land of Egypt,' (Gen. xli. 46). I think Brugsch mentions Chaemha in his history, but I do not remember whether he points to his resemblance with Joseph,* which I find particularly striking, considering that Joseph seems to have been a purely civil officer, and to have had nothing to do with the military class, which, however, must have been powerful under Apophis, who had wars during his reign.

"How very Egyptian verse 49 of the same chapter, compare line 11 of the great tablet of Abu Simbel: 'I will give thee corn in abundance, to enrich Egypt in all times; the wheat is like the sand of the shore; the granaries reach the sky, and the heaps are like mountains.'

* No. See *Hist.* i. 437.—H. G. T.

"I am glad to see that you were interested by the article I wrote in the *Revue Chrétienne*. I think that I expressed there my opinion about Joseph's marriage. I believe that the king did it on purpose to have one of his men connected with the most ancient and the most venerated college of priests. The importance of Heliopolis as a religious centre comes out in many inscriptions, and it is natural that Apophis should attempt to create a link between his Government and those priests, who most likely were of pure Egyptian origin. The priests in general must have been very powerful at that time when we see Joseph respecting all their privileges, while he taxed so heavily the rest of the country. Of course all those points require some further proofs; but they seem to me to agree pretty well with the Hebrew narrative. The Egyptian character of the whole account is certainly the best demonstration of its authenticity.

"There are a good many points on which I should like to make some more remarks; but without any book of reference it is hardly possible, specially for a man who is now entirely absorbed in the variants of the Ritual. I look forward to the publication of your book, which will deserve careful study. . . . Excuse this letter, much too long for its worth, and believe me, my dear Sir,

Yours truly,

"EDOUARD NAVILLE."

I have also received a letter from M. l'Abbé Vigouroux, who writes :—

"J'ai été heureux de constater, lors de la publication de vos *Studies on the Times of Abraham*, si intéressantes et si remarquables, que nous étions arrivés à des résultats analogues; cet accord me semble une confirmation frappante de la vérité que nous cherchons l'un et l'autre à défendre.

"Je viens de lire aussi avec beaucoup de plaisir vos excellentes observations sur l'histoire de Joseph. Tout m'y paraît juste et exact."

There are also letters from Dr. Birch and Mr. Reginald Stuart Poole, to whom I am indebted for valuable notes on points of detail, of which I will avail myself in some additional observations ultimately.

Mrs. Finn has kindly sent me the following remarks :—

P. 85. In Palestine appliqué-work of coloured פִּיִּם is still used as ornamentation. Coloured "pieces," = "patches," are skilfully laid on and form very pretty ornament to garments.

P. 95. חֶרֶם in its Arabic form is still the name for the signet, whether ring or seal.

[In Egyptian, *Teb* is the finger-ring, *Khatem* is the signet or sealing-ring. Both occur.—Note by Dr. Birch.]

P. 96. שָׁלֵט , known to us in the word *Sultan*.

P. 98. "Is he well?" (Arabic *Tayyeb*, טוֹב) is still synonymous in Palestine with "to be alive."

P. 100. You notice the $\frac{1}{3}$ of the agricultural produce. To this day in Palestine the cultivator gives the owner of the land $\frac{1}{3}$ if he has found not

only labour but cattle and seed. If the owner gives cattle and seed as well, the cultivator only gets $\frac{1}{2}$ of the produce.

P. 103. It may be worth notice that a walking-staff in Palestine is often carried *head-down*.

P. 104. *חֶמֶת*, *wheat*, is commonly found as *חֶמֶת*, the *ו* being dropped. In Palestine we use the word *Hhunta*, which is the same in Syro-Arabic.

P. 105. Joseph spake unto the "house" of Pharaoh. "The house" still is the polite phrase for "wife," in common use.

(I do not think the word is used in the sense of "wife" in the case referred to. I think it is used in the same sense as that in which we use the word "household" in England.—H. G. T.)

Lieut. C. R. Conder, R.E., writes :—"As to *צַרְיָה* (p. 87), it seems to me probable that the *Balanites Aegyptiaca*, or *Zakkum*, was the balm-tree; as the *Opobalsamum* does not now occur in Palestine, and I see no very good reason to suppose it ever did.

"May I also suggest that decapitation (p. 92) is mentioned in the Mishna as a legal punishment. See *Handbook to the Bible*, p. 132."

The Rev. J. Baylee, D.D., asks :—"Are you quite warranted in giving so strong a force to 'my wife' in Gen. xlv. 27 (p. 85), when the same word is applied to Bilhah and Zilpah in Gen. xxx. 4, 9?"

I think that after all I have been perfectly accurate in the meaning I have attached to the words "my wife." It occurred to Jacob's mind, when blessing his descendants, that he should call Rachel only, or Rachel emphatically, "my wife," and it is in strict conformity with this that she is so named emphatically in the pedigree. I do not at all wonder at this. Certainly Rachel was especially Jacob's wife, and it is not in the least degree marvellous to me, nor does it appear unfair, that the firstborn of the true destined wife should have the birthright given to him and should, in fact, be the preferred son. I think it was not a mere matter of dotage on the part of Jacob, although there are a great many people who would take so low a view of the patriarchs that they would altogether wash out their individual characters, and render them such ghosts of themselves that they are to be either hissed off the stage altogether, or laid down to be poor infirm people, of such weak characters that it is of no consequence who they were or what they did. But I am not of that way of thinking at all. (Hear, hear.) Dr. Baylee also says :—

"With regard to the word *מִיָּבֵם*, can we go so far as to make it designate unique distinction as heir apparent (if I may use the phrase), when it was the common garment of the king's daughters who were virgins?" 2 Sam. xiii. 18, 19.

This is true enough, but even at the present day a special ornamental garment is given to the favourite son, and I think it certainly did indicate that it was intended to do a particular honour to Joseph; and if it were really

to designate him as the one who was ultimately to hold the patriarchal rank of the family, that is a solution of the matter.



Dr. Baylee also notices that in the phrase translated, "the eleven stars," there is no article in the Hebrew, nor in the LXX. This is important, but it may be that the full complement of twelve would have been called "the twelve stars;" and I leave my suggestion in the text for what it is worth.


I refer to an old book of Ainsworth's, which gives an independent translation of the Hebrew, and there the word is omitted—he simply says "the sun and moon and eleven stars." I mean to say with regard to this that if it had been a certain series of twelve, then the article would have come in. It was not "the" eleven stars, for the eleven did not make up the series, but had the whole series been meant it would then have come in, so that after all it does not all melt away, this suggestion that it implies some familiar cycle of twelve stars.

Dr. Baylee, like Dr. Birch, thinks it very uncertain whether *nebat* and *nepath* were the same original word (p. 87).

He writes:—"I agree with your observations on גֵּית הַפֶּהֶר."

I am very glad that Dr. Baylee agrees with me here.

Dr. Birch notices (p. 93) that Pierret, *Zeitschrift*, f.; *Æg. spr.* 1879, 136, gives  variant of , horse, as a proper name in the 30th year of Amenemha I. (from the Bulak stela). This is very interesting, but I do not see in it, with M. Pierret, a proof of the appearance of the horse itself in Egypt at that date, but only of a (foreign) person bearing a name derived from that of the horse. The personal name may have preceded the animal. Just as you may take the name of Oliphant, which is found as a surname in Scotland, and which means elephant—in fact, "elephant" was anciently spelt "oliphant." The existence of this name in Scotland does not prove that elephants had been brought there before the name was known, but the natural supposition is that some one had gone there with that name before the beast was ever introduced into that country. The personal name may have preceded the animal.

Dr. Birch doubts if *qebh* (p. 98) is the equivalent of the Hebrew word. On further thought, I believe , *kabu*, is the real Egyptian equivalent, applied to cups and flowers.

The Rev. P. Lilly has kindly given me several interesting suggestions. He refers to Rosenmüller on Gen. xli. 42, who notices that by the same ceremony (gift of the signet) the Sultan constitutes the Grand Vizier.

Of course, we need not go beyond our own Cabinet for an illustration of this: they receive the seals of office at the present time.

The same eminent commentator quotes, with apparent approval, a similar explanation of Gen. xlvii. 31, to that given in p. 103, viz.: that Jacob bowed

himself to the staff of his son, which Joseph held in his hand as the symbol of his vice-regal dignity, and kissed him, thus honouring him according to his dream (Gen. xxxi. 7).—Rosenm. *Scholia*.

On this curious subject I have made more minute inquiry, which will be recorded in detail. The explanation given in my paper is, I believe, quite the most probable.

I have to thank Miss Amelia B. Edwards for her kindness in sending me very interesting suggestions on this topic.

Rev. PREBENDARY ROW.—I think that the importance of this Paper largely depends upon a paragraph which I notice at the end of the last page:—“I am quite unable to see cause why this Joseph should, at the bidding of some modern critics, be resolved into a meteorologic mythus.” Now, so far as I am aware, there is no person among the large range of unbelievers, who denies that the Old Testament contains a good deal of good history. There is, however, one theory set up in opposition to this, which has been elaborated in a work I have read within the last twelvemonths. The author of the book in question endeavours to show that the whole of the Old Testament characters, and a good many besides, were simply solar myths. Having read the book with some care, I must say that I do not think much danger to revealed religion will come from it, or from kindred works, for it seems so absolute an offence against all the principles of common sense, that it will certainly not be of any great use even to controvert the writer’s views. (Hear, hear.) On the principles that critics of this kind are attempting to resolve the characters of the Old Testament into solar myths, I would undertake to make nearly every fact in existence a solar myth. (Hear, and laughter.) If their principles were conceded, it would be easy to show that every character in Shakspeare is really a myth. We all know that the sun does, at various times of the year, assume very various aspects. I need not attempt to enumerate the actual means or instrumentalities by which these solar myths are manufactured; it is sufficient to tell you that it is from the various appearances the sun presents, aided by the fancy of mankind. It seems to me that if the principles laid down by such critics as I have referred to are conceded, it would be easy to prove that Queen Victoria is a myth; that Lord Beaconsfield is a myth; that Mr. Gladstone is a myth, and that our worthy selves, here assembled, are all solar myths. (Laughter.) This is what seems to be the actual upshot of all such criticism, and I think, therefore, that it is hardly worth while, as far as this Institute is concerned, to read a Paper intended to refute the outrageous logic, and the enormous amount of assumption and fallacy involved in such principles. This being so, I do not intend occupying the time of this meeting except so far as will enable me to draw attention to what I regard as the real point of the controversy. I think the point we ought really to consider is this: What we want to maintain is, not that the Old Testament contains a great deal of good history, which I believe no one now-a-days thinks of disputing, but that the superhuman or supernatural element in it

contains good history ; and, on the other hand, it should be observed that it by no means follows that because the ordinary facts contained in the Old Testament are good history, the supernatural element is good history likewise. And here I will refer to a conversation I had last January with a gentleman who stands in a high position as a writer on the constitutional history of England. He told me that in the documents of the middle ages, those who were engaged in historical researches meet with a number of facts, just such as might be expected in ordinary life, all told in so simple and truthful a manner, that no person would think of disputing that they were good history ; but, he added, in the closest connection with these are a number of miraculous stories which no man on earth could possibly believe to be true. According, then, to my friend's observation, we have during the middle ages a very large amount of good history, containing the most ordinary facts that can well be conceived, and so told that they receive ready credence, while united with these in their immediate context, are a number of miraculous statements, which, as he says, it is impossible for any one to believe. Here we have two things—a true historical statement and an utterly fabulous, miraculous story, side by side ; and I think that this so far bears on the subject that there are numbers of persons who suppose that because we can prove that the Old Testament contains a great deal of good history, we are, therefore, proving the historical truth of its miraculous element. I say that it behoves us carefully to look at this matter, because it is of no use to attempt to put down unbelievers' objections to the historical character of the Old Testament by such arguments, which, of course, can be given in abundance ; but what we want to prove is, not the truth of the history generally, but that the superhuman and supernatural element contained in the Bible is also true. This is the real point, and the whole gist of the modern controversy respecting both the Old and the New Testament Scriptures centres in this. To this therefore we ought to address ourselves, and it seems to me that with all the proof given in this Paper of the general truth of the History of Joseph, as well as the proof that might be given of the other characters of the Old Testament, still the Paper does not deal with the great fact which we wish to maintain, namely, that not only is there a great deal of truth in Biblical history, but that the supernatural element is as true as the ordinary facts.

REV. A. R. GREGORY.—May I ask Mr. Tomkins one question upon a point which struck me very forcibly when listening to one part of the paper. During the interim which elapsed between the death of Joseph and the taking away of his bones into Palestine, where might his remains have been kept, and how would those who removed them procure them when they wanted to take the same away, especially when we consider the circumstances under which they left ?

REV. H. G. TOMKINS.—I think I can give you a tolerably good theory in answer to your question. In Egypt the destination of the mummy was to be consigned to that sepulchre to which the family had constant access, and, in the Egyptian sepulchres the family not only had constant access, but

a perpetual duty was imposed upon them, which is represented at the present day by the Roman Catholic custom of saying masses. There was, in their case, even more than the saying of masses among the Catholics, because the Egyptians not only deposited the ritual papyrus and deemed it needful to offer up prayers for the departed, that they might fulfil all the destinies in Hades, but, besides that, they offered on behalf of the dead personal offerings, while legacies and endowments of a very magnificent kind were given for the purpose of maintaining the perpetual repose of the deceased in their mummy cases. Therefore, it is highly probable that Joseph, in his injunctions and provision for the family care of his mortal remains, would have taken very good care that his body, properly embalmed, should be forthcoming in after generations. We have two historical facts, the one that Joseph was embalmed and put into a coffin, the other that his injunctions were carried out when the children of Israel went forth out of Egypt; and I think there is no historical improbability in believing in the fulfilment of Joseph's injunctions, and admitting the credibility of the latter part of the narrative. I hope I have answered the question. (Hear, hear.) The deposit of the mummy was a most sacred family trust—an object of great veneration and care.

Mr. G. M. TURPIN.—I should like to make one or two observations in consequence of what has fallen from the Rev. Prebendary Row. It has been my fortune to spend a great deal of time in defending the Old Testament, and my views and opinions on the point raised by Mr. Row are opposed to those which he has enunciated. The great object of the controversy carried on by sceptics has been to destroy the credibility of the Old Testament narrative, and by that means to show that there is no historical basis for its supernatural element. (Hear, hear.) It seems to me, therefore—as a common sense person, not having very much acquaintance with Egyptian hieroglyphics, although I have read very extensively what has appeared in English on the matter, as my friend Mr. Tomkins is aware—that his is the most useful way of defending the Scriptures. It shows that the Book contains nothing but what is true history, and this is proved by the discoveries we have so far made among the Egyptian hieroglyphics. When we are told that the opponents of the Bible would destroy all faith in it, it is an advantage to be able to go to Assyria and find that Biblical history is confirmed by the Assyrian monuments. (Hear, hear.) These things, I think, give us a firm basis of hard and solid fact on which to rest a belief in the supernatural element of the Bible. Another point of importance is to be found in the concessions made by modern scientists, which show that, when you have traced them through all their various wanderings, they cannot get away from God Almighty after all. (Hear, hear.) I affirm, then, that the historical facts of the Bible are admitted and proved by the modern revelations of Egyptology and Assyriology, and I assert that there is a good deal to be made of all this in our defence of the Old Testament, not only as to its truth in regard to matters of ordinary history, but also as to Supernatural Revelation. (Hear, hear.)

Mr. R. W. DIBDIN.—It seems to me that the gentleman who has just sat down has thoroughly understood the true state of this subject, and it has also struck me that the Rev. Prebendary Row has lost sight of what constitutes the real value of Papers of this description. The argument of the infidel is, that if he can show the so-called historical facts of the Bible not to be facts at all, but mere traditions which have no basis in truth, then, *à fortiori*, the supernatural element, which is also contained in the Scriptures, must likewise be a mere delusion. I certainly thought, from my recollection of the controversies on this subject, that the strong infidel argument in former times was that the historical facts were not facts at all ; but we now hear, and are very glad to hear, that the infidel party are prepared to give up this point, that they have altogether dropped their old line of argument and now admit the Biblical facts to be true history. (Hear, hear.) Perhaps it may not be too much to hope that having thus been shaken out of one position, they may ultimately be shaken out of the inner circle of their fortifications,—that having admitted the proofs furnished by men like Mr. Tomkins, who have devoted their lives and their great abilities to the task of showing the truth of the Scriptures, as proved from external sources, they will ere long come to see that the supernatural element in Scripture is also true. (Hear, hear.)

Rev. J. SHARP.—As an old Indian missionary who has had great experience in combating infidel views imported from England, and especially those of a gentleman who is now a distinguished member of Parliament (laughter), I should like to give my testimony to the great value I set on Mr. Tomkins' paper. I once listened to a very interesting lecture, by a learned Hindu, on the New Testament, and I remember that one of his great points was that we had no authority for the life and doings of Christ except what we had obtained from his own disciples. One of the passages which he quoted in order to show this, was from a history of the Roman Empire, in which it was stated that the early Christian Emperors destroyed a great deal of the Pagan literature, and he said that if we only had that literature to appeal to, we should be able to judge as to what was true in the supposed history of Christ. Now, I think it self-evident that if we can only obtain from Egyptian philology and Egyptian monuments and papyri, or any evidence of that kind, proof altogether independent of the Old Testament, of the truth of the plain history contained in that book, then, as has just been said, we shall have a firm basis on which we may proceed to deal with the supernatural element. (Hear, hear.) We shall in that case have procured independent testimony against which no one will have a right to say it is only the evidence of persons who are interested in the case, and who are consequently prejudiced in what they say in favour of it. (Hear, hear.) From this point of view, I value Mr. Tomkins' paper very much, and I should like to say, further, with reference to it, that the results which have already been obtained from all the learning and investigation which he and others have bestowed on this subject might, with great advantage, be set forth in plain and simple language in a series of short papers to be circulated in India, in

order to counteract the infidel publications that are sent out from London in large quantities by every mail, and read very extensively by educated Hindus all over the country. (Applause.)

Rev. H. G. TOMKINS.—I will endeavour to occupy but very little time in replying to what has been said by the Rev. Prebendary Row. There is no one in this room who can possibly feel with more acuteness than I do, the immense importance of maintaining all that is contained in Holy Scripture, or that, if we are to draw distinctions, what is called the supernatural element is the cause and warrant of all the rest. But the historical basis is the support of the supernatural superstructure, and it is because if the basis should be destroyed the superstructure would fall with it that I have felt so very much the necessity of devoting what leisure God has given me to the most minute investigation of the historic evidence. (Hear, hear.) Now I have a thorough answer to what has fallen from Prebendary Row with regard to the supposed want of necessity, if I understood him rightly, for such investigations as these. It would appear that he thinks we are beating the air and slaying the slain; but we are neither doing the one nor the other. I will address myself to two points only. One is the mythological theory. If Mr. Row has happened to see the paper to which, for the sake of brevity, I have merely referred this evening, he will have noticed—and in my book also, to which I have prefixed the same remarks—that I have already had to tussle with that adversary, the mythological theory. It so chanced that just at the time I read my first paper,* Goldziher's book, which made a stir in the literature of biblical history, came out. And I say that there was such a thing as a great body of negative opinion which had formed itself in the direction of approval of the mythological explanation, but that to some extent at least that approval has been modified. With regard to the particular character whose history I have taken up—Joseph—I have this to say: my subject being Joseph, the narrative with regard to him does not bring me across the supernatural excepting as it regards the dreams, and I suppose I really need not stop to argue that God Almighty may communicate knowledge to those who sleep as well as to those who are awake. That I have thought unnecessary, and I expressly guarded myself by stating that I did not want to enter into argument; what I desired was to give you, ladies and gentlemen, the means of arguing—the groundwork for criticism. In the fashionable books of philosophical explanation Joseph is resolved into a merely mythical character. It is assumed that he was not a human being that ever lived, but the son of the "rain-cloud," which was Rachel. Rachel was the "rain-cloud" and Joseph was nothing but the rain that was produced by the "rain-cloud"; but there was fanciful ground put forward for the mythological explanation. With regard to the other matter, as to the historic accuracy of the Scripture narrative being admitted, all I can say is

* "The Life of Abraham, Illustrated by Recent Researches." *Transactions*, vol. xii. p. 110.

that I wish with all my heart it were so, but it is tolerably notorious that this is not the case. If Mr. Row had looked at the book, or had asked what book was referred to, when it was stated here that certain professors, in the year 1873, had commended to young people a quantity of sophistical objections which were intended to show the impossibility of the historic narrative, he would have seen that there was a foundation for what was said; but I, prudently I think, refrained from mentioning what the book was. That was a translation. Of late, Germany not being sufficiently negative for our English sceptics, more scepticism has been imported from Holland, where three eminent Dutch Professors of Leyden allied themselves together to produce a book called "The Bible for Young People" *—a book with which I am only too familiar. That book was expressly prepared for young people, and its object was to shake all to pieces their belief in the historic character of the early books of the Bible. There are all manner of objections; to two or three I have called attention, by way of specimens, and answered them. Such are the kind of books that are written for young people by gentlemen of literary fame and well-known attainments. They are published in the interest of some of the negative religionists—to use a term which they will not object to—they are sold largely for children to read, and they give the tribal view of Joseph. Perhaps some of my hearers do not know what I mean by the tribal view, but there are a few of our friends here who are acquainted with my meaning. They take the story of Jacob and Joseph, and the twelve sons of Jacob, and so forth, and so handle it as to favour a theory as to the position of the tribe of Ephraim. We very well know that the tribe of Ephraim was the rival of the tribe of Judah, and this is not the first time we have heard about the one envying the other—Ephraim envying Judah. There was a tribal rivalry between the two which ended in that terrible split by which the kingdom fell into two. They tell us that it is all an *ex post facto*, cooked up business—the whole story of the patriarchs got up in the interest of the kingdom of the ten tribes, to magnify the mythical forefather Joseph, who was to be made a hero. Now, does not Mr. Row know

* The Rev. H. G. TOMKINS calls attention to the following extracts from *The Bible for Young People*, Vol. I. :—"But although we cannot accept the accounts of the patriarchs as completely trustworthy, we might easily suppose that they had a historical foundation, that such men as Abram, Isaac, Jacob, and the rest did really live, and that the stories give us, on the whole, a correct account of their fortunes, though in an embellished and exaggerated form. But when we come to examine these stories closely, and to compare them with one another, we find that this is not the case," &c., p. 129. "No doubt the names of the sons of Jacob were simply those of the Israelite tribes, which might easily be used as the names of tribal fathers," &c., p. 133. "The names of the various tribes and districts were made into those of men, and were then brought into connection with each other," p. 135. "We shall speak of Abram, Hagar Esau, Joseph, and all the others as if they were men who really lived, and shall try to strengthen our moral life by marking their faith, and to take warning from the description of their sins," p. 139.

better than I do, that objectors see two interwoven incoherent narratives in the story of Joseph, which is a matter that I have said I would not enter into, but will leave the answer on the basis of the results of archaeological investigation? Well, these writers I have referred to tell our little children how to distinguish the one story from the other, that the one was written in the interests of the men of Judah, but that all that which we are accustomed to admire in the character of Joseph, both in behalf of our children and ourselves, has been cooked up as an *arrière pensée*, to magnify the tribe of Ephraim; that the Joseph of that lovely story was an invention, and that the only meaning of the word Joseph was the tribe; only they have projected backwards, if I may say so, and endeavoured to account for the greatness of the tribe of Ephraim by an ancestral glory which never existed. I have stated in the plainest way I can this theory of theirs, and I ask Mr. Row, or I would ask him if he were still here, whether he does not agree with me that there is sufficient warranty for my saying with David—"What have I now done?" "Is there not a cause?" (Applause.) I am very thankful to have heard what our friend from India has said. I have been greatly concerned about the condition of India, and it is not without reference to providing a handbook of historical materials and references for such controversies as these in the distant parts of the earth, that I have put together the paper I have read. I may add that I shall be only too thankful if it can be of any service, and I should be happy to help to put it into any form that may have the effect of rendering it more generally available for circulation abroad. (Hear, hear.)

The meeting was then adjourned.

ORDINARY MEETING, DECEMBER 6, 1880.

REV. R. THORNTON, D.D., VICE-PRESIDENT, IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced :—

MEMBERS :—The Right Rev. the Bishop of Kansas, United States; The Ven. Archdeacon Usherwood, South Africa; Rev. Aberigh-Mackay, France; Rev. F. J. Ambridge, Barbadoes; G. W. Brush, Esq., M.D., United States; Rev. S. Charlesworth, M.A., London; Rev. W. C. Clarke, A.B., Ph.D., Canada; R. J. Cross, Esq., England; Rev. A. G. Day, B.A., India; Rev. Canon Hall, M.A., London; F. Langley, Esq., London; Rev. H. P. Stokes, M.A., Dorset; Colonel J. T. Smith, R.E., F.R.S., London; Rev. Canon Vaughan, M.A., Leicester.

LIFE ASSOCIATES :—The Right Rev. the Bishop of Athabasca, United States; R. Shettle, Esq., M.D., Reading.

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Also the presentation of the following Works for the Library :—

"Proceedings of the Royal Society."	<i>From the same.</i>
"Proceedings of the Royal Geographical Society."	<i>Ditto.</i>
"Proceedings of the Geological Society."	<i>Ditto.</i>
"Proceedings of the United Service Institution."	<i>Ditto.</i>
"Proceedings of the United States Geological and Geographical Society."	<i>Ditto.</i>
"Proceedings of the Smithsonian Institute."	<i>Ditto.</i>
"Proceedings of the American Philosophical Society."	<i>Ditto.</i>
"Proceedings of the American Geographical Society."	<i>Ditto.</i>
"Proceedings of the Asiatic Society of Bombay."	<i>Ditto.</i>
"Proceedings of the Société Hollandaise de Science."	<i>Ditto.</i>
"Proceedings of the Sydney Metereological Observatory."	<i>Ditto.</i>
"Almuth." Rev. J. S. Blackwood, D.D., LL.D.	<i>Ditto.</i>
"The Newest Atheism." President N. Porter, D.D.	<i>Ditto.</i>
"The Antiquity of Man and the Origin of Species." Dr. J. W. Dawson, F.R.S.	<i>Ditto.</i>
"The American Antiquarian." Rev. S. D. Peet.	<i>Ditto.</i>
"The Advancement of the Natural Sciences." Baron Mueller, F.R.S.	<i>Ditto.</i>
"Science the Stronghold of Belief." Dr. Painter.	<i>Ditto.</i>
"Oriental and Biblical Journal of Chicago."	<i>The Editor.</i>
"British Thought and Thinking." Professor Morris.	<i>Ditto.</i>
"Cautions against Mr. Clodd's Works."	<i>Ditto.</i>
"Sceptical Fallacies." Canon Hall.	<i>Ditto.</i>
"The Three Heavens." Rev. J. Crampton, M.A.	<i>Ditto.</i>
Pamphlets from <i>Baron Mueller, F.R.S., M. Lombard, and G. Harries, Esq.</i>	

THE CHAIRMAN.—It seems desirable that I should say a few words before calling upon Mr. Blencowe to read his paper. We are here to-night recommencing our campaign against what I may call the misconceptions and misrepresentations of God's Holy Books,—the Book of Nature and the Book of Revelation. There has been a great deal of misconception and misrepresentation of both; and in order to meet, and, if possible, to do away with, these evils, this Institute was formed, and I have every reason to believe that it has done its work extremely well. The number of subscribers we have gained gives evidence that the labours of the Institute are appreciated in various parts of the world, and that they have not been confined to London, nor England, nor even to the British Islands; for our list of members includes persons, not only from European countries, but also from Asia, Africa, and America.

(Hear, hear.) Indeed, this Society is becoming well known in all the four quarters of the globe, and we may congratulate ourselves that our hopes for it are being realised. Its importance is shown in many ways ; for instance, in India we see the natives drifting away from their old faith. Their old religion is slowly, very slowly, quitting them, and the question is, what they are to accept instead of it. They are willing to part with their old faith because of its want of suitableness to rational minds, but they must have something presented to them suitable to reasoning beings. We, of this Institute, say their alternative is very simple. They must either take refuge in scepticism, which will be most emphatically an atheistic scepticism, or they must, in some way or other, find a haven of refuge in the Christian Church. It must be one thing or the other. This Institute can, without the slightest narrow-mindedness or sectarianism, point out that the more rational way is belief in the truths of Christianity, instead of an acceptance of the unsatisfactory theories offered to them by the various forms of scepticism which even now have begun to show themselves among the natives of India. I think that this Institute may congratulate itself on having been marked out for a very important work, and I only trust that it will be able to go on with that work and prosper. (Hear, hear.) I have now to call on Mr. Blencowe to read his paper.

The following paper was then read by the author :—

*THE SCIENCE OF RELIGION AS EXPOUNDED BY
F. MAX MÜLLER IN THE "HIBBERT LECTURE"
OF 1878, AND IN "CHIPS FROM A GERMAN
WORKSHOP, 1867."* By THE REV. G. BLENCOWE.

THE subject I have now to bring before you is the Science of Religion as expounded by Max Müller in his *Hibbert Lecture* and in his *Chips from a German Workshop*. In these books we have some of the results of many years' labour by one of the most profound students of language, who has unveiled many of the mysteries of Grecian mythology, and dug up the roots of a kindred mythology among the Aryans of India. We are greatly indebted to their learned author for the enlargement of our field of view, and for the ability he has given us of beholding our ancient relations, not as

they made war upon one another and carried on a process of mutual destruction, but as they were in themselves, in their thoughts and emotions; and especially as those thoughts and emotions were employed on the momentous question of religion.

We are glad to have the testimony of such an independent witness as language in proof of the primary dignity of man. Mr. Müller assures us that all the most ancient languages indicate a high degree of intelligence and culture, and that the most barbarous contain evidence of a much higher state from which they have fallen. By a parallel line of proof he shows that Fetishism has not been, and cannot have been, a primitive form of religion; but that, on the contrary, it is the lowest condition of degradation to which a religion can sink.

After clearing the way for his description of the Growth of Religion among the Aryans of India, by removing the false opinions which have been expressed concerning the origin of man and his advance from fetishism to the spiritual worship of the Living God, he proceeds to unfold his own opinions as to how, and in what form, religion began and grew among the people whose religious history he especially discusses. The sources of this history are the *Vedas*, which are "four collections of hymns respectively known by the names Rig-veda, Yagur-veda, Shâma-veda, Atharva-veda." The quotations, however, are principally from the Rig-veda, because, "for tracing the earliest growth of religious ideas in India, it is the only important, the only real Veda. The Yagur-veda and the Shâma-veda may be described as prayer-books, arranged according to the order of certain sacrifices, and intended to be used by a certain class of priests." The Rig-veda consists of ten books, and contains altogether 1,028 hymns, for which, on sufficient historic data, Mr. Müller claims an antiquity reaching up from 1200 to 1500 B.C., or from the time of Moses to Samuel. They are in ancient Sanskrit, which from several centuries before the Christian era has been an unknown language to the priests who used them; they have, nevertheless, carefully learned every word, every syllable, and every accent, according to the original form, although the whole is sound without meaning. To Western ideas and habits this seems to be a most precarious mode of preservation, but we are informed by Mr. Müller and other authorities that no syllable or accent has been lost.

In our author's opinion the genesis of Aryan religion was on this wise. The fathers of the race saw the wide earth, the all-embracing sky, the bright and vivifying sun, the huge mountains, the brilliant day and sombre night; they heard

the thunder and felt the tempest; and in these physical objects and conditions they beheld a splendour, a magnitude, and a power, in the presence of which they became conscious of their own insignificance, and were consequently impressed by their grandeur with feelings of fear and awe. But, as they continued to observe and think, they learned that this which impressed them was only varying phenomena, which must have some real and permanent basis. Thus they attained to the persuasion that, beyond the tangible, semi-tangible, and intangible objects of sense, there was a superior being from whom all their excellence sprang. But they did not carry their generalisation so far as to conceive of one all-pervading substance or essence, manifested in the varied phenomena; nor were they able to construct a graduated hierarchy of gods, as did the Greeks, but for the time being gave to each one supreme honour and worship. Thus their religion became Henotheism, which, "after trying in vain to grow into Polytheism on the one side, or Monotheism on the other, ended by necessity in Atheism, or the denial of all the Gods."*

The work which Mr. Müller undertook was to trace the first signs of religious thought, and to mark its progress up to the consummation just expressed. And the importance of this work he thus declares:—

"To my mind the great epochs in the world's history are marked, not by the foundation or destruction of empires, by the migrations of races, or by French revolutions. All this is outward history, made up of events that seem gigantic and overpowering to those only who cannot see beyond, or beneath. The real history of man is the history of religion: the wonderful ways by which the different families of the human race advanced towards a truer knowledge and a deeper love of God. This is the foundation that underlies all profane history: it is the light, the soul, and the life of history, and without it all history would indeed be profane."†

This we most fully believe, because the capacity for religion is the distinguishing peculiarity of man. But we are unable to follow Mr. Müller in his history for several reasons. First, we have no evidence from the Vedas of any commencement of religion—no proof that in the earliest times the writers of these hymns were without a god. He says:—

"When man has once arrived at a stage of thought where he can call anything, be it one or many, God, he has achieved half his journey. He has found the predicate God, and he has henceforth to look for the subjects only to which that predicate is truly applicable."‡

But not only do we find the predicate, but numerous appli-

* *Hibbert Lecture*, p. 302. † *Chips*, pp. 20-1. ‡ *Hibbert Lecture*, p. 258.

cations of it all through the Vedic hymns. Secondly, we are unable to trace any chronological succession. Although he speaks of a diverse age, yet he seems only able to judge of the age by the contents, which, in a case like the present, is a mode of judgment utterly inadequate to the establishment of succession. The most diverse doctrines may have been propounded simultaneously, or in an order the reverse of that which is supposed. We have a much wider range of difference in doctrines at the present time, propounded by men all of whom claim to be Christian, than Mr. Müller has presented to us from the Vedas. Thirdly, we find a still greater difficulty, in that the Vedic worshippers are assumed to have started without the predicate God, and to have proceeded onward to a truer knowledge and deeper love of God, until they had perfected their elaborate ceremonial, fully evolved their doctrine, and thus had accomplished the whole journey. And yet the reformers, Zoroaster and the Buddha, made great strides in advance, by destroying the work of the Vedic singers, and bringing back the people from the regions into which they had wandered to the point from which they started—a simple worship of the one living God. That this was really the point from which they started will be seen from what follows :—

“I shall read you a few Vedic verses, in which the religious sentiment predominates, and in which we perceive a yearning after truth, and after the true God, untrammelled as yet by any names or any traditions.”

Therefore, before a subject for the predicate, God, was found :—

“1. In the beginning there arose the golden Child—He was the one born lord of all that is. He established the earth and this sky ;—Who is the God to whom we shall offer our sacrifice ?

“2. He who gives life, He who gives strength ; whose command all the bright gods revere, whose shadow is immortality, whose shadow is death ;—Who is the God to whom we shall offer our sacrifice ?

“3. He who through His power is the one King of the breathing and awaking world ; He who governs man and beast ;—Who is the God to whom we shall offer our sacrifice ?

“4. He whose greatness these snowy mountains, whose greatness the sea proclaims, with the distant river—He whose these regions are, as it were, His two arms ;—Who is the God to whom we shall offer our sacrifice ?

“5. He through whom the sky is bright and the earth firm—He through whom the heaven was established, nay, the highest heaven—He who measured out the light in the air ;—Who is the God to whom we shall offer our sacrifice ?

“6. He to whom heaven and earth, standing firm by His will, look up, trembling inwardly—He over whom the rising sun shines forth ;—Who is the God to whom we shall offer our sacrifice ?

“7. Wherever the mighty water-clouds went, where they placed the seed

and lit the fire, thence arose He who is the sole life of the bright gods ;— Who is the God to whom we shall offer our sacrifice ?

“ 8. He who by His might looked over the water-clouds, the clouds which gave strength and lit the sacrifice ; He who alone is God above all gods ;— Who is the God to whom we shall offer our sacrifice ?

“ 9. May He not destroy us—He the creator of the earth ; or He the righteous, who created the heaven ; He also created the bright and mighty waters ;—Who is the God to whom we shall offer our sacrifice ?” *

According to Mr. Müller, the Aryans at the beginning thus knew God. But, although this was before they had given a name to the Deity, they had a clear idea of the necessity of sacrifice, and of the manner in which, on some occasions certainly, and presumably in others, the Lord signified His acceptance of sacrifice. There is also a distinct recognition of the Creator as the righteous ruler, while several of the verses can be best understood by a reference to facts recorded in the first book of the Pentateuch, traditions of which were preserved by all the ancient nations. The opening sentence, as it seems to us, can only be explained by a reference to the first promise, which Eve supposed to have been fulfilled when she had “ gotten the man from the Lord.” The prayer of the ninth verse also is in harmony with the conditions of a people whose fathers had been saved in the ark, and whose less remote ancestors had witnessed, and in some sort experienced, the chastisement of the dispersion.

We have another hymn addressed to the Creator under the name of Varuna, of which Mr. Müller says :—

“ We should look in vain in late Sanskrit works for hymns like the following :—

“ 1. Wise and mighty are the works of Him who stemmed asunder the wide firmaments (heaven and earth). He lifted on high the bright and glorious heaven ; He stretched out the starry sky and earth.

“ 2. Do I say this to my own self ? How can I get unto Varuna ? Will He accept my offering without displeasure ? When shall I, with a quiet mind, see Him propitiated ?

“ 3. I ask, O Varuna, wishing to know my sin, I go to ask the wise. The sages all tell me the same : Varuna it is who is angry with thee.

“ 4. Was it an old sin, O Varuna, that thou wishest to destroy thy friend, who always praises thee ? Tell me, thou unconquerable lord, and I will quickly turn to Thee with praise, freed from sin.

“ 5. Absolve us from the sins of our fathers, and from those which we committed with our own bodies.” †

Of other hymns to Varuna, we are told :—

“ The poet believes it ; he not only believes, but he knows it, that all good things come from above.

“ Without thee, O Varuna ! I am not master even of a twinkling of the

* *Chips*, i. pp. 29, 30.

† *Ibid.* ii. p. 310.

eye. Do not deliver us unto death, though we have offended against Thy commandment day by day. Accept our sacrifice, forgive our offences, let us speak together again, like old friends.

“Hear this my calling, O Varuna, and bless me now; I call upon Thee, desirous of Thy help.

“Thou, O wise God, art the king of all, of heaven and earth; hear me on my path.” *

These hymns Mr. Müller considers as among the earliest of the Veda, and we think, from their correspondence in substance and tone with their contemporaries, that his judgment is correct. By Abraham and his descendants we are able to trace the existence of similar knowledge of God through five preceding centuries. Abraham knew the Lord and worshipped Him before he was bidden by Him to go from his country. He found the King of Salem also to be a worshipper of the one living God, although called by a name which especially proclaimed His supremacy. In his sojourn in Gerar he saw another king who feared the Lord and wrought righteousness. And, about a hundred years afterwards, Isaac found king and people of similar character. And as late as the end of the life of Moses we find Balaam, although holding the truth in unrighteousness, yet knowing the Lord, acknowledging His supreme authority, having access to Him, and, however unwillingly, feeling himself bound to obey His word. During this period, in the cases above cited, the common idea of religion was “speaking together like old friends.” The connection of sacrifice with forgiveness of sin is in full harmony with the Mosaic record, and is much more distinct than in the later hymns. All this looks like a common source, although the repudiation of such a common source is declared by Mr. Müller as a necessary qualification for the study of the science of religion.† We do not see how sacrifice can be accounted for as an act of worship but as coming from Divine appointment, and it is equally impossible to explain its prevalence but from the fact that it was a primitive institution, established before the various tribes commenced their wanderings. It is in this evidence of Aryan connexion with the one source of all true knowledge of God that we see no difficulty in accounting for the above doctrines at the beginning of their national life. And in the same way we account for so explicit a hope of personal immortality as that found in the following passages:—

“Where there is eternal light, in the world where the sun is placed, in that immortal, imperishable world place me, O Soma!

* *Chips*, ii. p. 326.

† *Hibbert Lecture*, p. 258.

“Where life is free, in the third heaven of heavens, where the worlds are radiant, there make me immortal !

“Where there is happiness and delight, where joy and pleasure reside, where the desires of our desire are attained, there make me immortal !” *

We agree with Mr. Müller in that “we can hardly think of Abraham or Moses as without a belief in life and immortality.” But, if they had this hope, then their contemporaries and predecessors also had it; and we regard the evidence of its existence in the earliest generations of men as being equally full with that of many other important truths. We must remember that it can only be accounted for, at all, as a revealed truth. It is incapable of demonstration, and if philosophical speculation were able to present many reasons for human immortality, yet, as they would, after all, be only probabilities, so they could never lead to anything higher than a probable conclusion; from which we cannot account for the universal existence of this doctrine up to the first records of human thought. The absence of an explicit statement of this doctrine in the early chapters of Genesis has never seemed to us a proof of the absence or of the obscurity of this truth in the earliest times. For we cannot suppose that the brief record we have in the first five chapters of Genesis is all that was known of God and of His government of man till the time of Noah. What has been written has been written, not for their instruction but for ours, and, so far as we can see, with the special purpose of showing the continuous action of the Creator and Ruler with the earth and man from the beginning, and of establishing the identity and continuity of the race. Yet in this brief and specific record we have these three facts, which plainly imply this knowledge from the first: Adam was made in the image of God, which necessarily carried his immortality. The first death occurred under circumstances which, in the absence of immortality and of the knowledge of it as the birthright of every man, must have shaken to its foundation the Divine government, as revealing His impotence to protect His obedient servants. Then, the translation of Enoch, taking place, as it did, at a time when men generally were falling under the power of sensuality, and, as a consequence, were losing sight of the better life to come, was specially calculated to call them back to spirituality and God, by forcing the future life on their attention. And that, in the days of the Israelitish patriarchs, this was a fundamental truth is unquestionable from the simple and every-day mode of recording their deaths. They are not represented as ceasing

* *Chips*, i. p. 46.

to be, nor is there a grand flourish of some wonderful elevation which is to compensate for the loss of the wealth and honour they were leaving, but it is simply said "they were gathered to their people"—a record which satisfied their own hope and the desire of their mourning friends. Immortality, therefore, although more ostentatiously expressed by the Aryans, is not an advance beyond the Hebrew original, but shows an identity of source.

In the early times of Vedic religion, so far as diversity of time can be fixed, we find these facts in religious operation:—there is a Creator of the universe; He also upholds it, and He is the King under whose rule man is continually. Man has broken His law and is under His anger, but he can obtain forgiveness by means of sacrifice, and thus communion may be restored. That communion is such as exists between "old friends," and may result in immediate blessing to the man while praying; and this prayer is so direct and personal, that he may offer it on his journey, and, after enjoying the blessing of God on earth, he may be raised by Him to immortality, in an abode of happiness and delight, where the "desires of our desire" are attained. It was from this knowledge that the Indian Aryans "advanced to their truer knowledge and deeper love of God," by paying worship to the sun, the sky, fire, and sundry other material objects and forces. What this worship may be learned by the following selections from "hymns addressed to individual deities whose names have become centres of religious thought and legendary traditions—deities, in fact, like Jupiter, Apollo, Mars, or Minerva—no longer mere germs, but fully developed forms of early thought and language." Here, therefore, the other half of the journey has been achieved. Not only the predicate but the subject has been found.

"HYMN TO INDRA. Rv. i. 53.

"1. Keep silence well! we offer praise to the great Indra in the house of the sacrificer. Does he find pleasure for those who are like sleepers? Mean praise is not valued among the munificent.

"2. Thou art the giver of horses, Indra; thou art the giver of cows, the giver of corn, the strong lord of wealth; the old guide of man, disappointing no desires, a friend of friends:—to him we address this song.

"3. O powerful Indra, achiever of many works, most brilliant god—all this wealth around here is known to be thine alone: take from it, conqueror! bring it hither! Do not stint the desire of the worshipper who longs for thee!

"5. Let us rejoice, Indra, in treasure and food, in wealth of manifold delight and splendour. Let us rejoice in the blessing of the gods, which gives us the strength of offspring, gives us cows first and horses.

"6. These draughts inspired thee, O lord of the brave! these were vigour,

these libations in battles, when for the sake of the poet, the sacrificer, thou struckest down irresistibly ten thousands of enemies.

"The next hymn is one of many addressed to Agni as the god of fire, not only the fire as a powerful element, but likewise the fire of the hearth and the altar, the guardian of the house and the minister of the sacrifice, the messenger between gods and men :—*

"1. Agni, accept this log which I offer thee, accept this my service : listen well to these my songs.

"2. With this log, O Agni, may we worship thee, thou son of strength, conqueror of horses ! and with this hymn, thou high-born !

"3. May we thy servants serve thee with songs, O thou granter of riches, thou who lovest songs and delightest in riches.

"8. Thou art wise, and thou hast been pleased ; perform thou, intelligent Agni, the sacrifice without interruption, sit down on this sacred grass !" †

We confess that we are unable to see a truer knowledge of God, or a deeper love to Him, in these hymns, which might be multiplied if space permitted. All desire of friendly relations is sunk in desire of cows, horses, and all other kinds of wealth and splendour, while the god to whom these prayers are addressed is degraded into one who is inspired with bravery and strength for battle by the libations he had drunk. So that, if the chronological order which is supposed were fully established, yet the Veda would not exhibit the growth, but the decay, of religion.

We are sorry that Mr. Müller at the beginning of the *Hibbert Lecture* came to the conclusion that no definition of religion could be given. After examining the definitions given by Kant, Fichte, Schliermacher, Hegel, Comte, and Feuerbach, he says :—

"There seem to be almost as many definitions of religion as there are religions in the world, and there is almost the same hostility between those who maintain these different definitions of religion as there is between the believers in different religions. What, then, is to be done ? Is it really impossible to give a definition of religion that should be applicable to all that has ever been called religion, or by some similar name ? I believe it is, and you will yourselves have perceived the reason why it is so. Religion is something which has passed, and is still passing through an historical evolution, and all we can do is to follow it up to its origin, and then try to comprehend it in its later historical developments." ‡

Such a definition as is here described, is impossible, in any case. The design of a definition is to shut out all that is only called, but is not in reality the thing to be defined. The above process is a conglomeration, not a definition. Nor do we see an insuperable difficulty in the number of species to be included in the genus. Disease is varied, both in locality and kind ; but for this reason a physician does not refrain from de-

* *Rv.* ii. 6.

† *Chips*, i. pp. 30-4.

‡ *Hibbert Lecture*, p. 21.

fining its nature; nay, he finds it necessary to define, that he may have an intelligent principle of practice; and in proportion to the accuracy of his definition will be the breadth and precision of his treatment. And so with religion, or any other thing of which we are making investigation. In this case, Mr. Müller treats religion as an entity which he has to trace to its source, and then come back and look at its later developments. How can he find it if he does not know what he is looking for? If he has not the idea or definition in his mind, the first question in the investigation is, What is religion? Had this question been plainly answered at the beginning, the whole discussion would have resulted in more definite conclusions than those at which he has arrived.

We are unable to proceed in this examination without a definition; and to obtain it we pursue the course recommended above. We go to the first man and see what it was in him, and we come down the long line of his descendants, and we see nothing in the whole survey to prevent us regarding religion as *the obedient, submissive communion or fellowship of man with the Creator, Upholder, and Ruler of the universe*. This is the religion which the most ancient Vedic hymns exhibit, which is shown in the aspirations of all nations, but which is imperfect in all cases, in proportion to the obscurity, imperfection, or perversion of the idea of the Creator. Sometimes Mr. Müller has this idea of religion before his mind, but more generally he seems to look upon religion as an apprehension of the Infinite. Thus, the fourth lecture commences with this statement of the case:—

“Let us clearly see the place from which we start, the point which we wish to reach, and the road we have to travel. We want to reach the point where religious ideas take their first origin, but we decline to avail ourselves of the beaten tracks of the fetish theory on the left, and of the theory of a primordial revelation on the right side, in order to arrive at our goal. We want to find a road which, starting from what everybody grants, viz., the knowledge supplied by our five senses, leads us straight, though it may be slowly, to a belief in what is not, or at least not entirely, supplied us by the senses—the various disguises of the infinite, the supernatural, or the divine.”*

Pursuing this course, Mr. Müller proceeds to find evidence of the infinite in the objects of sense, thus:—

“When we speak of the earth as something complete in itself, like a stone or an apple, our senses fail us, or, at least, the senses of the early framers of language failed them. They had a name; but what corresponded to that name was not finite or surrounded by a visible horizon, but something that extended beyond that horizon.”†

* *Hibbert Lecture*, p. 169.

† P. 177.

We beg to remind Mr. Müller that part of this is assumed; what evidence have we that the first name for the earth expressed anything more than what was perceived by the senses? And the remainder is here irrelevant, he was to find the idea of the infinite by the five senses only, and the first step goes beyond sensation. Immediately after, he says:—

“It is not by *reasoning* only, as is generally supposed, that we know that there is an endless view beyond;—we are actually brought in contact with it, we see and feel it . . . we have before us, before our senses, the visible and the tangible infinite.”

We demur to this, as contrary to all testimony of the senses, and as a result to be attained only by a process of reasoning which can never produce demonstration. And when the difficulty, which after the strong assertion yet seems to have remained, is evaded by saying, “Infinite is not only that which has no limits, but it is *to us*, and it certainly was to our earliest ancestors, that also of which *we* cannot perceive the limits,” we must again say this also is irrelevant. That which was proposed was, to find the way by which the absolutely infinite one was perceived, directly or indirectly, by the senses. And to this end we do not advance a step by such statements as the following:—

“The more we advance the wider, no doubt, grows our horizon; but there never is or can be to our senses a horizon unless as standing between the visible and finite on the one side, and the invisible and infinite on the other. The infinite, therefore, instead of being merely a late abstraction, is really implied in the earliest manifestations of our sensuous knowledge.”

This cannot be. Our senses tell us of nothing beyond our horizon, and Mr. Müller thinks so, in spite of his seeming assurance, for he says:—

“We must begin with a man living on high mountains, or in a vast plain, or on a coral island without hills and streams, surrounded on all sides by the endless expanse of the ocean, and screened above by the unfathomable blue of the sky; and we shall then understand how, from the images thrown upon him by the senses, some idea of the infinite would arise in his mind earlier even than the concept of the finite, and would form the omnipresent background of the faintly dotted picture of his monotonous life.”*

But this was not the condition of the first man or of any of the men to whom appeal is here made. But, if it were, how a man living on a plain with a view of less than ten miles in every direction can get by that limited horizon, from his senses, an idea of infinite extension, it is impossible to show. And, if it could be shown, it would not help in this case,

* *Hibbert Lecture*, p. 38.

because what is wanted is not infinite space, or infinite linear projection, but infinite personality, or being. But, although nothing better than this is offered in proof, it is assumed that the position is established. And from the existence of "*semi-tangible objects*, such as trees, mountains, rivers, the sea, the earth," which are supposed to contain sensuous elements of infinitude, Mr. Müller tells us, "These objects supply the material for what I shall propose to call *semi-deities*;" while of "*intangible objects*, such as the sky, the stars, the sun, the dawn, the moon," we are told that "in these we have the germs of what hereafter we shall have to call by the name of *deities*."* Let us here take notice, that all these are material things of which, by hypothesis, our senses inform us, and yet they are the semi-deities and the germs of deities, which man has to find for himself, and to which he is to affix the predicate God.

Having indicated an unlimited source for the supply of gods, our lecturer proceeds to show how their names were obtained. And here we have some curious speculations as to the origin of language, on which we should make no remark but that the origin and growth of language is, in these lectures, represented as mixed up with, or travelling in lines parallel to, the origin and growth of religion. We are told that

"Language breaks out first in action. Some of the simplest acts, such as striking, rubbing, pushing, throwing, cutting, &c., were accompanied then, as they frequently are even now, by certain involuntary sounds—sounds at first very vague and varying, but gradually becoming more and more definite. At first these sounds would be connected with the acts only. *Mar*, for instance would accompany the act of rubbing, polishing stones, without any intention, as yet, of reminding either the speaker or others of anything else."

After showing how by change of accent *mar* would become an imperative verb, the speculation proceeds:—

"After a time, however, a new step would be made. *Mar* would be found useful, not only as an imperative, addressed in common to oneself and others (*mar* 'let us work!'); but, if it was found necessary to carry stones that had to be smoothed, from one place to another, from the sea-shore to a cave, from a chalk-pit to a beehive hut, *mar* would suffice to signify, not only the stones that were brought together to be smoothed and sharpened, but likewise the stones which were used for chipping, sharpening, and smoothing." †

This is pure theory unsupported by facts, and utterly inconsistent with the conditions supposed. First, there is no uniform involuntary sound uttered by men in the act of

* *Hibbert Lecture*, p. 180.

† *Ibid.* pp. 183-4.

rubbing, pushing, throwing, or cutting, because there are no two of such acts precisely the same, while the great majority of them call forth no sound from the operator, and never could have done. The only involuntary sound which is called forth by such acts is a grunt, when the strength is fully taxed, and it is the same sound whether occasioned by striking, throwing, or pushing. Then we have men able to get *stones* from a chalk-pit to build a beehive hut,—which would be beyond the skill of half the masons of England at the present day,—so far advanced in carpentering as to be able to construct and take to pieces the frame on which it was built, with tools sufficient to sink the chalk-pit, and expert lapidaries who polished stones, and yet so poor in words as to have only *MAR* to express all their actions. He that can believe this, let him believe it. The advancement in mechanical skill would be impossible without a language.

Unsupported, however, as this theory is, Mr. Müller carries it on as a certain fact, and, from the assumption of its certainty, proceeds to establish the kindred theory of religion. In doing this, however, we do not think he fairly meets the difficulties by which he is confronted. It is easy to state a difficulty in such a manner that, while it contains the substance of the objection, yet contains also certain elements which the objector would repudiate, and then, by replying to the incongruous element, to assume a full answer. This is what we think Mr. Müller has done in this case. He says (page 255):—

“Without any warrant, either from the Bible or from any other source, nay, without being able to connect any clear understanding with such a theory, many mediæval and even modern writers have maintained that language too owed its origin to a primeval revelation It is easy to understand that, even if a complete grammar and dictionary had suddenly come down from heaven, they would have been useless to beings that had not themselves elaborated their percepts and concepts, and that had not themselves discovered the relation in which one concept may stand to another.”

We have no intention of contending for language by revelation, or for a grammar and dictionary from heaven; but we, notwithstanding, hold opinions contrary to those here propounded, and which, so far as we can see, neither the theories nor the arguments of Mr. Müller in any way remove. When Adam, in maturity of body and intellect, came into being by the fiat of the Creator, we must suppose him to have possessed such powers of perception as would enable him to distinguish between the various objects of whose existence his senses informed him; but in this there was a concept from the percept, and, as from the first he had the power of speech, there is no

difficulty in understanding that he expressed these concepts in names which to him were true, and therefore scientific. In this way all the substantives that he needed would be formed. In like manner we must suppose him capable of perceiving the operation of force. We need not claim for him intuitive perception, but suppose that, like his sons, he attained to perception and conception by examination and experience. When he had the perception, where is the difficulty in his expressing it in a word which he understood, and which Eve and their children understood? But in this expression of the concept of force in operation we have the verbs. Thus with the substantives and verbs, and their relation to each other,—carrying with more or less completeness, according to accuracy of observation and carefulness of thought, all subsidiary grammatical forms,—we have a true and sufficient language involved in the original power of speech. It is after this manner that the Bible shows language to have been used by primitive man.* Here, however, we have no dictionary or grammar, either printed or written and given in a book, or by oral revelation, but a language springing out of the nature and condition of man, adequate from the first, and one which would grow as objects multiplied, forces varied, and relations became more complex. We readily admit that “man must conquer everything by the sweat of his face,” language like everything else; but we would remind Mr. Müller that the authority whence he quotes the above aphorism shows man to have been able to use and understand language before the necessity was imposed. Words are the counters of thought, and a sufficient supply must be obtained before we can express the thought; but according to the range, the complexity, and the depth of the thought, will be the variety and richness of the forms in which it is expressed. To us there seems no difficulty in understanding the growth of language from such an origin, but we cannot understand how a community could have existed who were obliged to put the poor “*mar*” to a thousand uses. And we have still greater difficulty in understanding how a conference for the elaboration of the terms and structure of a language could have succeeded when only *mar, mar, mar* could have been uttered as the vocal sign of all work. We know that no language has thus been produced, but that its various forms have obtained currency by use. But, in the case above supposed, you have a community without a language, and consequently without a current in which thought can flow, and, as it seems to us, there is no means of

* Genesis ii. 19.

producing it after the generations which have passed without it but by expedients which Mr. Müller repudiates. And we especially feel a difficulty in understanding how language, as complete as those Vedic forms of which he especially treats, and to which alone he applies his theory of origin, could have come in the way he supposes. In the old Sanskrit we are told we have more perfect grammatical forms than the modern supplies, and these are really *gems* of language.

“Now I confess that such a vocative as Dyaus, having the circumflex instead of the acute, is to my mind a perfect gem, of the most precious material and the most exquisite workmanship. Who has not wondered lately at those curious relics of pre-Hellenic art, brought to light at Hissarlik and Mykenæ by the indefatigable labours of Dr. Schliemann? I am the last man to depreciate their real value, as opening to us a new world on the classical soil of Greece. But what is a polished or perforated stone, what is a drinking vessel, or a shield, or a helmet, or even a golden diadem, compared with this vocative of Dyaus? In the one case we have mute metal, rude art, and little thought; in the other a work of art of the most perfect finish and harmony, and wrought of a material more precious than gold,—human thought.”*

But how could the Vedic Sanskrit, which we are told “is full of such pyramids of human thought,” have been produced by a people who, for many generations, had only one word for all action? Therefore, either the Vedic Sanskrit is not an original language, or language did not originate in the way Mr. Müller describes.

Discussing the origin of language after the above manner, he finds our modern word Deity through the Greek $\Theta\epsilon\acute{o}\varsigma$ in the Sanskrit “*Deva*, a bright thing,” which came from the root *div*, to shine, and which, before the Aryans broke up from their original seat, was no longer used in the sense of bright, but in the special sense of God, to which it was afterwards confined (p. 5). But if, when we meet with it for the first time in the oldest literary documents, it is so far removed from its primitive etymological meaning that “there are but few passages in the Veda where we can with certainty translate it still by ‘bright,’” what proof can the Veda give us of the growth of the predicate God? We are informed, however, how fire, although visible and tangible, came to be regarded, not as a semi-deity, according to programme, but as a full deity:—

“We must forget the fire as we know it now, and try to imagine what it was to the early inhabitants of the earth. It may be that, for some time, man lived on earth, and began to form his language and his thoughts, without possessing the art of kindling fire. Even before the discovery of this art, however, which must have marked a complete revolution in his life, he

* *Hibbert Lecture*, p. 144.

had seen the sparks of lightning, he had seen and felt the light and warmth of the sun, he may have watched even, in utter bewilderment, the violent destruction of forests by conflagration, caused either by lightning or friction of trees in summer. In all these appearances there was something extremely perplexing. At one moment the fire was here, at another it had gone out. Whence did it come? Whither did it go? If ever there was a ghost in our sense of the word, it was fire. Did it not come from the clouds? Did it not vanish in the sea? Did it not live in the sun? Did it not travel in the stars? All these questions may sound childish to us, but were very natural before men had taught fire to obey their commands. And even after they had learnt to produce fire by friction they did not understand cause and effect. They saw the sudden appearance of what we call light and heat. They felt fascinated by it, they played with it, as children are fascinated by it even now, and will play with fire whatever we say . . . They called him the quick or ag-ile, in Sanskrit *ag-nis*, in Latin *ig-nis*. So many things were told of him, how that he was the son of two pieces of wood; how, as soon as he was born, he devoured his father and mother; how he disappeared when touched by water; how he dwelt on the earth as a friend; how he mowed down a whole forest; how at a later time he carried the sacrificial offerings from earth to heaven, and became a messenger and mediator between the gods and men: that we need not wonder at his many names and epithets; nor need we wonder at the oldest of all myths, that there was in the fire something invisible and unknown, yet undeniable—it may be the Lord.*

This wonderful genesis of a god claims a careful examination; to us it seems a grand building on the narrowest basis—a pyramid with its apex for a foundation. It starts with an unfounded hypothetical assumption. And till it can be shown that not only man *might have lived* and it have begun to form his language, by the slow process of “*mar mar*,” with diverse accentuation, before he knew how to kindle a fire, but that *he did live* long enough to see forests burned down by lightning or friction before he found out how to light a fire for himself, the whole theory is baseless: this is its sole foundation, and it is incapable of proof. Man as yet is supposed to know nothing of fire but what he has seen in the sun, in the sparks of lightning, and in burning forests; yet these appearances and disappearances are extremely perplexing. The *sparks* of lightning might have perplexed them if they had seen them, but otherwise we cannot conceive of one of the questions of wonder which he supposes having been put by man before he knew how to make a fire for himself. The last they certainly did not ask; for in such ignorance of earth they had not become such good astronomers as to ask the question, Are the stars globes of fire? How could they have learned to produce fire by friction, and yet not know the relation of cause and effect in this particular case? What proof is there that they played with it, or were fascinated by it? And how could they,

* *Hibbert Lecture*, pp. 206-7.

in this early stage of their knowledge of fire, have travelled along the metaphysical path of abstraction to the predicate God, and have found in their new acquaintance and playfellow "something invisible and unknown,—it may be the Lord?" Could men in this condition have formed of themselves this highest conception of Divinity, which is uttered in the incommunicable name, which man never did devise, but which was proclaimed by the Deity? If they had any knowledge of this name, it must have been by revelation, pure and simple; it has no other source. Yet we are told that it was the *oldest of all* myths. If this be so, then in the earliest records of human thought we have proof that men started with a knowledge of God, as pure, necessary, infinite, immediate being; but that they had so far degraded this grand conception as to ascribe that being to a plaything, the product of friction with two sticks. This was not an approach to the true idea of the infinite, but a departure from it, and it has not the semblance of a sensuous source or authority.

Unsubstantial as the entire theory is seen to be, it is, nevertheless, assumed as proven, and employed in the sixth Lecture to prove that man must have grown his religion after this manner. The lecture begins thus:—

"If you consider how natural, how intelligible, how inevitable was the origin and growth of the principal deities of the Veda, you will perhaps agree with me that the whole controversy, whether the human race began with monotheism or polytheism, hardly deserves a serious discussion."

We have seen that the origin of one at least was unnatural, unreasonable, and therefore not inevitable; we have also seen that, in making this god, they had a remnant of true monotheism remaining, which was the only rag of divinity they could hang on the god of their own making. And we further assert, that whether they started with monotheism or polytheism is a question of the highest import, because it involves this more primary query—Did the Creator leave His immortal creatures, whom He had made in His own image, and into whom Mr. Müller says "He breathed the Spirit God," without any knowledge of Himself? and were they so unfurnished with intelligence, that it was inevitable, after they had kindled a fire by rubbing two sticks, that they should ascribe infinitude, divinity, to the sparks of their own kindling? We do not suppose Mr. Müller would give an affirmative answer to this query; but an affirmative answer is the only one possible, from the "natural, intelligible, and inevitable" origin and growth of the Vedic deities. Seeing, therefore, how entirely he has failed to establish his theory thus far, we are not de-

tered from an examination of his next position. He tells us (p. 258) that man is as incapable of receiving a revelation of religion as of a dictionary and grammar. And (p. 256) he tells us that the students of the science of religion, pursuing the only true method,—

“Have undertaken a genealogical classification of all the materials which have hitherto been collected, and they have then only approached the question of the origin of religion in a new spirit, by trying to find out how the roots of the various religions, the radical concepts which form their foundation, and, before all, the concept of the Infinite, could have been developed, taking for granted nothing but sensuous perception on one side, and the world, by which we are surrounded on the other.”

Thus by implication, and directly an immediate Divine revelation is denied. And, in proof of the direct denial, he says:—

“Ask a missionary whether he can efficiently preach the mysteries of Christianity to a people who have no idea of what religion is. All he can do is to discover the few germs of religion which exist even among the lowest savages, though hidden it may be beneath deep layers of rubbish; to make them grow again by tearing up the weeds that have choked them, and then to wait patiently till the soil in which the natural seeds of religion can grow may become fit again to receive and to nurture the seeds of a higher religion.”*

There is difficulty in getting at the precise sense of the above. We have a people who have no idea of what religion is, and yet they have some few germs of religion, hidden under rubbish. Where is it hidden? In their individual minds or in floating tradition? But the missionary has to make these germs grow by tearing up the weeds and taking away the rubbish. This reads smoothly; but what line of action does it describe? Having got rid of the weeds and rubbish, he has to wait patiently till this soil, which can only sustain these buried germs, is able to nurture nobler seeds. How is improvement to come about? Will it be by the growth of the natural germs? This would hardly hold good either in agriculture or in psychology. The final act is to put in the seeds of a higher religion. That is, to speak without figure, by an extraneous revelation the new religion is caused to grow. But this supposed case was brought to show that man has not only not received an external revelation, but that it would have been of no use to him if he had received it.

The rule of missionary labour which Mr. Müller lays down is as wide of reality as the theory it was brought to sustain.

* *Hibbert Lecture*, p. 258.

In the Zulu tribes of South Africa we have just such a people as he supposes. They have no god and no worship, and the only idea of beings different from themselves which they possess is that the spirits of their ancestors survive their death, and enter the bodies of snakes, of which, as a consequence, they have a superstitious fear. But among these people the missionaries do not discuss the question of ancestry, or bring back and illuminate the shadowy tradition of "the Great Great One," whom they only know as the author of death; but they relate the facts of Holy Scripture, and state the obligations and blessings which those facts guarantee and enforce. And, although this statement contains the most perfect revelation the Creator has made of Himself, yet the Zulu, who had no idea of what religion is, finds no greater difficulty in receiving it than a well-educated Englishman. He so receives this testimony as to become conscious of a Divine joy; of a righteous, pure, true, and benevolent direction or inclination to his mind, and of a superhuman power, enabling him to embody in his practice the virtues of his mind.* The missionaries among these tribes are able to point to many who began life without any idea of what religion is, who not only have lived for many years a blameless, useful life as the fruit of the religion which came to them by revelation; but the renewed natives have become the teachers of their equally ignorant fellow-countrymen, whom they have led into the light, and joy, and power of the true religion. A dozen years since, Abantwana, the uncle and general-in-chief of Tshaka, who followed the terrible Zulu king in all his battles, and commanded when he was absent, who was an old man before he heard anything of the Gospel, who had never before had any conception of a being superior to Tshaka, might have been seen, as an example of the ability of the most ignorant to receive the perfect revelation, and of its transforming power when received. Nor did those who knew him doubt but that, by his acceptance of this revelation, he had been "made meet to be a partaker of the inheritance of the saints in light."

Cases like the above, which might be multiplied indefinitely, show that man is capable of receiving religion by revelation. To them it came in a declaration from another man, accompanied by a Divine demonstration of its reality to each individual. And this ought not to be a difficulty to Mr. Müller, for he tells us:—

"No doubt there existed in the human mind, from the very beginning, something, whether we call it a suspicion, an innate idea, an intuition, or a sense of the Divine. What distinguishes man from the rest of the animal

* Psalm cxix. 130.

creation is that ineradicable feeling of dependence and reliance upon some higher power, a consciousness of bondage from which the very name of 'religion' was derived."*

It is in this "true Light, which lighteth every man which cometh into the world," that the Zulu and every other man to whom the Gospel comes beholds the glorious revelation of Divinity in "the Lamb of God who taketh away the sin of the world." It is this original endowment of our nature, confirmed and enlarged by the Divine Incarnation, which constitutes what Mr. Müller calls the religious faculty, but which, after all, he denies to man. He denies it because he supposes it to be unnecessary. But is it so? We have the faculty of sensation and of reason; by the one, we are able to certify ourselves of physical phenomena; and, by the other, of certain relations between the several objects of sense and of supersensuous qualities which underlie them. But in religion I, a person, am seeking communion with a spiritual and infinite person, without which communion my religious need cannot be met. Now, although my reason may conduct me, as conclusively as it conducted Kant, to the necessity of such an existence, yet it cannot conduct me a step further. My reason will not enable me to come into His presence, to lay hold on His strength, and plead with Him; but this direct intercourse is what I need, and it is evident that this is what has been enjoyed by men from the beginning. Enoch walked with God, Abraham was His friend, and millions of intelligent, sober-minded men in the present day are able to testify that the exercise of this faculty, which is in harmony with reason, which uses all its deductions, but goes far beyond it, is the most profound and thorough exercise of their consciousness day by day. Without ability to go beyond reason and to attain an individual consciousness of the Divine presence, and of our real relations to Him, we cannot conceive of religion, which is essentially individual. Worship is offered by a congregation, by a community; but in this form it is the worship of a collective unity, and in all cases is the worship of individuals, although many are assembled in one place. The failure in remembering this has, we think, led to the primary error in this history of the growth of religion. Religion can only grow by the more perfect communion of the individual, and by an increase in the number of those who possess it.

But, while we require this natural power of direct and individual personal contact with God, this by no means supersedes the necessity of outward revelation, any more than reason removes the necessity of sensation. But let us from

* *Chips*, vol. i. p. 238.

the beginning understand that there has been no revelation of the infinite. In the case Mr. Müller brings the search for the infinite led to atheism, and, although Kant required the idea as the keystone of his philosophy, yet he could not predicate it. Man has never found the infinite, and it must not be assumed that he ever will. And, if he did, it could only be a grand abstraction with which we finite persons could have no fellowship. In the Bible we have a revelation by which we can know God. But he is revealed, not as an unlimited negation, but as the Creator and Upholder of all things, and as the Redeemer, Saviour, and King of man. The revelation is entirely a record of facts, sometimes reported, more frequently done, but all within our ability to understand, and all within sensuous perception. All difficulty in the way of revelation vanishes before such a method. For we cannot suppose a difficulty in the way of the Creator at any time in revealing Himself to our senses, when we can convey the operations of our intellect by sensible means to our fellow-creatures. The mode of Divine operation we may not be able to understand; but the fact itself, as accomplished, is as easy to know as any we witness or receive on human testimony. This mode of revelation is in harmony with our nature; and we know it by the same process by which we obtain our knowledge in every line of science. It has so fully answered its purpose, that by it we may become wise unto salvation. But we must remember that this revelation is given to show our relations to our Creator and our fellow-creatures, with the obligations and duties springing out of them. And we think we have strong scientific reasons for expecting such a revelation of Himself by the great Ruler, so far as is necessary to the establishment of religion—that is, of an obedient fellowship with Him.

Man is the evident head of creation, the earth by a long process has been fitted for his habitation, and the work and the wreck of former ages furnish his support and wealth, while the limitless storehouse only opens its treasures as he himself acquires the skill to discover and use them. Recent investigation and discovery have shown a wealth of structure and of ability to use it, which remove to an indefinite boundary the limits of improvement to man and his condition, thus revealing more fully the grandeur of the scheme of which man is the crown. But it all shows that the design can only be adequately realised by a *natural*, that is, a high moral character in man. The history of man shows he has a tendency to deterioration. All Mr. Müller's facts show this tendency in operation. Now, as this tendency, unchecked, must render abortive the grand design of the Creator, and

as He must have known this tendency from the beginning, so we cannot suppose that means were not used to prevent its development, and thus secure the accomplishment of the design. But by necessity of nature man cannot be ruled by physical force, but by appeals to his understanding and conscience. There must, therefore, be some way by which those appeals may come from a supreme source. Less than this, plainly, will not meet the case; and less than a remembrance of the constant presence of the Divine King who inspects human action that "He may give to every man according to his ways and according to the fruit of his doings," has never yet produced a true and consistent morality. But such a motive is sufficient to prompt to and maintain all good works. But this involves a revelation of the existence and character of the great God, "in whom we live, and move, and have our being."

It must also be remembered, that man by nature is under law. Not only do we find Adam formally placed under law at the beginning, and all his children reminded of this condition by repeated commands and precepts of government, but we see that this condition corresponds with the profoundest principles of our nature, and requires to be reproduced by ourselves, in all our associations with each other; so that it is impossible for human society to exist without law, even in a state of barbarism. But this condition of things has been instituted by the Creator, as it all springs out of the nature, and is only now maintained by an appeal to the Supreme Ruler. All kings of old claimed Divine authority for their position and laws, and the only attempts which have been made in modern times to rule without God have speedily and totally failed. But we have only to practise a little introspection to find, even in lawless practice, in the earlier stages at any rate, that we are unable to debauch the nature itself. When a man violates his obligations to his neighbour, he not only regrets the discovery of his misdeed, because of its immediate consequences of shame, suffering, or loss; but, independent of all discovery, he is conscious that he is blameworthy, and that he is condemned by a higher tribunal than any human court. And, when a human court passes sentence contrary to the principles of righteousness which are involved in our mutual relations, the inward and higher tribunal overrules and reverses the judgment, and enables the condemned to triumph in the condemnation. But this could not be unless men were conscious of being under superhuman, that is, Divine, rule. And it is equally impossible that man can have commenced his existence under such a sense of subjection, and yet have

been left without any knowledge of the Creator, on whom he feels he must depend, and to whom he must appeal for help and approval; or without any knowledge of His will. But the possession of such knowledge involves a primary revelation.

This expectation of an adequate revelation is confirmed and strengthened by a consideration of what the law of the Creator must be. We cannot think of Him imposing arbitrary laws, out of harmony with the nature of man, or unadapted to the conditions of his earthly existence, but such as should develop and improve both to the utmost limit. And we may further expect, that much of human duty would be learned from the nature itself, so that we should be unable to escape entirely from a sense of obligation. But as human history shows that just and influential ideas of obligation and duty are impossible with degraded views of Deity, and as only a remembrance of the presence of the Supreme Ruler is an adequate motive for human duty, therefore, unless the Creator from the first intended man to be a failure, He must have revealed Himself so as to have furnished an adequate motive for a true and natural life. And further, as the tendency to deterioration is unquestionable, and as there cannot be deterioration without a proportionate loss of moral perception, so, to prevent total and universal degradation, we must suppose the Ruler to be able, within the scope of the nature, so to reveal Himself as to call back the individual or the nation to an acknowledgment of His own authority and to the fulfilment of duty. Such have been the nature and design of many individual and national corrections recorded in the Bible, and we have no difficulty in admitting that there has been similar Divine correction and recovery in other nations than those of whom we have information in the Old Testament. But all this implies, not only a primary, but a continuous revelation.

There is one period of such religious revival which is so remarkable, that it cannot possibly be passed by in any general history of religion. So far as it comes within the line of Mr. Müller, he discusses it, and gives as much as we can now know both of the Buddha and of Confucius. But not only within a few years of 500 B.C. did the Buddha in India, and Confucius in China, call men to repentance and righteousness, but at the same time Pythagoras was doing the like in Greece, and more especially in Sicily; while Daniel and his three friends were employed in a similar work in Babylon and Persia. We thus have these remarkable facts. First, in all the great centres of population and authority, we have at one time men raised up to effect a religious reformation. Secondly,

they were in each case successful. Grote describes the entrance of Pythagoras into Crotona, in Sicily, thus :—

“ His preaching and his conduct produced an effect almost electric upon the minds of the people, with an extensive reform public as well as private. Political discontent was repressed, incontinence disappeared, luxury became discredited, and the women hastened to change their golden ornaments for the simplest attire. No less than two thousand persons were converted at his first preaching. Nor was his influence confined to Crotona ; other towns in Italy and Sicily—Sybaris, Metapontum, Rhegium, Catana, Hимера, &c.—all felt the benefit of his exhortations, which extricated some of them even from slavery.”*

Yet wider and more permanent reformation was effected by the Buddha and Confucius, as shown by Mr. Müller, and as proved by the extent and power of their influence to the present day. The fidelity of the three Hebrews caused a decree to be published to the princes, the governors, and the captains, the judges, the treasurers, the counsellors, the sheriffs, and all the rulers of the Babylonian empire,—who had been assembled to inaugurate a new hero-god,—which acknowledged that the idol was nothing, and that there was no God who could save like Jehovah. But the devotion and the deliverance of Daniel caused a decree to go through the hundred and twenty-seven provinces of the Median empire in which Darius said :—

“ I make a decree that in every dominion of my kingdom men tremble and fear before the God of Daniel : for He is the living God, and stedfast for ever, and His kingdom that which shall not be destroyed, and His dominion shall be unto the end. He delivereth and rescueth, and He worketh signs and wonders in heaven and in earth, Who hath delivered Daniel from the power of the lions.” †

Thirdly, we have this special interposition at a time when the knowledge of God had greatly declined, when religion had become greatly debased, and when new elements of degradation were being introduced. This is seen to be the case in Babylon and Persia, and abundantly testified by Mr. Müller as to India ; of China we know not so much, but, so far as we do know, it was an equally opportune deliverance. And the condition of many Grecian cities is seen in that they had not the perception of their fall or the power to profit from their visitation. We confess we are unable to explain this wonderful page of human history on any theory of chance, but we find no difficulty on the admission that the Creator is able to reveal Himself to man, and that, as the Upholder and Ruler He has done so. And the condition of the world then sinking

* *History of Greece*, vol. iv. p. 546.

† Dan. vi. 26, 27.

into deeper degradation, and in danger of altogether "corrupting their way," and so of removing that and the succeeding generations beyond the possibility of recovery, was a sufficient reason for this special Divine intervention. We regard these cases as illustrious examples of the way in which "the God of the spirits of all flesh" shows his readiness to use any man, who will submit to His inward leading, as the means of enlightenment and salvation: because we believe that with Him is no respect of persons; "but in every nation he that feareth Him and worketh righteousness is accepted with Him." They brought back men to juster views of God, and in the bonds of a true morality united them to each other. Not only did they break the bonds of a tyrannical priesthood, but destroyed the elaborate hierarchy of gods which had grown to such large dimensions, and which our author delineates as the growth of religion. As soon, however, as these reforms had passed beyond their authors, they were submitted to a similar system of development, and they also became effete and powerless for good, like their predecessors. It is, however, important that we should remember that these reforms were accompanied by no speculations as to the Divine essence, but they more distinctly proclaimed the Creator and Ruler, and called to a simple and individual worship, as the means by which power for righteousness might be obtained. But this was only an appeal to "the feeling of dependence and reliance which has been in us from the beginning." Thus within the scope of the nature, and by means of primary revelations, the Creator in these cases brought back His creatures to Himself, and into the way in which He from the first intended them to walk.

In the form in which we suppose all Divine revelation to be made, it follows that when any enlargement takes place, that is, when any new facts concerning the Divine government are declared, and especially when these facts are out of the range of human observation, the declaration must be accompanied by such unquestionable marks of the presence of the Creator and Upholder of all things, that we shall have indubitable proof that the communication has been made with His authority. On the authority of another man's thought, no man would feel himself authorised to draw nigh to God, or to offer any work to Him as an act of service. This we see in the only two cases which the Bible furnishes. Moses and the Lord Jesus both wrought works which required the power and authority of the Supreme Ruler; not ostentatiously, but as they were required by the exigencies of their ministry, severally; with this marked distinction, that Moses as a

servant only, did his work at the bidding of the Master ; while Jesus, as the Son and therefore lord of the household, by His own direct volition. The importance of this principle is seen in the uniformity with which the Lord associated Moses with Himself in all the works He wrought in Egypt and in the Wilderness. All were done by the ministry of Moses, that the servant might have the authority of his Master. In both these cases there was a declaration of new facts—a new and fuller revelation. But there was no difficulty in understanding the facts, nor can we suppose any greater difficulty at the first. All that we can learn of the Creator and Ruler from our nature and the relations which are involved in it, we are left to learn by ourselves, but all that concerns us in these relations, which is beyond our power of discovery, can only be known by direct Divine instruction.

We started with the assumption that, regarding man as the king of the earth, we had reason to expect such Divine instruction as would remove him from the necessity of spoiling his own life, and rendering inoperative all past Divine work. And, with no wider horizon than the present life, we think we have given sufficient reasons for this expectation. But it is plain, from the teaching of Scripture and from the testimony of the various religions of the East of which Mr. Müller treats, that the life of man on the earth is only preparatory to another and enduring state of life. We cannot fail, therefore, to see, that every reason for a Divine revelation has much greater force from the fact that the present life of man is only preparatory to an endless existence.

Passing from Mr. Müller's view of the origin to his description of the growth of religion, we would suggest, that what he presents to us is not the growth, but the decay of religion. Religion, by common consent, is such communion with our Maker as shall result in the fulfilment of our duty to Him and to our neighbour. But, in the progress of the Vedic religion there grew up a dominant priesthood, who stood between the worshipper and His God, preventing all access to him, and who substituted a complicated and tedious ceremonial, in which their own service was necessary, for the truth, righteousness, and benevolence they owed to their neighbour. This Mr. Müller has fully shown in his paper on Caste. And this condition of priestly usurpation and tyranny

“ Had gained ground in India before the first collection of Vedic hymns was accomplished. These very hymns were the chief strength on which the priests relied, they were handed down from father to son as a most precious heir-loom But the priests only were allowed to chant these songs, they only were able to teach them; and they impressed the people with the

belief that the slightest mistake in the words, or in the pronunciation of the words, would arouse the anger of the gods. Thus they became the masters of all religious ceremonies, the teachers of the people, the ministers of kings. Their favour was courted, their anger was dreaded by a pious but credulous race.*

With such a beginning we are not surprised that they ended in claiming a share in the honour, authority, and power of the gods to whom they alone might approach.

"There are two kinds of gods: first the gods, then those who are Brahmins and who have learnt the Veda and repeat it. With oblations he appeaseth the gods, with gifts the human gods, the Brahmins who have learnt the Veda and repeat it. Both gods when they are pleased place him in bliss."†

And that this was no esoteric doctrine of mere speculation appears from the manner in which the Buddha was met when he commenced his ministry of emancipation from this priestly despotism. He was of the Kshatriya, or kingly caste, which for a long time had been able to preserve its equality with the Brahmins, or priests. But of him they said, "How can a Kshatriya take upon himself the office of priest? He breaks the most sacred law by attempting to interfere with religious matters." Thus it is plain that the true idea of religion was lost, and that this priesthood was a human device to prevent access to God, and to place men in the unnatural and unwarrantable position of deity or semi-deity over their fellow-men. And, when the true idea of brotherhood and consequent equality before God was so grossly outraged, it was no wonder that the preaching of the Buddha was eagerly followed by multitudes, who found in his doctrine deliverance from abject mental and spiritual bondage.

Half of the fifth lecture is devoted to an examination of the origin of the idea of law, which is supposed to have come from the observation of order and regularity in the motion of the sun, the recurrence of the seasons, and "the rhythmic dances of the stars." But this came only after a long period of "unconscious cerebration," and "was expressed vaguely and with difficulty." How could men have so considered the phenomena of the universe as to be able to detect an unvarying order in their appearance, and to rise to a perception of law as governing them, without at the same time seeing that the law was an imposition of their Maker, and not a quality in themselves? At the same time men who had proceeded so far in speculation must have known that they themselves,

* *Chips*, vol. ii. p. 327.

† *Ibid.* vol. ii. p. 233.

possessed of an independent will, were incapable of such regulation; law, as they saw it in "the rhythmic dances of the stars," could never be law to them. From the way in which the theory is stated, and from the testimonies quoted—which do not carry the conclusion—ages of settled national life must have passed before the idea of law was excogitated. But with law embodied in their mode of life during many preceding generations, and never long absent from their consciousness, the late discovery of stellar order cannot have been the source of the idea of law.

In the concluding lecture Mr. Müller pleads for the futile, inoperative, and degrading systems of religion and philosophy, as if they were as pleasing to the Creator as the imperfect lisplings of the babe are to the human father (p. 369). But the resemblance here supposed does not exist in man. He has not been left to make for himself a Divine name, nor to discover for Himself the Divine presence and will. And further, when such degradation of the idea of Godhead has taken place as permits a man to look for an all-sufficient helper and friend in a fire which he has himself kindled, and to pray to it, such prayer is no more addressed to the Heavenly Father than similar petitions to a beast or a stone are addressed to a human father. We do not presume to pass judgment on the ignorant heathen, or to define the precise relation in which they stand to the Supreme King and His government. We rest in the assurance that "the Judge of all the earth will do right," and "that many shall come from the east and west, and shall sit down in the kingdom of heaven." But it must at the same time be remembered, that in the measure in which man loses the true idea of God, or forgets Him, he also loses the idea of virtue and the most powerful motives to its practice; because all virtue is merely a fulfilment of the obligations arising out of the relations in which we stand to our Creator and fellow-creatures. In ignorance of these relations, and more especially with erroneous and degraded conceptions of them, there can be no just sense of duty, and the true end of man is neither seen nor realised. All such persons as, under the perverting influence of ignorance and idolatry, live to themselves are incapable of the favour of the Supreme Ruler. The prayers also of a man who has fallen from God and from righteousness are not likely to be such as the Lord can answer, nor will they ever be such as a man who knows the Lord would present. Unless, therefore, we merge every Divine attribute in a weak and thoughtless fatherhood, we can see no hope of special favour to the worshippers of idols, which are nothing in the world.

I have not omitted any important doctrine in Mr. Müller's statement of the Science of Religion, as illustrated in the Origin and Growth of the Religion of the Indian Aryans. But I have not been able to agree with him in many of his positions. We have seen, partly from evidence which he himself furnishes, that from the beginning man has possessed a knowledge of the existence, character, and claims of his Creator and King; that all through human life on earth this knowledge has been preserved, and men have had individual intercourse with Him; and that therefore man has never been left to discover the existence or the name of God. We have also seen in cases which Mr. Müller brings evidences of the retention of original revelation, which, in times of general degradation, have been sufficient to lead men back to God and righteousness. But all this is opposed to the theory of Mr. Müller, who, so far as we have been able to understand him, supposes that man has the power and the right to manufacture gods and worship for himself and by himself, without any reference to his Creator; and who seems to think that men are experiencing growth in religion as they become more gross and material in their worship, and more unrighteous in their lives. It is surprising that it did not appear to Mr. Müller that a process which necessarily ends in Atheism cannot properly be described as the Growth of Religion.

The CHAIRMAN.—I am quite sure, without putting it to the vote, that I may present the thanks of the meeting to Mr. Blencowe for his important and valuable paper.

The following communication from the Rev. Canon W. Saumarez Smith, D.D., Principal of St. Aidan's College, Birkenhead, was then read :—

23rd Nov., 1880.

I consider Mr. Blencowe's paper to be a very useful and opportune critique on Professor Max Müller's "Science of Religion."

The writer has shown that the Professor's assumption of a "godless" period, in which men were searching after GOD, is illogical, and involves him in inconsistencies of statement; that the alleged *growth* into better religious notions is, really, a *corruption* of simpler truth; that the practice of "sacrifice" among the Aryans implies an idea of God and of worship consonant with the earlier Mosaic record; that the *Mar mar* theory of language is ludicrous and inadequate; that the question of "monotheism" is an important one; and that external Revelation is needed by, and has been given to, men, both at first and (to a certain extent) continuously.

The gist of the argument is,—Was man, primarily, in possession of some

religious knowledge as well as of what we may call *instinctive religious sentiment*?

Max Müller admits a "sense of the Divine" as an ultimate fact in the analysis of human nature. In his preface to "Chips," &c., he enumerates "the radical elements of all religions," as "an intuition of God, a sense of human weakness and dependence, a belief in a Divine government of the world, a distinction between good and evil, and a hope of a better life." And yet he seems strangely averse to start with any definite idea of God in his history of religions. These Aryans, *e.g.* would seem to be a reasonable (?) religious (?) kind of animals, with no name for God, and no definite language; who, from a sense of infinite surrounding space, imagined supra-mundane powers, and gradually shaped an idea of God, and devise for their idea a Name!

Credo ut intelligam is, doubtless, the reasonable process of all knowledge; but the "belief" is not a vague, objectless, sentiment. Its foundation is a revealed knowledge (partial and elementary, but real) of a Personal God, mysteriously complex, yet eternally one; a revelation made at the commencement of human history by the Creator to the first created man. I cannot but think that we should reasonably prefer the statements of Moses to the "it may be" of Max Müller (p. 137). The Bible record is not sufficiently esteemed or used as *historical* material by philosophisers concerning man's origin and progress. Were it so, we should see them more ready to admit that a religion of Nature-worship is a *declension* from, rather than an *ascent* to, the knowledge of God.

Mr. Blencowe's paper is an able contribution towards the controversy which, I believe, Christian philosophers have to wage with three erroneous tendencies of the present day, *viz.* :—

- (1.) The prevalent reference of all things to a merely *natural evolution*.
The common and universal fact of deterioration ought to warn us against a philosophy which advocates a continuous *natural* order of things, without reference to God as the Anterior of all things, and the supra-mundane Ruler of the universe.
- (2.) The tendency to *equalise* all religions, as being so many fairly parallel forms of "religion." By the *extension* of the term "religion," its *intension* is diminished, until we have connoted by it only a thin residuum of vague sentiment, which is called Divine, but does not rest on God.
- (3.) The tendency to leave unduly out of consideration the "traditional" and "historical" phenomena of the Bible record concerning the earlier development of the human race.

To the Hon. Secretary,
Victoria Institute.

The CHAIRMAN.—I would call attention to one of the three paragraphs with which the Principal of St. Aidan's College concludes his remarks. He says that Mr. Blencowe's paper protests against three erroneous tendencies of the present day; and the second of these, to which I wish to call attention, is "The tendency to *equalise* all religions as being so many fairly parallel forms of religion." This is the grand fallacy against which I want to protest—the assumption that Christianity is one of many religions. That is a *πρῶτον ψεῦδος* to set out with, and against it we must take our stand at once. It is of no use arguing how far this or that form of development may have gone from the original truth; we must first of all lay down that Christianity is the truth, and that, in proportion as other religions resemble Christianity, they approach the truth; while, in proportion as they depart from pure Christianity, in the same proportion they depart from the truth. We know very well that the earlier people of God did what they could to corrupt the truth revealed to them, but that, having the written law, they could not do so, as they were unable to falsify it. So also, after receiving the later Christian Revelation, men have done a good deal towards corrupting it; but, there being a written and lively oracle of God, they could not succeed in perverting it. Let us, then, protest against the assumption that Christianity is anything but the one assertion of the truth.

Admiral E. G. FISHBOURNE, R.N., C.B.—I can quite understand the growth of infidelity when such doctrines as those noticed in the paper are set forth by certain learned professors, and I think we are very much indebted to Mr. Blencowe for having overturned Dr. Max Müller's arguments with his own weapons. There can be no comparison between Christianity and any other form of religion. There is this one principle that separates Christianity from all other forms of faith, and it is one which is denied by Dr. Max Müller, namely, that Christianity is essentially experimental. The doctrine must be put to each individual, and be a revelation to that individual soul; yet the communication between that individual soul and its Maker Dr. Max Müller denies. Now, there is really no other religion but this, because it is the only one which has God behind it to give that response which the individual worshipper seeks for. Yet we know that wherever we find man, throughout the world, he is a worshipping animal; he may be degraded, but he recognises a superior Being, to whom he feels himself responsible, and when he fails to obey his inward sense of duty and obligation he is condemned in himself, and feels that he is liable to the severer condemnation of his God. With regard to language, Dr. Max Müller throws the Bible over altogether as an historic record. It is distinctly stated in Scripture that "the Lord God brought every beast of the field, and every fowl of the air, unto Adam, to see what he would call them; and whatsoever Adam called every living creature that was the name thereof." Here, therefore, we have language from the beginning, even before a helpmeet for Adam was found.

Rev. J. JAMES.—More than one President of the "British Association

for the Advancement of Science" has said something to this effect,— that men who discovered facts in science were not always the men to theorise upon them. At all events, this appears to me to be true in the case of Dr. Max Müller. Notwithstanding that he has brought before us, in his "Chips from a German Workshop," so many facts of great importance, and in thorough accordance with Holy Scripture, nevertheless, when he begins to theorise upon those facts in his "Hibbert Lecture," he proves himself unequal to the task. In my humble opinion, and to my great sorrow, there seldom was in the case of one man so great a fall from a high degree of orthodoxy to so low a depth of heterodoxy, as these works show. I think it well to inform the meeting that the book called "Chips from a German Workshop" was published fifteen or twenty years ago, whereas the "Hibbert Lecture" was published only two years since. Also, I should like to call attention to the fact that every extract from the "Chips," given in the valuable paper which has been read before us this evening, was of an orthodox character in tendency and design, whereas every passage cited by Mr. Blencowe, which went against the first principles held by the members of this Institute, was taken from the "Hibbert Lecture." Therefore, I venture to ask the meeting not to look on the Dr. Max Müller of the present day as the same Max Müller who wrote the "Chips from a German Workshop." If we take his facts, we may find pleasure in, and take profit from, them, as there is much in them to encourage and satisfy the mind; but let us repudiate his "Hibbert Lecture." I should like to quote one passage from the "Chips," which, to me, was most encouraging; it refers to the state of men's minds in India. Dr. Max Müller, in his preface to that work, says:— "A Hindoo, of Benares, in a lecture delivered before an English and native audience, said, 'We really lament the ignorance of those who charge us with polytheism, in the teeth of thousands of texts in the Purānas declaring, in clear and unmistakable terms, that there is but one God, who manifests himself as Brahma, Vishnu, and Rudra (Siva), in his functions of creation, protection, and destruction,' and he summed up his view in the words of their great poet, Kalidāsa, as translated by Mr. Griffith:—

'In these three persons
 The one true God was shown,
 Each first in place,
 Each last,—not one alone.
 Of Siva, Vishnu, Brahma,
 Each may be
 First, second, third,
 Among the blessed three!"

True,—Christianity is the one revealed religion; but we gladly recognise in any other form of religion any traces of the original Revelation. Therefore, we may well rejoice in these and similar lively traces of it; because our missionaries, knowing them, will be able, amid a civilised people like the

Hindoos, to profit by such passages in their reasoning with them, and so, by God's blessing, to save them hereafter from the atheism into which so many of them are in danger of falling. And I think we may say the same of the earlier evidence of the Vedas; for the Purānas were probably of a date some time after these. Were not, let me ask, the extracts from the early Vedas, cited from "Chips" in Mr. Blencowe's paper, very wonderful in respect of the touching sense they express of the blessedness of being at peace with God, of their touching prayers for forgiveness, and of their touching petitions to God that he would receive them back to friendship and to peace?

Mr. ENMORE JONES.—I do not think that we, or Professor Max Müller, whilst looking further and further into the future, have sufficiently sought after evidences in the past. Taking the evidence we have, we find that the Vedas only go back 2,380 years; whereas the Book of Job, that great book,—the statements in which we neglect too much,—which acknowledges the Creator in the fulness of His mighty power, and the creation He has formed, and gives so much information as to geography and astronomy, and the whole mechanism of the Universe,—dates back 3,400 years; and we find that Abraham came from Egypt 3,798 years ago, which is considerably beyond the time referred to by Professor Max Müller.

Mr. D. HOWARD.—It is one of the boasts of modern science that it accurately records facts and draws conclusions therefrom; but I must confess that I have seldom seen a more unscientific statement than that which sets up, or lays down as a law, that we are to "take for granted nothing but sensuous perception on one side, and the world by which we are surrounded on the other." It is almost worth while to study that sentence in order to try and arrive at some conception of what it means. I am afraid it means that facts are to be put on one side if they do not fit in with the theory. I must say that I am surprised at the immense contrast which has been already noticed between the "Chips from a German Workshop" and the "Hibbert Lecture," and I have been sometimes inclined to draw a distinction between the first and second volumes of the "Chips." Certainly the progress has not been upwards even in that book. But what are the facts by which we are to judge of what the state of the early religions was? The paper that has been read to-night brings before us, most interestingly and ably, the state of religion at the Vedic period. If we compare the knowledge we thus obtain of the religious ideas of India with those of the Zendavesta, and with those investigated by M. Renouf in the "Hibbert Lecture" of last year, we have strong evidence that in all parts of the world—the thinking world—at the period referred to, there was one particular stage of religious thought which, by the introduction of a new word into the language, is now called henotheism, which used to be called nature-worship. The question is, Is this a progress upward, or is it a deterioration from a previous state? What are the facts? Is there the smallest proof that any human beings or tribes ever worked upward from that stage to a knowledge of the true God?

There is no such evidence whatever, and the facts appear to be thrown overboard because they cannot be made to fit the theory. But, I would ask, why should the facts be crushed in order to fit a theory which they can fit so little? I would advise any one who wants the strongest evidence against Mr. Max Müller's "Hibbert Lecture," to read M. Renouf's "Hibbert Lecture." A more interesting study of the evidence of the early deterioration of religion from a higher standard could hardly be obtained. We have not the record of the earliest state, but we have evidence everywhere of the religion as it was deteriorating, and we have records of a growth downwards from the Vedic period—from the period which the early Vedic hymns give us. I am afraid I am almost inclined to challenge the high character given to Buddha. He did what reformers are too apt to do—he swept away too much, and, in point of fact, left a sort of philosophical nihilism, so that the marvel is that it should have had so much power. Thus you have the history of a great decadence of religion. Does not this point, as plainly as anything could, to the fact that before these records there must have been a higher stage? If you have progress in one direction, you may assume that progress has previously been in the same direction, unless there is evidence to the contrary. There is no *terminus à quo* in these early histories; but in the earlier books of the Bible we have a starting-point. Why should we, simply because the Bible is believed by Christian men to be the Word of God, throw it overboard as a record? Why should we throw overboard deliberately what, as a mere history, would be invaluable on the subject in dispute? We may very well believe that the intellectual perceptions of man have enlarged and changed, but, perhaps, not always improved. We do not, for instance, suppose that Abraham's intellectual attainments were equal to those of Dr. Max Müller: probably Abraham* troubled himself little about the study of the words he spoke, and probably his logical premises were not those of Dr. Max Müller; but surely that does not show that Abraham's religious conceptions were not all that the religious power of any man now can require. I would appeal from Dr. Max Müller's "Hibbert Lecture" to the experience of any man who has watched the progress of religion in the human mind; and I would ask him, not only as to the progress of savage races, but also as to the progress of religious thought in an English child; whether religious perceptions come before intellectual ones, or whether the intellectual perceptions come before religious ones, and then, I would ask you to say if you believe the religious perceptions are merely intellectual? I confess I cannot. It does appear to me that in the experience of any one who will watch the progress of the mind, whether in the savage or in the child, it will be found that the intellectual perception is a different thing from the religious perception, and I might say, for the sake of argument, putting

* The position held by Abraham is discussed in vol. xii. p. 110.

aside revelation, experience itself teaches us that we are not left in this world alone with sensuous perceptions and our own intellectual perceptions, but that there is a spiritual perception which is entirely ignored by Dr. Max Müller, and which, after all, is as certain, according to the evidence we can produce, as is the evidence of our intellectual perceptions. Where is the force of gravity? where are the theories of Newton? where is the differential calculus, if we are left alone with sensuous perceptions and the world? I fail to perceive why then, if we admit intellectual perceptions, which certainly are not sensuous, should we be false to the testimony of our own nature, and refuse to admit religious perceptions, of which there is as much evidence as of the intellectual perceptions? I heartily thank the lecturer for the paper he has given us on a most interesting subject, and one which is most admirable, profound, and well adapted to the needs of this Institute. (Hear, hear.)

Mr. BLENCOWE.—I do not know that I need reply at any length after what has been said. I was going to refer to M. Renouf's "Hibbert Lecture," and to have suggested to one of the earlier speakers that he mentions what he calls the oldest book in the world, a copy of which is now in Paris, and which, he says, was written centuries before the Exodus, and that that is only a copy; that the author of that book, Ptahhotep, lived in the Fifth Dynasty, and that he did not propound a new religion, but was a reformer, bringing back his people to that knowledge of God from which they had departed. Mr. Renouf, in that lecture, also quotes the testimony of an eminent Frenchman, whose name I forget just now, and to whom he refers as of all other persons most competent to speak upon such a question; who says that the earliest doctrine of Egypt was one, sole, only God,—a most precise and definite expression,—not Gods, but one, only, sole God. This is the oldest testimony I know except that of the Bible, and, as the gentleman who last spoke says, both from the Zendavesta and those early records of Egypt, we have the sameness of doctrine at that period, most clearly established.

The meeting was then adjourned.

FURTHER COMMUNICATION RECEIVED.

The Rev. J. FISHER, D.D., sends the following remarks:—

This paper was much needed, and, though I highly approve of it, I would venture to remark upon a few passages.

On page 140 we read "The Zulus have no God and no worship." But the paper corrects itself and adds, "They know the *Great Great One* as the author of death." It is sometimes difficult to find out what ideas of God and worship the mere savage has. We hold, however, with Cicero, that "there is

no nation so savage as not to know that there is a God, though they may not know what worship they ought to offer him."

Page 145 gives us a quotation from Grote's History, telling of the effect of the visit of Pythagoras to Sicily. We may allow that beneficial results followed his visit. When, however, we read that "no less than 2,000 persons were converted at his first preaching," we submit that Pythagoras had not the good news whose preaching is followed by conversion; and that, using the word conversion in its ordinary religious sense, there were no conversions under Pythagoras. Cicero knew more of the Old Philosophers, of the Pantheist Pythagoras, and of his labours in Sicily than Grote, and he confessed that "not even in a single instance did philosophy reform either the philosophers or their disciples."

The best of them mourned over virtue and shame alike departed, and their cry was that of Ajax in Homer, "Give us light, O Jove." Plato, perhaps the best of them, said, "We have fallen into this miserable plight, from which we know not how to extricate ourselves, unless God send us a teacher."

God has done a great deal to keep this earth from total darkness and pollution, by raising up, in different places, great moralists, philosophers, poets, and legislators to teach mankind. But, as the late Dr. Duncan said, "the best pagan philosophy was only God's scavengery to keep his prison-house somewhat clean till He would come who was to proclaim liberty to the captives."

THE AUTHOR'S REPLY.

To the foregoing the Author of the Paper replies:—

With respect to Dr. Fisher's criticisms, I wish to make the following remarks:—

1. I am not surprised at the objection raised with respect to the Zulus. It is what any one who does not know them would naturally think. Yet both my statements are strictly and literally true. They have no God, and they have no worship, but they have a tradition that Unkulunkulu, the Great Great One, appointed death; and some of the tribes have a further tradition that he first made men out of reeds, or maize-stalks. The full tradition concerning the appointment of death is as follows:—Whenever any word is received from Unkulunkulu it cannot be changed. He sent the Chameleon to say to men that they must live and not die. Afterwards he sent the Salamander to tell men that they must die. The Chameleon, as usual, loitered on his way, and at best moved but slowly, so that the Salamander, who always runs, got to the end of his journey first, and delivered his message long before the Chameleon arrived; and, having had word already that they must die, his word was of no avail. But of Unkulunkulu the Zulus now know nothing not even his existence. He is not in their thoughts. The tribes which live in the Zulu country know nothing higher than the spirit of Tshaka.

2. I do not think that any explanation of the quotation from Grote is necessary. Alteration, of course, is impossible in a quotation. It fully established my position, that Pythagoras was successful in his mission of reformation; and although I should not have used the word "converted" had I been writing the description, yet I cannot blame Grote for using it. It simply means changed, and what he described was not only a great change, but a great moral improvement. If one set of men use a word in a much narrower sense than its etymology requires, they have no authority to forbid the rest of the world using it in its purity, especially when, as in the present case, their narrower use of the word is indefinite and equivocal.

3. I am quite ready to admit that the best of the ancient heathen had very imperfect knowledge of God and of Divine things, in comparison with those to whom were given the Oracles of God. But I should be sorry to regard Ptahhotep and Zoroaster as no better than "prison scavengers." And I cannot fully receive the second part of Dr. Duncan's doctrine; because, although all who lived B.C. were without that full revelation which could only come from "God manifest in the flesh," yet not a man has been born into the world beyond the scope and influence of redemption. Further, if the doctrine of Dr. Duncan be correct, then all the Old Testament saints were in bondage as well as the rest of the world. Like nearly all smart sayings, its smartness is the measure of its inaccuracy.

ORDINARY MEETING, JANUARY 3, 1881.

W. N. WEST, ESQ., IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced :—

MEMBERS :—H. Cosedje, Esq., London; Rev. W. Mason, D.D., Morpeth.

ASSOCIATES :—Rev. R. Burke, M.A., B.L., Victoria; Rev. M. Dods, D.D., Glasgow; Rev. J. Empson, M.A., Montreal; R. D. Hughes, Esq., London; Rev. J. McWilliam, New Zealand; Rev. J. W. Sloan, B.A., LL.B., Monte Video; Rev. E. Young, M.A., Bristol.

Also the presentation of the following Works to the Library :—

- “Proceedings of the Royal Society.” *From the same.*
 “Proceedings of the United States Geological and Geographical Survey.” *Ditto.*
 “The Bible, a Key to History.” By J. Coutts, Esq. *Ditto.*
 “The Science of Natural Theology.” By Dr. H. Mahan, D.D.
Adml. Fishbourne, C.B., R.N.

The following paper was then read by the Author :—

THE EARLY DESTINIES OF MANKIND. By JOHN ELIOT HOWARD, F.R.S., F.L.S., Member of the Society of Biblical Archæology, &c.

IT is most natural that our minds should turn towards the early condition of our race, and perhaps there never existed a keener interest in the inquiry than at the present moment.

Science, philosophy, and religion all offer us their aid in the research; not, however, in harmonious concert, but in rivalry; which it is the aim of many to render less manifest or to disguise by some friendly compromise.

As I am addressing the members of the Victoria Institute, who profess faith in the Christian religion, I confine myself to the last, and turn to the often-neglected third guide. Religion—Christian religion—bids us turn to the Scriptures, for information on an authority no less than divine. It is surely important that we should study profoundly the meaning of those records which we commend to thoughtful inquirers. We are told in the New Testament that the “Oracles of God” were a trust committed to the chosen nation (Rom. iii. 2), from whom we receive them (faithfully preserved, though not altogether uninjured in the transmission), and pass them on, still further obscured in part by our translations, to other Gentiles. It is surely needful, when these “Oracles” are attacked, to recur to the original *deposit*, and that in its primitive language and condition. The most celebrated translations, such as the Septuagint and Vulgate, afford much superfluous matter for critical objection. Look at “the Beginning” and see how every word tells, בְּרֵאשִׁית. This is the title of the first book in our Hebrew Scriptures, and it informs us of the great fact that there was a Beginning, concerning which both Science and Philosophy leave us entirely in the dark.

It is by faith that we enter upon the large and fair domain before us, a province which we cannot surrender to the “Agnostic.” It is by faith *alone* that “we understand that the worlds were framed by the word of God, so that things which are seen were not made of things that do appear.” Everything in Heaven and earth is represented as formed by and *for the Son of God*.* We read nothing of a self-developing Universe, of “the powers and potencies of matter.” Nature is but a figurative expression to conceal our ignorance; and the laws of Nature have no real existence, implying simply the course of things as it falls under our observation. The Son of God is represented as “upholding all things by the word of His power”; so that we have here in a religious aspect the *alone source* of forces and powers that we do not understand, but dimly recognise in their operation.

Mundane religion here accords with the account given in the Scripture, and, whilst not *adding* to its authority, certainly *confirms* what is there stated. The earliest conceptions of mankind of which we have any account symbolise with the above, representing not an effort to attain higher truth but a remembrance (and often a distortion) of truths already received.

* See Heb. i.; Coloss. i.; also Appendix A.

The first month amongst the Babylonians was the month of the altar of the Creator,* and two gods presided over it, *Anu* the primordial God, analogous to the *Ouranos* of the Greeks, and *Bel*, to whom is ascribed very specially the formation of the organised universe.

The grand spectacle of the Heavens must very early have fixed the attention of man, especially in those regions of the earth where the serenity of the air facilitated the observation of the stars. It was necessary for the purposes of agriculture that they should distinguish the seasons, and know when to expect their return. Hence arose the division of the year into the twelve months and the formation of the Zodiac (as is well explained in the works of Laplace.) These are some of the reasons which induce me to believe that astronomy was largely cultivated before the Flood; but I now direct attention to the above information derived from most recent and authentic researches into the elaborate astronomical system of the Chaldeans, of which the above forms a part. We look back over an interval of between 4,000 and 5,000 years, and find man believing in one Supreme God, the first ineffable cause; too high to be understood or worshipped; and in an *Architect God*, more or less identified with the former (see my previous paper on Egypt), afterwards called *δημιουργός*, the craftsman or skilled workman.

To the *Creator* (in some sense one with the above) they dedicated the *beginning of their year*, and raised their altar for sacrifice.

The *first elaborate study* of the Heavens was made by men in a state of high civilisation; having no other conception than a *religious* history of mankind, and familiar in their traditions with thoughts of the Creation, of the Deluge, and of other events recorded in the book of Genesis which they *stereotyped* in the Zodiac.†

THE CREATION OF MAN.

אֱלֹהִים (Elohim).

Now what is meant by *Elohim*? Does this *plural* and yet (in its construction) *singular* word refer to some corresponding revelation of the Divine nature to our first parents? I find in the Jewish commentators Dr. Sola, Lindenthal, and Dr. Raphall the following (*Gen.* p. 4): “When organised nature is called into existence, the words used are, *Let the earth*

* “In Accadian *ita bara zaggar*, the last word *zaggar* is given as an epithet of the god *Bel*.” Lenormant, *Origines de l’Histoire*, p. 242.

† See Appendix B.; also Laplace, *Ex. du Système du Monde*, p. 367, *et seq.*

shoot forth, let the waters teem, let the earth bring forth, but when man, an intellectual being composed of spirit as well as matter, is to be created, it is no longer earth or water who are directed to bring forth, but the concentration of all powers God, exclaims, *We* (pluralis excellentiæ) will make man."

But what do these learned Jews mean by "*the concentration of all powers*"? It is *figurative language*, no doubt; but is not the corruption of figurative language that from which *polytheism* sprang? The description would, I think, have been acknowledged by the priests of Babylon as of *their* religion. *All the powers* might be worshipped, it being understood that they were emanations of, and included in, "the God One."

At a later date this monotheism became a secret of the priests; nevertheless, in the Orphic Hymn it is very explicitly stated.* I notice that Μῆτις is there made one with Ζεὺς, elsewhere the first wife of the first Cause of all things.† And the word implies *Advice, counsel, a plan or undertaking*.

Let this be compared with the personification of *Wisdom* in the eighth chapter of Proverbs (which as a Christian I am not at liberty to consider as mere poetry), and it will be apparent, as I judge, that the false is but a reflection (or distortion) of the previously revealed true doctrine. I say previously revealed, for the assumption of the plural *We* on the part of the Almighty must have been *intentional*. In the subsequent revelation to Moses it is I, the personal pronoun, that is used, *I am that I am*. We have the highest authority for saying that more was made known to faithful men of old than Scripture records (see John viii. 56).

Elohim, in the first chapter of Genesis, is represented as forming the race of man after consultation. "Let us make man in *our image*:" the word is literally, *shadowing* forth יְצַלֵּם Christ is called the *Brightness* of the Father's glory (ἀπαύγασμα), which indicates something much higher than a mere shadow; also the *express image* of His person; the word χαρακτήρ implying "the peculiar nature or character of a thing or person," (Liddell and Scott's *Lex.*), and therefore also leading us to a

* Ζεὺς ἀρσῆν γενετο, Ζεὺς ἀμβροτος ἐπλετο Νυμφῷ
 Ζεὺς πυθμῆν γαίης τε καὶ οὐρανοῦ ἀστεροειντος,
 Ζεὺς ποντοῦ ρίζα, Ζεὺς Ἥλιος ἠδὲ Σελήνη,
 Ζεὺς Βασίλευς, Ζεὺς αὐτος ἀπαντων ἀρχιγενεθλος
 Καὶ Μῆτις, πρῶτος γενετωρ, καὶ Ἔρωσ πολυτεροπης.
 Παντα γὰρ ἐν Ζηνοσ μεγαλω ταδε σωματι κειται
 Ἐν κρατος, εἰς Δαιμων, γινεται μεγας ἀρχος ἀπαντων.

† Hesiod, *Theog. Th.* 886, quoted in Liddell and Scott, *Dict.*, sub v. Μῆτις.

higher range of thought than the remaining term in the creation of man, "in our likeness," *כְּצַלְמוֹתָיו* which is feeble in comparison ("similitude, likeness, image," Ges. *Lex.*)*

The purpose is then stated for which they (Adam, including his wife) were created. Adam was to have dominion, i.e. to be a visible God upon earth to all below him; as he was, on the other hand, to forbear to aspire to the glories of the Elohim above him, to whom he was to render unflinching homage and obedience.

This original dignity of man was dimly seen, even, by the heathen:—

Os homini sublime dedit, cœlumque tueri
Docuit, et erectos ad sidera tollere vultus.

In the Chaldean history men are formed by the mixture of the blood of Bel, the demiurge, with the earth; something divine being thus intermingled with much that is earthy!

It is a favourite subject of *agnostic* criticism that in Genesis ii. man is said to be formed of *clay*, and that science cannot find *alumina* in his composition. This is, however, a misconception of the subject. The word used is simply *dust*, and no reasonable criticism could extract from this any other meaning than that man was formed, as to his body, of materials derived from the earth, whilst his life (or "lives" rather) was from the breath of the Creator.

The word used ("formed"†) no doubt naturally directs our minds to the thought of a *potter*, and clay as the plastic material with which he works; but it is surely *hypercriticism* to carp at all figurative language when used in Scripture.

In the meantime, this very natural figure appears to have been widely adopted amongst the nations of the earth to express the creative action. Amongst the Egyptians, we find certain monuments showing the creative Demiurge kneading the clay, to form it into man, on the same potter's wheel on which he has formed the primordial egg of the universe.‡ Amongst the North-American Indians, the Mandans had a tradition that the Great Spirit formed two figures of clay, which he dried and animated with the breath of his mouth; and of which one received the name of the *first man*, and the

* M. Lenormant shows that the religion of Zoroaster is, perhaps, the most in accord with the Scriptures, in ascribing the creation of man to the good and great God who formed the universe and man, his crowning work, in six successive periods. Lenormant, *Les Origines*, p. 50, &c. and his Appendix.

† Vide Ges. *Lex.*, sub voce *יָצַר* "to form or fashion as a potter."

‡ Lenormant, *Les Origines de l'Histoire*, p. 39.

other that of *companion*.* The great god of Tahiti, *Taeroa*, formed man of red earth. The Dyaks relate that man was modelled from the earth. Elliot (*Polynesian Researches*, i. 180) states, that the *Areois* of Polynesia painted their faces red in their religious ceremonies, and that a tradition in accordance with that of many American nations said that man had been created out of red earth. Catlin, in his *History of the North American Indians*, gives an account of his visit to the Red Pipe Stone Quarry (unique in its kind), from which used to be procured the material for "the pipe of peace," the *Calumet*, all-powerful for its effects in soothing animosities; because the Indians considered it *part of their flesh*, and the Sioux had a tradition that the Great Spirit moulded a piece of it into the first man (others connected it with the Deluge), vol. ii. p. 169. It is said to be a sort of *Steatite*. (Adam seems to be from אָדָם "to be red-ruddy," Ges. *Lex*.)

The Chaldeans, says an ecclesiastical author of the first centuries of the Christian era, called the first man produced from the earth, Adam.† This is partly confirmed by the cuneiform inscriptions, but the general form seems to be *Admu*. They say that he lay without movement, without life or breath, like to an image of the heavenly Adam, until the latter had communicated to him a soul. Amongst the Greeks, Prometheus formed man by modelling him from clay, and communicated intelligence to him by imparting fire which he had stolen from heaven. In the cosmogony of Peru,‡ the first man created by divine power is called *Alpa camasca*, or "animated earth." Still more remarkable is the cosmogony of the Indians of Guatemala in their sacred book, called the *Popol Vuh*.§ They profess to derive the origin of their nation from the East beyond the sea; and, with this, the sacred traditions. As translated and published in 1861 by L'Abbé Brasseur de Bourbourg, these present us with an elaborate description of a chaos primordial.¶ There was nothing but silence, darkness, and night. Alone were the Creator, the Former, the Ruler, the Serpent covered with feathers, enveloped with green and gold, with sacred and mysterious garments. These speak together, consult and meditate. As the result of their counsel we have the creation. They said, "Earth," and at the instant it was formed, first appearing as a cloud, then the mountains rising like lobsters on the water, these afterwards clothed with cypress and pines. Then Gucumatz was filled with joy, which

* Lenormant, *Les Origines de l'Histoire*, p. 40.

† *Philosophorum*, p. 97; quoted by Lenormant.

‡ Lenormant, *Hist.*, p. 47.

§ *Ibid.* p. 40.

¶ See the *Popol Vuh*, chaps. i. ii. and iii. and Appendix C.

he expresses to "the heart of heaven." Afterwards the work proceeds, the course of the waters is divided, the streams wind amongst the mountains, and the plains and the little hills are formed and the world is filled with the varied tribes of living creatures. "The heart of the earth" seems to be the serpent and also the maternal principle, whilst "the heart of heaven" is the father* and *the Architect*.

The description of the creation is elaborate and picturesque. Then comes the command that the creatures formed should utter the name of the Divinity. "Honour us, your Father and Mother."

The response to this was in the inarticulate language proper to each species, so that "the heart of heaven" and "the heart of earth" found that no honour would accrue from their work. They were obliged to try again. This time they made man of *potter's earth*. These creatures, however, though they had speech, had no intelligence, and apparently were drowned in the waters. Then followed another consultation and an attempt to make a really intelligent creature, that should "adore and invoke the Creator and the Former." The result was the formation of mannikins from sculptured wood which spoke and reasoned on the face of the earth. These existed and multiplied, but they had no heart to remember their Creator, and lived like beasts.

Then the waters were swollen by the will of the Heart of Heaven, and a great deluge ensued, which came above the head of these mannikins made out of wood; because they had not thought of their mother and their father, of him who is the heart of heaven, whose name is Hurakan;† through them the face of the earth was obscured and a dark rain commenced, rain by day, rain by night; everything rebelled against these ungrateful people, and even their dogs turned to devour them. Filled with despair and lamentations, they wished to rush to the top of their houses, and the houses crumbling threw them again to earth; they wished to climb the trees, and the trees shook them far from them. They wished to enter into caverns, and the caverns closed before them.

Thus was accomplished the ruin of these human creatures. Now it is said their posterity is seen in those little monkeys which live in the woods. It is all that remains of them, for their flesh was formed of wood by the modeller and creator.

* In the old Accadian conjurations the *Spirit of Heaven* and the *Spirit of the Earth* are conjointly addressed. See Lenormant, *La Magie*.

† From which word the Spaniards derived *Hurricane*.

This is why this little monkey resembles man, the sign that he is of another race of men who were only mannikins wrought in wood, p. 199 (this seems a very plausible explanation if we study the monkeys and their emotions!)

Afterwards* follows the creation of the first parents, four in number, of the human race. They had neither father nor mother, but "it was truly a prodigy, a true enchantment 'of the Creator and Former,' and these rendered thanks for their existence and formation. Soon, however, their amount of wisdom displeased the above Creator and Former, and they took counsel thus. It is not good that which they say. Their nature will be no longer that of simple creatures; but they will be so many gods." Then a cloud was blown over their eyes and their view was limited. Their wisdom was diminished. However (in compensation perhaps) they received spouses during their sleep, "and immediately their hearts were filled with gladness because of their wives."

The celebrated Commander Maury has remarked (in reference to the *Deluge*) that we find, in America, traditions incomparably nearer to those of the Bible and of the Chaldean religion than amongst any people of the Old World; and that these could not be derived from the Buddhists or from India or Japan. Lenormant † quotes this opinion with approbation. It would lead me away from my present subject to explain this difficult, but, I think, not insoluble enigma. I learn from a friend in Nova Scotia that Miller, in his *Life among the Madocs*, records their tradition, tracing the origin of the red men to a fallen daughter of the Great Spirit; showing their conviction that man was, in some way, of a nobler origin than the brutes. Her earthly companion was punished by being compelled to walk on four legs, instead of two. To this day the grizzly bear is never slain by the red men, who recognise him as a sort of kinsman.

That we are by our constitution in part of the earth, earthy, and partly of superior origin, has been the belief of man in all ages; and our modern philosophy, instead of raising us to higher levels of thought, sinks beneath the average common-sense of uncultivated man. Philosophers profess to derive our origin from the brute creation, and thus libel our *bettors*, for it cannot be denied that *they* fulfil the end of their creation; that *their* lives are unstained by reproach attending the breach of commandments of their Creator. Without regret for the past, enjoying without stint the present, and having no dread

* See Lenormant, *La Magie*, p. 199.

† *Les Origines*, p. 456.

of judgment to come,—the philosopher might well (however vainly) wish himself back in their place; or even go further in rebellious thought against his destiny, and say to himself with the poet of despair—

Know that, whatever thou hast been,
'Twere something better not to be!

The origin of man has been amongst all nations a subject of the deepest interest. The traditions of the earliest ages have been treasured up; and, though mixed with abundant fables, have furnished deeply interesting materials for thought. It is not much to the credit of modern research that the alone authentic source of information should be superseded and quietly ignored by our philosophers. Much more worthy of the dignity of man's reason are the verses of Milton; when he says in his harmonious verse,—

How charming is *Divine philosophy*,
Not harsh and crabbed as dull fools suppose,
But musical as is Apollo's lute,
And a perpetual source of nectared sweets.

True Philosophy, i.e., Divine Philosophy, begins with the first words of Scripture; not by God *proving* His own existence, but *evidencing* Himself by His works. God saw that His creation was "*good*," according to His *own* standard.

"To philosophise is to render the causes and ends of things. No man, therefore, that denieth God can do this truly. For the taking away of the First Cause maketh all things contingent. . . . Wherefore nature and the causes and reasons of things duly contemplated, naturally lead us unto God, and is one way of securing our veneration of Him; giving us, not only a general demonstration of His Being, but a particular one, of most of the several qualifications thereof. For all goodness, righteousness, proportion, order, truth, or whatever else is excellent and amiable in His creatures, it is the demonstration of the like in God. For it is impossible that God should ever make anything, not like Himself, in some degree or other. These things, and the very notions which we have of them, are conceptions issuing from the womb of the Divine Nature."*

This, I take it, is the strong, immutable foundation of truth and of all knowledge, of which man can by any means possess himself. God is not only the source of stability, but all things are stable only in Him. "In Him we live, and move, and have our being." He is not only the source of beauty and of harmony, but the beauty and the harmony must be in Him before they exist in His works.

Man was created with free will, and was intended to exercise this free will in harmony with God. He had not essential

* N. Grew, M.D., F.R.S., *The Anatomy of Plants*, p. 79.

and inherent stability, but this was dependent on his keeping his true position as a creature, ascribing all glory to the Creator, and finding it his happiness to be continually receiving every good gift from above.

So in the account of the creation of man in Genesis this is represented as the result of settled purpose. To entrust a creature with free will was a decision pregnant with the most momentous results, to which the formation of a world seems comparatively insignificant. There is, therefore, a dignity and a glory about man's creation of which neither science nor philosophy can tell us anything.

Elohim *created* the universe from previously non-existing material; *formed* the man from the elements of the world; and, as we shall see, "*built up*" the woman from the substance of the man.

Intellect, strength, and wisdom, including love to the good and hatred of evil, combined with power to originate the good and to eradicate the evil, are some of the most marked and prominent features of the masculine character; whilst intelligence, perception, grace, and benignity, including steadfastness of affection in cherishing and developing all that is lovely and desirable in those committed to her fostering care; or in one word, the true *companion* and the true *mother*, mark the typical Eve (the mother of all living) as proceeding from the hand of her Creator.

Do we not see that these are but the reflections of various attributes of the Divine perfections, and that a want of comprehension of the whole subject leads to serious evil? In some popular theology we have a Divinity all benignity and shorn of power; a Universal Father, with little ability to restrain or to correct his unruly family, and none to execute vengeance on the "vessels of wrath." The female advocates of "woman's rights" seem never to have learned the secret of woman's true power—"She openeth her mouth *with wisdom*, and in her lips is *the law of kindness*." I commend to their favourable notice the following lines of the author of "The Praise of Womankind" ("Würde der Frauen"),—the poet Schiller:—

Mächtig seydt ihr, ihr seydt's durch der Gegenwart ruhigen Zauber;

Was die stille nicht wirkt, wirket die rauschende nie.

Kraft erwart' ich vom Mann, des Gesetzes Würde behaupt er;

Aber durch Anmuth allein herrschet und herrsche das Weib!

As regards the stronger sex, we look for strength and maintaining the dignity of the law; but instead we find the prevalence of an *emasculated philosophy*, which departs in

every direction from sound good sense; and in nothing more evidently so than in the manner in which it estimates the female mind, being incapable of comprehending the contrasted beauty and grace of her nature; and insisting on treating her as simply a weaker *homo*, to be raised (not *exactly* by gymnastic exercises in the Platonic method), but by ill-adapted intellectual training, to become an inferior copy, instead of a poetical rendering of the original *Adam*.

I have always been in favour of the highest culture for the female mind, and know that those thus educated can fulfil with the greatest propriety all the duties of their station. But, then, this culture must be adapted to the special character of those subjected to it. To expect the accomplishment of laborious tasks, invigorating and enjoyable as these may prove to the masculine mind, is to inflict probably irreparable injury on the more delicate, though equally perfect, organisation. It is simply to realise what Schiller has described in his charming little piece, *Pegasus im Joche*, wherein the poet tells us what befell the noble beast when yoked to the plough with a laborious ox; and what, on the contrary, was seen when his peculiar powers were developed in their own line of things.

It is a fable, I own, but marvellously like what has fallen under my own observation.

Leaving the noble beast to the care of the *philosophers*, where he lies—

Von Gram gebeugt das edle Götterpferd
Zu Boden stürzt und sich im Staube windet—

I turn for a moment to the laborious ox, of which I take as an antitypical illustration a real man of science, to whom concentration of thought was a pleasure; the late John Dalton, well known to several of my relatives.* As a boy, and early developing his taste for abstruse studies, his master, who delighted to exercise his powers, used to set him a difficult problem—say in his morning's school. In the afternoon or evening the master would ask whether he had conquered the difficulty. "Not yet, master, but I think I shall have it by morning," used to be the reply; sleeping or waking he would not relinquish his bull-dog grip till he had mastered his subject.† Try the same plan with a girl of the same age, and the probable result would be *brain-fever*.

* I accompanied my father and the above author of the Atomic Theory to the meeting of the British Association at Edinburgh in 1834, of which I have the record in copious notes.

† Something similar is recorded of Sir Isaac Newton.

The Scriptural account of man presents us with the thought of *variety in unity*, and *unity* ever more developing itself in *variety*. The child is not the exact image of either parent, but always a combination of the qualities of both. Hence arises the possibility of an almost infinite diversity combined with substantive unity, for God "hath made of one blood all nations of men, for to dwell on all the face of the earth"; but, if this had been ordered in the way of evolution of one individual into many, there would have been no variety; all would have been the wearisome repetition of an individual type. This we see in the vegetable kingdom, in propagation by slips and cuttings, and also in what is termed *parthenogenesis* amongst insects.

It seems to me that we have displayed before us in creation these two ideas of the Creator—*unity* and *variety*. *Unity*, because all things exist in Him alone; and all the immense universe is, in all its parts, obedient to His laws. He is the great King, and His kingdom ruleth over all; and *variety*, because all His creation is one poem, perpetually hymning His praise, and telling forth to the ear of faith the beauty, the loveliness, as well as the grandeur and majesty, of the character of God. The adaptation of music to the soul of man illustrates this poetry of nature; the divinely-taught gift of speech as capable of portraying all the emotions of the soul; the divided colours of the rainbow; and the association of light, and life, and love, in the moving world—all tell forth this great truth that God in creation manifests His own glorious perfections, and *illustrates Himself*. In the figurative language of the old Greeks *Ὀὐρανός*, descends, and *Γῆ* becomes fruitful. This poetical conception is common to all mankind.

But there is a deeper mystery still to be revealed. I speak of the *idea of the Church*, by which I presume to understand that which rests on the response, in the hearts and lives of men, to the revelation of the deepest and most glorious attributes of God. For whilst we read that His greatness is unsearchable, that His understanding is infinite, and that His glory is above the earth and heaven, it is only in the manifestation of His *grace* that we are assured of the consoling truth that God *is* love. "We love Him because He first loved us"!

Now, all this Scriptural teaching is connected with the account given in Genesis of the formation (literally, "building-up") * of the woman from the side of Adam whilst he slept—

* *בָּנָה* "and he *built up*," from the same root comes the word for "son" as the one by whom the house is *built up*.

symbolical of "the Church," as arising from the death-sleep of "the Christ"—and her ultimate position as intended to be presented to Himself * without spot (no trace left of the fall), without wrinkle (in everlasting youth), "nor any such thing," as would be unworthy of the mansions in the Father's house to which He will conduct her. All this bears upon our present life. The Church is now being "buildd together,"† quickened together with Christ, and those who follow the instructions of Scripture are assured that there is thus a spiritual bond that will endure when all merely earthly relationships pass away. It may be permitted to me, after fifty years' happy experience, to bear testimony to the unspeakable blessing of the institution of marriage; not only as a civil contract (though this cannot be over-estimated), but as a "mystery" (or shadowing-forth of heavenly realities), in which are involved truths quite hidden from modern philosophy. We have (as expounded by our Lord) the assurance that God from the beginning united the first pair in an *indissoluble bond*, and that "He hateth putting away." We have, also, the reciprocal duties of man and wife established; not on the basis of superior strength, but the husband, according to the teaching of the great apostle, is bound to nourish and to cherish his wife even as *the Lord the Church*. To those who discard the idea of "the Church" this is, of course, without meaning; and to those who own no "Lord" to whom they owe subjection, it may seem unreasonable that the wife should find happiness in a state of subjection to her husband. Still more impossible in such cases must it appear that the wife should "see that she reverence her husband"!

THE PAST OF MAN'S HISTORY.

We will now review the bearing of the truths we are considering on the illimitable past. We have seen that man was created to have a religious history, to respond, in fact, to the gracious purposes of God in his thoughts towards the workmanship of his hand. It necessarily follows that the degree to which he fulfils, or fails in fulfilling, the original purpose of his being must ever have made him amenable to the judgment passed by his Maker on his works.

We have, then, the basis of a religious history in God revealing his own mind and purposes to man, and gradually bringing these to pass through such a series of dispensations as we read of in Scripture. Thus, in some sense, the kingdom

* Ephesians v.

† *Ibid.* i. ii. iii.

of God exists wherever we find men (from Abel downwards) disposed to walk in his ways; but the existence of such a kingdom cannot possibly be placed further back than the fall of man, and the first promise of a Redeemer; nor can this era be looked upon as much more ancient than that ascribed to these events in our Bibles.

Philosophy asks us to look back over a dreary waste of man's existence for hundreds of thousands of years, during which (if a created being) he must have been responsible to his Creator, and condemned for his misdeeds without hope or possibility of pardon or recovery. Who can believe that an *Almighty* Being could suffer such a portent to exist? If *not* Almighty, but limited by laws which he cannot break, then we fall back into the conception of a mere thundering Jupiter; full of bombast, but in the end subject himself to Fate! Is this better than Atheism? It is impossible to frame any accordance between those who have banished an *Almighty* God from their thoughts and their councils, and those on the other hand who look upon all things as ministering to his glory.

All such believers have in every age confided in a *living God*, "The alone Powerful One" (ὁ μακάριος καὶ μόνος δυνάστης) who is not dependent for happiness on any source external to himself—who is, in fact, blessedness itself (*αὐτομακαριότης*, Chrysostom), independent of all laws (else *not* Almighty), capable of being moved to love or hate by human actions, and answering prayer by altering in their favour the ordinary course of events, or even the hearts and dispositions of men. Such an One has been the object of trust from the beginning. I regard the philosophers who would construct for us a universe without God, and an immeasurable past of man's history without law, or faith, or hope, as simply the advance guard of the army of *Nihilists*, and as bent on destroying everything which makes life valuable; in fact, as enemies of the whole human race. Take away the kingdom of heaven from amongst men,—abolish all notion of "the Church" as that which responds to God's revelation of himself,—you take away all the colouring, all the beauty, all the poetry out of this visible scene. You leave nothing but a ghastly skeleton; in the language of the alchemists, the *Spiritus* has vanished the *Phlegma* alone remains.

I maintain that the world cannot be in any measure understood either in its past or present condition, if we exclude the spiritual, the religious aspect. I cannot surrender my convictions to those who think otherwise. If we have to do

with persons afflicted with colour-blindness, we cannot be blamed for saying, "We regret that your view of the world invests everything with the hues of universal drab, in which it is your misfortune to behold the fair face of Creation shrouded; but we do not submit to be taught by you, whose vision is imperfect, that *you* are the only persons capable of painting landscapes, or of writing poetry."

THE FIRST HOME OF MANKIND.

Philosophy is, at present, attempting to furnish us with a quite new history of religion. By investigating the written religious books of the East, and evolving much out of her own consciousness, she hopes to understand the gradual steps by which man slowly worked himself up to the conception of "the Infinite." She will then (it is hoped) be able to present this conception in a new and clearer light,—a quite *fresh crystallisation* of the idea (as the chemists would say), free from Jewish and Christian *mother-liquor*, and we shall then be able to do correct homage to that hitherto misunderstood "something which, external to ourselves, makes for righteousness"!

In the meantime, the testimony of the sacred Scriptures is quietly ignored, and the modern instructors of our race tell us that "it is supposed that man first appeared in a land now beneath the Indian Ocean"!

It is not too much to say that not the slightest ground exists for such a supposition. Like other of the dreams of philosophy, it rests on no solid proof whatever. "I see no difficulty in believing" has become the creed chanted in full chorus by Darwin and his disciples. This theory is wholly opposed to the most recent researches of science.

In the recently-published first volume of the publication of the *Challenger*, Sir Wyville Thomson informs us, as the result of the deep-sea sounding, that*

"There does not seem to be a shadow of reason for supposing that the gently undulating plains, extending for over a hundred millions of square miles, at a depth of 2,500 fathoms beneath the surface of the sea, and presenting, like the land, their local areas of secular elevation and depression, and their centres of more active volcanic disturbance, were *ever* raised, at all events in mass, above the level of the sea; such an arrangement, indeed, is inconceivable."

* Quoted from *Nature* of Nov. 11th, 1880.

The researches of science thus help to dispel the dreams of philosophy.* On the other hand, we find the truths of revelation confirmed on every side. The remembrance of the first home of the human race has imprinted itself too deeply in the language, the traditions, and the history of mankind to be easily eradicated, even by the crudities of Positivism, however all-potent these may seem for the moment.

In the first place, the testimony of Scripture is very clear and precise.

The religious history of man begins, then, in the embodying of what I have called *the Church idea* in the introduction of our first parents, not into the wild world, but into a specially-selected garden. The Covenant name *Jehovah Elohim* specially marks out this account as the Church history in contrast with the more secular account in the first chapter of Genesis. Here, whilst abundantly supplied with all that was good and warned against evil, man was to have responded to the goodness of God, and to have learned how to name all God's creatures, and to subdue them all to himself as the visible representative of Deity. He was to exercise to the full his faculties both of mind and body; and evidently all this arrangement pointed to nothing less than his becoming king over all the earth.

As the germ in the acorn is sheltered from all mischief and abundantly supplied with nourishment, so man was placed in those favourable circumstances which were essential to the first beginning of his life—a life which, when matured, was intended, like the oak, to dominate all the surroundings.

These circumstances could only be found in the warmest and most favoured regions of the world,—such as the district of Babylonia, the exuberant fertility of which is celebrated by Herodotus.† He says that its soil was so well fitted to the growth of the cerealia, that it seldom produced less than two hundredfold, and in favourable seasons as much as three hundredfold. Xenophon adds, that the dates of Babylonia were so good, that what the Babylonians gave to their slaves were superior to those which found their way to Greece. Strabo states that Babylonia produced barley such as no other country did, and that the palm-tree afforded the people bread and honey, and wine and vinegar, and materials for wearing. In such a situation, and with a delightful climate, which continued till the days of the Greek writers, was man first placed. Cyrus was in the habit of spending the seven colder months at Babylon because of the mildness of the climate.

* See also Appendix D.

† Smith's *Dict. of G. & R. Geography*, vol. i. p. 361; xi. 193.

Two of the rivers of Eden are expressly stated to be the Euphrates, and the Tigris under its old Accadian name, *still in use*, "Hiddekel";* and Gikhhkhan, the exact representative of Gihon, is given as a synonym of the Euphrates. This was probably a branch of the Euphrates, compassing the whole land of Cush, or *the land of Nimrod*, the Kutha of the Arabian geographers. The site of the town has been identified with the ruins of Towibah, immediately adjacent to Babylon. There remains only the river Pison to be inquired after. This compassed the whole land of Havilah, which was a settlement of the Ishmaelites, the most to the east of any of their tribes. It has been identified by consent of commentators with the province of Bahrein, on the Persian Gulf, a district anciently watered, as we gather from Pliny, by a branch of the Euphrates which, diverging from the course of its other channels, ran southward parallel with this gulf, and fell into it nearly opposite to the Bahrein Islands, of which one still retains the name of Aval,† famous for its pearl-fishery. A further verification of the site is afforded by the added words "there are (bdellium) pearls," כְּבִלְיָהּ, from the root כָּבַל, as signifying an excellent, selected pearl (*Ges. Lex.*). All things considered, I think it must be admitted that the sacred historian described the Garden of Eden as in Babylonia. The first mention of Eden, עֵדֵן (delight, pleasure) is in Gen. ii., apparently of a district well known under that name, watered by the four well-known principal streams above mentioned, flowing through a deep rich alluvial tract of country, which by this very description reminds us that ages must have elapsed before the creation of man for such rivers to be formed and for their alluvium to be thus deposited. These streams (the Euphrates and the Tigris) have throughout the historic period mingled their often-changing courses either through natural or artificial channels. Through one of these last the steamboats of Colonel Chesney's expedition made their way, passing from the one river to the other.

When Cain went out from the presence of the Lord, he dwelt in the land of Nod, on the east of Eden, that is, apparently, of the district so called; whilst this tract of country again was that lying to the eastward of Judea.

This whole region is little watered by rain, as Herodotus remarks (*Olio*, i. 193); but there went up a mist from the

* Col. Chesney, *Ex. to the Tigris and Euphrates*, i. 13. See *Eden*, Smith's *Dict.*; A. H. Sayce, *Soc. Bib. Arch. Trans.*, vol. i. p. 300; Smith's *Dict.*, *sub voce Eden*.

† Forster's *Geog. of Arabia*, i. 40.

earth and watered the whole face of the land. The name seems to have been conferred upon it from its exuberant fertility. A similar term (גֶּדֶן, Eden) lingered till the late times of the Jewish monarchy.* This slightly different form helps to mark the district in which the Garden was placed.

It is remarkable that in this, as in so many other cases, the recent discoveries confirm the inspired narrative. A common Elamite name of Babylonia was *Gan Duniyas* and *Gan-duni*, *Gan* signifying "enclosure," "district," and *Duni* or *Duniyas* being the sacred name. The word in the Hebrew translated *garden* is also *Gan*. *Gan-eden* and *Gan-duni* are in all probability parallel words—"Garden of Delight" or "Enclosure of God." It is necessary to remember that the genius of the nations we are speaking of as the early inhabitants of this region, tended strongly to what we call *paronomasia*. Thus, according to Jewish commentators, Cain had a double meaning (the *lamentable* or the *acquisition*) as derived from one or other of two similar verbs; † and, not to multiply instances, the word Babel appears to have been at first *Bab-il* or *Babilu*, "the Gate of God," as alluding to the sacredness I have above spoken of. When the confusion of tongues had taken place, it was called (by the family of Shem) Babel, or confusion, with very little alteration of the pronunciation. ‡ The whole district was called "*the Dominion of Bel*" up to the time of Sargon, who uses this term for Babylonia, and *Bel* or *El* was the name of God derived from times before the flood. The sacredness which belonged to the whole district was, so to speak, intensified in reference to the site of Babylon. This was always the sacred city in the estimation both of the Babylonians and Chaldeans.

It was, then, *in Eden* that Jehovah Elohim is described as planting the garden, and, though called the garden of Eden afterwards (or simply the two words in apposition), there is no reason to identify the garden with Eden, which was evidently a much wider appellation.

Now it is remarkable that the *most ancient* § name of Babylon, in the idiom of the *ante-Semitic* population, was *Tin-tir-ki*, which signifies, according to Lenormant, "the place of the tree of life."

Many reasons induce me to believe that the site of Babylon was exactly that of the garden itself. *Corruptio optimi fit pessima*—I commend the thought to the inquiry of students of Scripture, but cannot follow it out here. To those who

* 2 Kings xix. 12; Is. xxxvii. 12; Ezekiel xxvii. 23.

† De Sola, *Gen.*, p. 12, קִין or קֵיִן. ‡ *Soc. Bib. Arch. Trans.*, i. 31.

§ *Les Origines de l'Histoire*, pp. 78, 79, note.

have any acquaintance with the mysteries such as I have alluded to in my treatise on "the Druids," reasons derived from this source will probably present themselves without difficulty. The enclosed garden, the tree of life, the serpent, and the woman,—the dark colour with which even the British females stained themselves, showing the Eastern origin of the rites,—the cherubim, the fiery flaming sword, the impending curse, death, and simulated resurrection; the final attainment of the knowledge of good and evil; the entire laying aside of shame,* in a reversion to other than Paradisaical innocence, the worship of the serpent still practised with mysterious rites and orgies; do not all these things point to one original?

I think there can be but one answer to this question.

I suspect that, even in the modern system of Freemasonry, there may be a hyper-exaltation of the tree of knowledge above the tree of life. How can the highest good be obtained but by the knowledge of the *Christian* "mystery," in which are all the secret treasures of wisdom and knowledge.† (See Alford, *Greek Test.*, iii. p. 215.)

Nothing in the known history of mankind corresponds to the gradual progress of mankind from savagery, by slow steps to civilisation. We have, on the contrary, the remembrance of the first happy home in Eden,—of the garden and river (to which the mysteries of Demeter had no obscure reference), of the ten patriarchs before the flood, of the lawless giants, and the time when the earth was filled with violence; and then of the flood, called in Hebrew by a particular word—the *Deluge*. According to Babylonian tradition, arts and sciences had made great progress before this event; so much so, that it was worth while taking special care to preserve them. Berosus relates that after the death of "Ardates his son Xisuthrus (or as written on the baked tiles *Sisit*, 'the escaped of the Deluge,') succeeded him. In his time happened the great *Deluge* (*κατακλυσμός*). The Deity, *Cronus*, appeared to him in a vision, and gave him notice that, upon the 15th day of the month, Desius, there would be a flood, by which mankind would be destroyed. He therefore enjoined him to commit to writing a history of the beginning, procedure, and final conclusion of all things down to the present term, and to bury these accounts securely in the city of the sun, at Sippara." After the flood, according to this account, they returned to Babylon, and, having found the writings at Sippara (near Babylon) they set about building

* It will be understood that I allude here to the ancient world.

† Coloss. ii. 3.

cities, and erecting temples, and Babylon was thus inhabited again.

Several things are to be noted here. In the first place, that the Babylonians believed their history (like our Genesis) referred to the beginning of all things, *man*, of course, included. In the next place this is the first account we have of the art of writing being known before the flood.* The Greek of the original, from Apollodorus, speaks more clearly of the writings as *γράμματα*, and these *records*, it says, were to be buried at Sippara, and were again *dug up*. This would correspond well with their being recorded, as Pliny says, *on baked tiles*,—a most lasting kind of deposit. The Temple of the Sun, at Sippara, was celebrated, and was repaired by an early Babylonian king.†

Now, whatever truth there may be in all this, one thing is clear, that the Babylonians had no other conception than that of a *religious history of mankind*; that they believed in his early civilisation, and connected together in their thoughts the first and second home of mankind.

Another remarkable connexion to which I can only allude is the widely-diffused belief in *Idris*, or *Seth*, as a great astronomer, whose *writings* had come down to the Sabians, the star-worshippers of the new world. In the Babylonian account of the Deluge it is said that when the window of the ark was opened “the land appeared high and mountainous, for it rose 12 degrees above the horizon.”‡ This curious passage (according to Fox Talbot) seems to show that the Chaldeans used instruments for measuring and surveying. And since 12 degrees is a very reasonable and probable elevation for a mountainous coast, seen not far off, it is likely that they divided the circle into 360 degrees, as we do.

Not only do we find traces of a remarkable amount of civilisation, but also, however hidden under a mass of idolatry, we see clearly that they believed in one Supreme Being,—“the god One”;§ also in a future life of blessedness to the righteous and destruction to the wicked. See a paper by Fox Talbot on “The Religious Belief of the Assyrians.”||

A remarkable instance of a common knowledge of God as the Supreme Ruler is found in 2 Chron. xxxvi. v. 13, where

* Cory, p. 29.

† Smith's *Early History of Babylonia*; also Rawlinson's *Herodotus*, i. 358.

‡ *Soc. Bib. Arch. Trans.*, iv. p. 58.

§ Rawlinson speaks thus :—“I have already stated that the *Monad* or single deity, was placed above and apart from the *Triads*, and that the great gods of the Egyptian pantheon were the *deified attributes of the God One*.”

—Wilkinson's *Ancient Egyptians*, vol. ii. p. 487.

|| *Trans. Soc. Bib. Arch.*, ii. p. 50.

we are told that Nebuchadnezzar made Zedekiah swear by God, *i. e.*, by "Elohim,"—passing by Nebo and all the gods of Babylon. This oath the Israelitish monarch is reprobated for not having kept.

In all this we do not see a trace of the modern figment of man raising himself by slow degrees to the conception of the Supreme Being. It is all the other way, and the primitive knowledge common to all the world was *kept down* or *crushed** by unrighteousness. The true God seems to have been known as *El*, and it was אֱלֹהֵי יְיָ, —the Most High God, whom Melchizedec acceptably worshipped. It is the Allah of the East to the present day.

Strange to say, and confirming the scripture history, amongst the very earliest idolatries we have the worship of *Hea, the serpent*, the god of wisdom, who takes possession of the Lady of the earth, and by her has the promised seed,—the Mediator. Was this, then, the purpose of the Old Serpent? Did he thus seek to become the Lord of the whole earth, in the person of the Mediator, as his adopted Son? Do we not listen to the voice of the same personality in the temptation of our Saviour where he says,—“All this power will I give thee, and the glory of them, for that is delivered unto me, and to whomsoever I will I give it. If thou, therefore wilt worship me, all shall be thine.”†

“In the Assyrian system it was the special work of the god *Hea* and his son Merodach to check and reverse the work of these [seven] demons, the messengers of the vengeance of *Anu*, the Supreme God of heaven.”

The Chaldeans divided the night and day into twelve instead of twenty-four hours, and the circumference of the heaven into twelve signs of the Zodiac, through which the sun passes in its annual course. These were the *mansions*, to each of which were assigned three stars (called, according to Lenormant,‡ *dieux conseillers*, and, I suppose, alluded to in the dream of Nebuchadnezzar, where he sees a *watcher* and an holy one come down from heaven). These twelve signs of the Zodiac corresponded to the twelve months of the year.

The heavenly host of stars were naturally regarded as a flock, and when they began to form these into groups and constellations it was most suitable to assign the leading place in the zodiac (from ζῷον, animal) to the *Ram* as the leader; then followed the bull, the twins, the crab, the lion, the virgin, the scorpion, the claws of the scorpion, the archer, the

* See Alford (*Gr. Test.*) on Rom. i. 18. † Luke iv. 6; *S. B. A. Trans.*, iii. 458.

‡ *Les Origines*, p. 335; Daniel iv. 13.

goat, the water-carrier, the fishes. It will be noticed that they differ somewhat from the modern. A place was found for Ishtar the Virgin translated to the heavens as the mother of the young sun (the heavenly child in the mysteries). The zodiacal ram was the object of worship in all Syria and in Persia, when this was honoured as the sign under which the world had received its origin.

The vernal equinox corresponded with Aries * (the ram). The sun would have entered the first point of Aries at the vernal equinox since 2540 B.C., and still at the time of Hipparchus marked the beginning of spring. *Before* this time it would have accorded with another sign (the bull).†

Laplace marked the probable origin of the zodiac at 2500 B.C., before much of the above had been discovered.

THE TEMPTATION AND FALL OF MAN.

I approach now with some solicitude the most difficult part of my subject, in which lies, however, the very heart and kernel of the destinies of the human race.

It is some relief to think that science has nothing whatever to say as to the moral or spiritual nature of man. We cannot subject his actions to the test of ultimate analysis, neither can we project a prism of his spiritual nature and define the meaning of the dark lines which cross the spectrum.

It is with philosophy that our difficulty lies, for human wisdom might readily admit that the creation seems to find its crowning point in man. This has been admitted by deeply thinking heathen. But that man, created very good, should have fallen away from his Creator and become a rebel and an apostate ;—that hence arise the sin and misery that surround us, of which we are all partakers ; and also the doom of death that awaits us in consequence,—this is so humbling, that without faith it is impossible to receive the truth. If philosophy could lay aside her pride, she would no longer be the dangerous guide whom we have been refusing to follow. In fact, she would give place to enlightened faith. In the meantime, failing to receive the help of religion, she becomes herself a notoriously *unpractical* teacher.

As before explained, I take religion as my only guide in seeking to investigate the early destinies of man, and consequently receive by faith the account given in the third of

* Rev. A. H. Sayce, *Soc. Bib. Arch. Trans.*, iii. 337.

† *Système du Monde*, p. 369.

Genesis. In so doing I find that great light is thrown on the present condition of mankind; and the cheering promise mingles its rays with the dark shades of the picture, leading to the assurance of the ultimate triumph of the Deliverer. The seed of the woman consequently becomes "the Desire of all nations," and the facts recorded mingled themselves with the traditions of all early times; although (as is well said by M. Lenormant*), "the truth of the fall, and of the original sin, is one of those against which human pride has most constantly revolted, and that from which it has sought immediately to withdraw itself. Thus, of all the portions of primitive traditions concerning the outset of humanity, it is that which has the soonest become obliterated. As soon as men felt the pride which the progress of their civilisation inspired, and their conquests of the material world, they abandoned the idea. The religious philosophies founded outside that revelation, which is now deposited amongst the chosen people, have taken no account of the fall. Besides, how could this doctrine square with the reveries of Pantheism, and of Emanation?" He quotes Pascal, who eloquently says, "Sans doute le nœud de notre condition prend ses retours et ses replis dans cet abîme, de sorte que l'homme est plus inconcevable sans ce mystère que ce mystère n'est inconcevable à l'homme."

It is boldly asserted that no one is able to write the history of mankind but the author of the Positivist religion. I know not wherefore, unless that (as developed in the French law courts after his death) his own life so strongly illustrated the position I have been taking of man being a fallen, and apostate, and every way degraded creature.

Let us then, once for all, admit that man is what the Scripture describes and experience proves him to be; and we shall find a clear light thrown at once upon all his religious history. Revealed religion is appointed as his relief and succour in this unhappy condition. Idolatry also presents its counterfeit means of salvation; but Philosophy must recommend him to end his miserable life as soon as possible; for she has *no* prospect to open out to him individually. She can only speak hopefully to future generations who may benefit by the advance of civilisation.

But man requires some better comfort than the above, some more glorious good news to illuminate his darkness. He asks for something or some person on which to place *his trust*. If the efforts of philosophy succeed in destroying his hopes, he

* Lenormant, *Les Origines*, p. 62.

will probably finish, as he began, by exalting some hero, some "benefactor,"* into the place of divine authority and power. Some centre of worship there must be; some visible authority to control all consciences.

The leopard skin of united priestly and kingly authority may, for anything I can see, be yet thrown around the shoulders of some glorious mortal greater than Cæsar, claiming the homage of all †

Such a personage seems to have been the mighty Nimrod, whose career, though little noticed in Scripture, must have left indelible traces on the early destinies of mankind. It is most evident that the material on which he had to work was that of a *fallen* humanity; and if, as appears probable, he was the first to claim for himself divine honours, his career makes out very clearly the effect of the early infusion of the poison of the old Serpent, and the tendency of the race of man towards the attempted usurpation of the prerogatives of the Most High; indicated by the proud assumption, "Ye shall be as Elohim." It was as "a mighty hunter," rather than as a philosopher, that he found the means of establishing his kingdom.

The Rev. Mr. Sayce has attempted to show that all our evidence arising from recent study of early Babylonian history goes to identify this great hunter of the ancient world with Merodach, the primary object of Nebuchadnezzar's worship. ‡ Babylonia is described in the cuneiform inscriptions as "the land of Merodach," just as in the Bible it is called "the land of Nimrod." § Merodach is the wild hunter of the ancient world, having his four celebrated dogs, "the Despoiler," "the Devourer," "the Seizer," and "the Capturer." The name Maruduc (in Assyrian) is a modification of the Accadian Amarud.

Merodach alone of the gods in Babylonia is symbolised by the human figure as a man walking. He is called *Gusur*, or *the hero*. According to Genesis, he was a descendant of Cush; and this brings us back to the land of Cush, of which we have already spoken. He was worshipped at a later period in a most famous temple, Kharris-Nipra, which was the especial dwelling-place of Bilu-Nipru. Rawlinson, in his "History of Herodotus," says that, after mature delibe-

* Comp. Ptolemy Euergetes.

† See figure in Rawlinson's *Herodotus*, ii. p. 53. The high priest (styled Sem) always wore a *leopard's skin* placed over the linen dress, as his symbol of office.

‡ *Soc. Bib. Arch. Trans.*, ii. 243; see also paper by J. Grivel, iii. 136.

§ Micah v. 6.

ration, no better explanation can be obtained for *Nipru* than *the hunter*.* A strong confirmation of this being the right meaning is found in the expressions of Tiglath Pileser I., who boasts of having *hunted* the people of Bilu-Nipru (the Divine hunter). Sargon also speaks of the 350 kings from remote antiquity, who ruled over Assyria, and hunted the people of Bilu-Nipru, the verb *napar* being used in each passage, and the allusion being apparently to the original Nipru, or Nimrod, having proved himself a mighty hunter before the Lord.

The name of this chieftain had at first, in all probability, some reference to *Nimr*, the leopard.† Whilst honoured by divine titles by his people, he is in the religious history of mankind noted as *the Rebel*. Another name by which he is marked out seems to be that of *Chesil* (כֶּסֶל), or the Fool, in allusion to his arrogant presumption. This is the name given in Scripture to the constellation Orion, which the orientals call "The Giant," and the Chaldeans apparently Doumouzi or Tammuz.‡

According to the learned Assyriologist from whom I have quoted above, it is very difficult to distinguish between *Bel Merodach* (the planet Jupiter) and *Bel Nimrod* (the god Nimrod). He was identified with the star of Babylon's adoration, and the influence of his character impressed itself on many succeeding generations. In fact, as long as the world yields homage to "Cæsarism" as simply the embodiment of power, it will yield its assent to the principles of Nimrod's government.

I am not writing as a theologian or as a politician, nor as competent to expound all the figurative language of Scripture, but I find exactly what I want to express my idea in striking metaphor, when out of the sea I behold arising (in Rev. xiii.) a wild beast (*θηρίον*, "a savage beast") like unto a *leopard*,§ acting on its own instincts, but invested by "*the dragon*" with his power and his seat and great authority. I have dwelt upon "the great authority" and the "seat" of "the serpent god," but must recall that his seat must be associated both with Eden and Babylon. "And all the world wondered after the Beast."|| Whatever may be the fulfilment, this

* Rawlinson's *Herodotus*, vol. i. p. 491.

† *Les Origines*, p. 247, note.

‡ The leopard is found in Babylonia, and called *Nemcr*, *S. B. A. Tr.*, v. 326. The Assyrian name on the monument is *Ne-em-ru*. "The nations of Africa seem, in some way, to connect the leopard's skin with the *idea of royalty*."—Smith's *Dict.*, *sub voce*.

§ See Liddell and Scott, *Lex.*

|| Rev. xiii. 3.

seems all foreshadowed in the history of Nimrod and the early apostasy of which he was the head.*

The contrasted Conqueror in the Revelation is the Lamb as it had been slain in the midst of the throne (having there the fulness of power and the fulness of vision and receiving universal homage), and subsequently presented as coming forth to conquest as "King of Kings and Lord of Lords."

A further contrast (I do not say intended) is that the claim of Nimrod was, as above, to have identified himself with "the star of Merodach" and consequently to have been worshipped as such in the great temple of Babylon, and to have descended to rest on the golden couch at the summit.† The prophet Isaiah apostrophises the king of Babylon thus:—"How art thou fallen from heaven, O Lucifer, son of the Morning." *Dilgan* was the patron star of Babylon, the star of Merodach, i.e. the planet Jupiter,‡ the same with the Phœnician *Gad*, the star of good luck.¶ See Isaiah lxx. 11, margin.

The claim of Christ is to be *the Bright and Morning Star* leading on to the eternal day and the worship of the heavenly city. Lucifer and Christ thus stand in contrast.

I am very much impressed with the permanence of conceptions early fixed in the memory of the race of Adam. I should instance as above the names of the heavenly constellations, but observe further that the formation of the zodiac¶ dates from the same period, as also the names of the days of the week. The figure of a star, as indicating a royal personage, familiar to the Magi, dates from Nimrod. There is, moreover, a whole catalogue of Eastern legends originating thus far back.

* Another interesting connexion, serving to illustrate the subject, is the following:—Nergal "the ancestral god of the Assyrian kings," "the god of the chase," from whom the kings both of Babylon and Nineveh would trace their descent through, according to the boast of Sargon, 350 generations, is simply *the great beast*, Nir, signifying an animal (or beast), and *gula* great, the first having a peculiar adjunct to distinguish Nir, the animal, from Nir, the man, forming together the *great hero* the god of Kutha, identified with the planet Mars. *Soc. Bib. Arch. Trans.*, iii. 175.

† *S. B. A. Trans.*, iii. 167, 171.

‡ Rawlinson's *Herodotus*, i. p. 253. § *S. B. A. Trans.*, 111, 141.

¶ Specially "the shining one": "Les Assyriologues Modernes l'ont identifié avec la planète de Jupiter. Le nom de Nimrud, ou *Marduc le brillant*, donné à cet astre par les astronomes Assyriens, justifie l'identification des Assyriologues et en même temps la justice de mon interprétation. Chacun sait que Jupiter est la plus brillante des planètes" (J. Grivel, *Bib. Arch.*, iii. 141). I think Is. xiv. confirms this. It is ☿ the *Shining One*, Son of the morning.

¶ "The Chaldean origin of the Zodiac is a fact henceforth incontestable." Lenormant, *Les premières Civilisations*, vol. ii. 67.

Take, as an instance, "the women weeping for Tammuz." In reading the accounts of the Gnostics we find the notions of the "Demiurge" and of the creation as viewed from the serpent's point of view.* The mysticism of Druids and serpent-worshippers, as well as of *Ophites* of a later age, all pointing to a common Chaldean origin. Demonology and magic, of course, are essentially Babylonian, but it is not so generally known that modern science, in some sense, returns to the same source and renews that which had passed away. The Pythagorean system, and Greek philosophers drinking in their inspiration at the fountain of Egyptian and of still earlier Chaldean lore, would easily furnish proofs of the above statement. It is enough to instance the atomic theory,† and the conception of Empedocles of Eros and Anteros (*attraction* and *repulsion*), also similar ideas connected with the formation of the universe as told by Sanchoniatho.‡

Those who read the conceptions of Hades in the earlier poets will find many of their thoughts anticipated in the account of the descent of Ishtar to the infernal regions. The Chaldeans placed "the spring of the waters of life" in the most profound abyss of Hades, guarded with jealous care by the infernal Hecate.§ A commandment of the heavenly power could open access to the fountain, and whoever drank of this water returned also to the light of day. For the rest it was a road which one descends, without returning, through seven gates into the *prison*—the place where one has only dust to satisfy the cravings of hunger, and mud for drink; where light is not seen, and the inhabitants dwell in darkness; where the shades of the dead, like birds (*query*, bats), fill the vault of the temple of the dead.

THE CONCLUSION.

When man, not content with a position of dependence, aspired to be as Elohim, he manifested that species of thirst after knowledge which distinguishes philosophy, and soon

* The Manicheans held that "an angel of light, or rather the spirit of the Sun himself, persuaded man to transgress the commandment." See Neander's *Church History*, ii. p. 157.

† See Daubeny, *On the Atomic Theory*, p. 7, &c.

‡ Cory's *Ancient Fragments*.

§ *La Magie*, pp. 155, 195. Dans la première cosmogonie de Sanchoniathon le Souffle devient amoureux de ces propres principes, et c'est le point de départ de la naissance de l'univers. Phérécyde dit que Zeus se transforma en *Eros* pour accomplir son œuvre démiurgique. Car il amena à la concorde et à la bonne harmonie le monde composé d'éléments contraires, y semant l'accord et l'union qui gouvernent toute chose." *Les Origines*, p. 557.

sought after this in forbidden ways. This seems to have been the first lie (*πρῶτον ψεῦδος*), which beguiled our first parents in their primitive transgression, and it may be connected with the last "falsehood" (*τῷ ψεύδει*) that shall consummate the "apostasy"*—*the lie* of Christian prophecy symbolising with the old temptation, "Ye shall be as Elohim." (See 2 Thess. ii. 11.)

Pride seems to be the ruin of the human race. The first who took the name of *φιλόσοφος*, and that on the ground of much superior knowledge (I allude to Pythagoras), was overthrown with all his followers on account of their *intolerable pride*.† "The hatred which they had excited speedily led to their destruction."

The Scripture enlightens us as to the early destinies which man designed for himself, and his consequent rebuke and chastisement. Remarkably is this confirmed both by tradition and by the most carefully recorded history; such as that of Berossus, the Chaldean.

I think that I have succeeded in proving that the guidance of religion is the only true leading in the matters we have contemplated. I honour and esteem Science working in her proper sphere. Philosophy, on the contrary, viewed in the aspects I have described, is certainly doing her utmost to overthrow Christianity; but if successful, if she could for ever banish the idea of God from the world, it would not be to set up the reign of reason, but to introduce a period of *lawlessness*,—(the *ἀνομία*, *lawlessness* said to be characteristic of the last days of this Dispensation, Matt. xxiv. 12; 2 Thess. ii.), resulting in the reign of supreme force in the person of a *lawless one* (*ὁ ἄνομος*), the last embodiment of apostasy against God.

The satisfactory conclusion to which I arrive is that, when man is brought humbly to accept Divine teaching, he is furnished with what I have designated Divine Philosophy founded on Divine Revelation. He is made acquainted with his fallen state, and led to accept the peace and reconciliation provided for all who thirst after the blessing. The spring of the water of life, rising not from the depth of Hades but flowing from the throne of God and of the Lamb, will have this effect, that he shall *never thirst again*, and the water which the Prince of Life gives shall spring up into *everlasting life*.

Man's first destinies were noble and worthy of the good-

* 2 Thess. ii. 11, 12.

† See Smith's *Dict.*, *sub voce*, also *The Druids and their Religion*, p. 26.

‡ *Soc. Bib. Arch. Trans.*, v. 303, &c.

ness of his Creator. His aspirations are still noble, but for some reason (inexplicable except by religion), the more noble his aspirations, the more cultivated his intellect, the more perfect his civilisation,—only so much the more splendid is his misery. To judge by the preparations of nations at the present moment, the highest ambition is to perfect the arts of destruction; and yet at the suggestion of Philosophy we are called upon to bow down and worship Humanity! If such be the teaching of the nineteenth century, I prefer that of a poet of the past, which presents in a condensed form the subject for this evening's consideration and the happy result of the teaching of Divine Philosophy.

Then we are free. Then liberty like day
Breaks on the soul, and by a flash from Heaven
Fires all the faculties with glorious joy.
A voice is heard, that mortal ears hear not,
Till Thou hast touch'd them; 'tis the voice of song—
A loud Hosannah sent from all Thy works,
Which he that hears it with a shout repeats,
And adds his rapture to the general praise.
In that bless'd moment Nature, throwing wide
Her veil opaque, discloses with a smile
The Author of her beauties; who retired
Behind His own creation, works unseen
By the impure, and hears His power denied.
Thou art the source and centre of all minds,
Their only point of rest, Eternal Word!
From thee departing, they are lost, and rove
At random, without honour, hope, or peace.
From Thee is all that soothes the life of man,
His high endeavour, and his glad success,
His strength to suffer, and His will to serve.
But O, thou bounteous Giver of all good,
Thou art of all thy gifts Thyself the crown;
Give what Thou wilt, without Thee we are poor,
And with Thee rich, take what Thou wilt away.

APPENDIX A.

בָּרָא

This word, according to Gesenius, means "to create, to produce"; according to De Sola, Lindenthal, and Raphael,* it means, in Genesis c. i., "to create, to produce something out of nothing," and this view is confirmed by Genesis ii. 3, in which it stands in connexion with another verb לָעֲשׂוֹת בָּרָא which Gesenius says should be explained, "he produced by making," i.e. "he made by producing something new." "The older commentators,—the Talmud, Aben Ezra, Abarbanel. R. Solomon ben Melech, &c., properly render לָעֲשׂוֹת, to continue acting. God having created the universe and all that it contains,† the production of something out of nothing ceased; the ordinary laws of nature began to act, and the unceasing reproduction of something out of something commenced."

* Sacred Scriptures, Genesis, p. 1.

† *Ibid.* p. 5.

APPENDIX B.

Epochs of the Year.	Assyrian (and Jewish) Names of the Month.	Symbolic Accadian Names.*	Corresponding Signs of the Zodiac.	Protecting Gods.	Cosmogonic Legends attached to the Months.
1. March-April	Nisan	The Altar of the Creator (Bel)	Aries	Anu and Bel	Creation and organization of the world
2. April-May	Air (Yiar) ...	The propitious bull ...	Taurus.....	Hea, Lord of humanity...	Creation of man
3. May-June	Sivan	The fabrication of bricks	Gemini	Schin, eldest brother of Bel	The two brothers, enemies. The foundation of the first city
4. June-July	Douz (or Tammuz)	The blessing of the seed	Cancer	Sandan (Moloch ?), the fierce summer sun (p. 524).	The untimely death of Tammuz
5. July-August	Ab	Fire producing fire.....	Leo	Allat, the lady of the magic wand	
6. August-September .	Ouloul (or Elul)	The message of Ishtar	Virgo	Ishtar	Descent of Ishtar into Hades
7. September-October .	Taschrit (or Tisri)	The pure tumulus (sanctuary ?)	(Claws of the Scorpion)	Schamash, the supreme and equitable judge; <i>the scales</i> , equinox (p. 256).	Entrance of evil (p. 267)
8. October-November .	Arakh Samna (or Hesvan)	Opening the foundation	Scorpio	The herald of the gods, Maruduc	Combat of Maraduc with Tiamat (p. 507)
9. November-December	Kisiliv (or Kisleu)	The thick clouds.....	Sagittarius ...	The great hero, Nergal, the lord of the tomb (p. 257).	Death of the sun (solstice of winter)
10. December-January .	Tebit (or Tebet)	The cavern of the rising (of the sun)	Capricornus...	Papsoukal, the messenger of Anou and of Ishtar	[Birth of the sun 25th Dec.] (p. 258)
11. January-February...	Shebat (or Sebat)	The curse of the rain	Aquarius.....	The god Ramman, the Inundator (pp. 241, 260, note).	The Deluge
12. February-March ...	Adar	Month of good augury .	Pisces	The seven great gods† ...	Renewal of the culture of the earth after the Deluge

* Chiefly from Lenormant, *Les Origines*; see the *Tableau*, p. 598, and also the pages of the same work referred to; see also Sayce, *Soc. Bib. Arch. Trans.*, iii. 162.
 † ? The Pleiades.

APPENDIX B. (Continued).

This table is put together chiefly on the basis of one constructed by M. Lenormant, and published in his work, *Les Origines*. It is simply tentative, and may probably be much improved by subsequent discoveries in the cuneiform inscriptions. Even in its present shape it may show how inextricably interwoven are the traditions of events recorded in Genesis with the earliest astronomical science of the most civilised nations of the early world. Long before the time of Moses these appear to have been commemorated in a series of tablets adapted to the twelve months of the year, as shown in the last column.

The stereotyped astronomy then early decided upon is not without its influence to the present day. It is sufficient to cite the 25th of December, of which M. Lenormant remarks :—

“Le jour du solstice d’hiver, jour de la mort périodique du soleil, est immédiatement suivi de sa résurrection, de la reprise de sa marche ascendante. C’est ce qu’exprimait, dans le culte Dionysiaque de la Phocide, la simultanéité de la cérémonie nocturne* accomplie par les Hoséoi au tombeau du dieu dans le temple de Delphes avec la fête orgiastique où les femmes sur les montagnes, à la même heure, évaillaient par leur cris le Licnités, c’est à dire, Dionysos nouveau né, couché dans le van mystique qui lui sert de berceau. À ceci fait sûrement allusion le nom symbolique accadien du mois qui succède immédiatement au solstice d’hiver—de Tebit—*itu abba uddu*, ‘le mois de la caverne (ou de l’adyton) du lever’ (du soleil). Pour en comprendre le sens, il suffit, en effet, de se souvenir des rites de la fête de la renaissance du jeune soleil ; tels que la célébraient les Sarraceni, au dire de St. Epiphane, entrant à minuit dans un sanctuaire souterrain, d’où le prêtre ressortait bientôt en criant ‘La vierge a enfanté, la lumière va recommencer à croître.’ Cette cérémonie avait lieu chaque année le 25 Décembre. On sait que c’est le désir de déraciner ces fêtes essentiellement populaires, en les remplaçant par une fête de la religion nouvelle qui fit fixer, dans le commencement du IVe Siècle au 25 Décembre par les chefs de l’église d’occident la célébration de la naissance du Christ, dont l’anniversaire exact était inconnu.”

In *Macmillan’s Magazine* for January, 1881, there is an interesting account of the observance of the Yule feast in the Black Mountain (Montenegro), in which it will be found that this festival, common to the allied nations in the early time, was essentially a commemoration of the same thing—the birth of the sun from the dying embers of the old represented by the Yule log.

APPENDIX C.

“La doctrine des âges successifs et la destruction de l’humanité du premier de ces âges par un déluge se retrouvent dans le singulier livre du *Popol-Vuh* ; ce recueil des traditions mythologiques des indigènes de Guatemala, rédigé en langue Quiché postérieurement à la Conquête par un adepte secret de l’ancien religion, découvert, copié et traduit en Espagnol

* *Θυσίαν ἀπόβηρον*. Plutarch, *Isis and Osiris*, cap. 35.

au commencement du siècle dernier par le dominicain Francisco Ximenes curé de Saint Thomas de Chuila. Sa version Espagnole a été publiée par M. Scheltzer ; le texte Quiché, avec une traduction Française par l'abbé Brasseur de Bourbourg." Lenormant, *Les Origines*, p. 472.

APPENDIX D.

* Sir C. Wyville Thomson, it appears from a letter of Darwin in "Nature," Nov. 11th, 1880, "does not understand the principle of natural selection." The truth is, that he finds that *the facts* in his wide sphere of observation are *against Darwin's theory*. He says :—

"The character of the abyssal fauna refuses to give the least support to the theory which refers the evolution of species to extreme variation, guided only by natural selection."

A discussion ensued, in which the following took part :—The Chairman ; the Rev. C. L. Engstrom ; Mr. J. Bateman, F.R.S. ; the Rev. T. Aveling, D.D. ; the Rev. T. M. Gorman, M.A. ; and Admiral E. G. Fishbourne, R.N., C.B., who said that the earlier part of the paper must be understood as showing that, although theoretical science and philosophy might be opposed to religion, yet that true science and philosophy were not ; after which the author—Mr. J. E. Howard, F.R.S.—remarked, that philosophy was the love of wisdom for its own sake. This was a noble attribute of man, but one likely to become perverted and misused. There were few things more misleading than the desire to know, to know for no good end, or when knowledge would do us no good service. As regarded history, as far as we could obtain it, it was a corroborative proof of that which we read in Scripture ; but we must remember that we were fallible in our use of history. With regard to the Divine Being being independent of all laws, God could not act contrary to His own nature, *e.g.*, He could not lie, but in His upholding power, exerted throughout creation, He was subject to no law but His own will. He (Mr. Howard) had sought to bring forward evidence to show that man at the beginning had an amount of Divine revelation communicated to him. This in no way sanctioned the perverted idolatries gradually built up in connexion with original truths ; the Vedas contained grand and glorious truths about Varunah or the Supreme God. The passages were so grand that Professor Max Müller represented them as almost equal to those in the Bible ; but what was the use of denying that these were fragments of an early revelation, and that they were only good as far as they went ? This did not sanction polytheism, or the folly and idolatry of India, and were he an Indian missionary he would seek to impress on the people the fact that their own writings contained better religious knowledge than they had adopted.

The meeting was then adjourned.

ORDINARY MEETING, JANUARY 17, 1881.

REV. R. THORNTON, D.D., VICE-PRESIDENT, IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced :—

LIFE MEMBER :—H. S. Bosanquet, Esq., London.

MEMBERS :—F. Newth, Esq., Barnet ; Rev. E. Wells, M.A., Dunstable.

ASSOCIATES :—Rev. C. B. Brigstocke, M.A., Germany ; G. W. Childs, Esq., Philadelphia ; A. E. Longhurst, Esq., M.D., London ; Rev. E. S. Radcliffe, A.B., Australia ; H. Sandford, Esq., London.

Also the presentation of the following works for the library :—

“Proceedings of the American Geographical Society.” *From the same.*

The following paper was then read by the author :—

PLIOCENE MAN IN AMERICA. By JAMES SOUTHALL, A.M., LL.D., of Richmond, Virginia.

AMONG well-informed persons opinion has undergone a great change within the past few years with regard to the antiquity of man in Europe. We presume that few now* attach any importance to the evidences for the antiquity of the race derived by the late Sir C. Lyell, Sir J. Lubbock, and others, from the ancient stone-graves, the objects found in the Danish peat, the shell-mounds of Denmark, and the lake-dwellings of Switzerland. It has been abundantly shown that the division by the archæologists of the human period

* Dr. Southall, in his reply, explains that recent exploration has thrown much new light on the evidences cited by these authorities.—Ed.

(apart from the palæolithic epoch) into the three ages of stone, bronze, and iron, has little value; and the discoveries of Dr. Schliemann at Hissarlik and Mykenæ have proved that stone was freely used for cutting implements in Greece and Asia Minor about 1,000 and even 700 years B.C. In each case this was in a *town*, and at Troy these rude implements were employed not only in association with the arts of civilisation, but under the very shadow of the Phœnician, Assyrian, and Hittite empires. It would not be strange, then, if the use of stone survived in Britain and Denmark down to, and after, the Christian era.

The evidence for the remote date of the appearance of man in Europe rests, therefore, now exclusively on the remains found in the caves and in the river-gravels in association with the bones of extinct animals. Ten years ago—indeed five years ago—on the evidence of the stalagmitic floors which covered these remains, such men as Mr. Vivian and Mr. A. R. Wallace claimed for them an antiquity of 1,000,000 and 500,000 years; and 800,000 years was suggested on other grounds by Sir Charles Lyell prior to 1872. But even here the tendency now is to reduce these figures, and in fact some bring them down as low as 20,000, and even 10,000 years.

I have myself within the past few days received from Thomas Karr Callard, Esq., a member of this society, a piece of the tusk of a mammoth, part of a specimen sent to him from Archangel, and the ivory is in so fresh a condition that it has been shaped into a checker by an ivory turner.

I spoke of 10,000 years: Dr. Winchell, Professor of Geology and Palæontology in the University of Michigan, in his recent learned work entitled *Pre-Adamites* (the object of which is to show that the black and brown races originated in "Tertiary time"), after a careful examination of the question of "the antiquity of the Stone Folk in Europe" (the Palæolithic race of Lubbock and Dawkins), comes to the conclusion that "we do not discover valid grounds for assuming him [man] removed by a distance exceeding six to ten thousand years."

Prof. Winchell has, of course, no prepossession against the theory that the implements found in the gravel of the Somme Valley are 200,000 years old: on the contrary, he argues for the existence of a sunken continent in the Indian Ocean (the Mascarene continent of M. Milne-Edwards), where, as I have intimated, he believes the black man to have appeared on the earth during the Tertiary age; and he also accepts the Pliocene Man of California. But, as a candid geologist, he feels compelled to refer the traces of man found in the river-gravels and

bone-caves of Europe to a post-glacial date not exceeding 6,000 to 10,000 years ago.

Prof. Winchell does not rest his belief in the Tertiary man of the Mascarene continent on any ascertained evidence; it is avowedly a speculation.

The evidences for Tertiary man in Europe (such as the notched bones found at St. Prest, the worked flints from Thenay, the incised bones from the *faluns* of Léognan, the incised bones described by Prof. Capellini from the Pliocene of Tuscany, &c.), he also rejects.

In his recent magnificent work on *Early Man in Britain*, Prof. Dawkins reaches the same conclusion with Prof. Winchell as to Tertiary man in Europe. The evidence on the subject he deems unsatisfactory, and with regard to Miocene man he remarks:—"There is, however, one most important consideration which renders it highly improbable that man was then living in any part of the world. No living species of land mammal has been met with in the Miocene fauna. Man, the most highly specialised of all creatures, had no place in a fauna which is conspicuous by the absence of all the mammalia now associated with him" (p. 67). And again, as to Pliocene man, he remarks:—"As the evidence stands, at present the geological record is silent as to man's appearance in Europe in the Pliocene age. It is very improbable that he will ever be found to have lived in this quarter of the world at that remote time, since of all the European mammalia then alive only one has survived to our days" (p. 93).

The latest claim for the great antiquity of man has proceeded from America, and this claim is so extraordinary, and is supported by names of such high authority in the scientific world, that it seems to deserve a serious notice. The facts are not now for the first time made public, but they are put forth in so formal a manner within the past year or two by the most eminent geologists and palæontologists in the United States (their statements having, moreover, been repeated in Europe), that the subject deserves an attention which it did not receive when the discoveries were first announced.

Dr. Foster, who was an able geologist and archæologist, referred to them in his work on *The Prehistoric Races of the United States* in 1873, but now they are vouched for by Professor Le Conte, Professor Whitney, Professor Winchell, and Professor O. C. Marsh, and the inference drawn from them is that man lived on the Pacific coast of North America in a semi-civilised condition in the Tertiary age.

The facts in question have reference to the discovery of certain vessels and implements of human workmanship at the

depth of several hundred feet from the surface, under volcanic and other deposits, in the gold-bearing gravel-beds of California.

Mr. Bancroft, in his *Native Races of the Pacific States* (vol. iv. p. 698 *et seq.*), recites a number of cases in this connexion.

We are informed that in 1858 a stone mortar holding two quarts was taken, at the depth of 300 ft. from the surface, from a mining tunnel in Table Mountain, Tuolumne County, California, lying in auriferous gravel under a thick stratum of lava. In 1862 another mortar was found at the depth of 340 ft. (104 of which were composed of lava), and 1,800 ft. from the mouth of the tunnel. At the same depth in Table Mountain, spear-heads, 6 or 8 in. long, a ladle of steatite, and a pendant or shuttle of siliceous slate, were found along with bones of the mastodon and other animals. At San Andrés, in 1864, large stone mortars were taken from a layer of cemented gravel 6 ft. thick, lying under the following strata:—coarse sedimentary volcanic material, 5 ft.; sand and gravel, 100 ft.; brownish volcanic ash, 3 ft.; cemented sand, 4 ft.; bluish volcanic sand, 15 ft. At Kincaid's Flat, 16 or 20 ft. below the surface, in clayey auriferous gravel, a stone mortar and pestle, and many other stone implements were found with bones of the elephant and mastodon. At Gold Springs Gulch, in 1863, a granite mortar and pestle, the former being 12½ in. in diameter, and weighing 30 lb., were found at the depth of 16 ft. in gravel. At Shaw's Flat, along with bones of the mastodon, a stone bead of calc-spar and a granite mortar, holding about a pint, were found at a point 300 ft. from the mouth of the tunnel. At Gold Springs Gulch, discoidal stones (corresponding with the hurling or *chungke* stone disks of the Red Indians), perforated through the centre, were found with mastodon bones, under about 25 ft. of calcareous tufa; and at the same place, a flat oval dish of granite, 18½ in. in diameter, 2 or 3 in. thick, and weighing 40 lb. "An ancient skillet," as we are told, "made of lava, hard as iron, with a spout and three legs, was washed out of a claim at Forest Hill." A similar "skillet" was found in 1861, at Coloma, at a depth of 15 ft., under an oak not less than a thousand years old. "Many stone mortars and mastodon bones," we are told, "have been found about Altaville and Murphy's." It was at Altaville that the famous Calaveras skull was found some twelve years ago. This skull was submitted to the American Association for the Advancement of Science in 1869 by Professor Whitney, the State Geologist of California. "It was found in a shaft 130 ft. deep, near Angelos, in Calaveras county. The shaft passed

through five beds of lava and volcanic tufa, and four beds of auriferous gravel. The upper bed of tufa was homogeneous and without a crack through which a human relic could have been introduced into the lower beds. The skull was given to Professor Wyman to describe, who found great difficulty in removing the cemented gravel in which it was incrustated." I quote from Dr. Foster.

In 1857, Dr. C. F. Winslow sent to the Boston Natural History Society the fragment of a human cranium, found in the "pay-dirt," in connexion with bones of the mastodon and elephant, 180 feet below the surface of Table Mountain.

Prof. Le Conte, in his *Elements of Geology*, refers in a hesitating way to these discoveries, and remarks (p. 567) that if man should undoubtedly be found in the older auriferous gravel, "it would show an immense antiquity, for, since the lava-flow, cañons have been cut by the present rivers 2,000 or 3,000 feet deep in solid slate rock."

Since these mortars were abandoned by man, according to Dr. Foster, "the physical features, as well as the climate of this region, have undergone great changes. The volcanic peaks of the Sierra have been lifted up, the glaciers have disappeared, the great cañons themselves have been excavated in the solid rock, and what were once the beds of streams now form the Table Mountain" (p. 54).

It was stated last year in the *New York Independent* that in the forthcoming edition of his *Elements* Prof. Le Conte will commit himself fully to the Pliocene age of these relics. With regard to this I have no personal knowledge, but the *Independent* spoke as if well informed on the subject.

Professor Whitney, however, has very recently made a formal report on these gravels (*Auriferous Gravels of the Sierra Nevada*, 1879), and in this he expresses the conviction that they belong to the Upper Tertiary, and that the human relics found in them are beyond question of the same period. He gives a list of the objects which have been found in the gravel, comprising (1) a mortar found in pay gravel under volcanic matter, at the depth of 150 feet (at San Andreas); (2) A stone hatchet, triangular in shape, size 4 inches around, 6 inches long, with a hole through it for a handle, found 75 feet from the surface in gravel, and under basalt, 300 feet from the mouth of the tunnel, locality Table Mountain, Tuolumne county; (3) a large number of mortars, pestles, stone dishes, with bones of elephant and mastodon at "Murphy's" Tuolumne co.; (4) mortars, weighing from 20 to 40 pounds in gravel, at the depth of 40 feet, locality Amodor co.; (5) bones of a human skeleton found in clay at a

depth of 38 feet, by Dr. H. H. Boyce, at Placerville; (6) numerous stone relics, mortars, grooved disks, &c., at various depths. We may add that bones of the camel, rhinoceros, hippopotamus, and extinct horse, or of allied forms, occur in these gravels.

In his address before the American Association for the Advancement of Science, at Saratoga, N.Y., Aug., 1879, Professor O. C. Marsh, of Yale College, President of the Association, had the following passage:—

“Important evidence has likewise been adduced of man’s existence in the Tertiary, both in Europe and America. The evidence to-day is in the form of the presence of man in the Pliocene of this country. The proof offered on this point by Professor J. D. Whitney in his recent work (*Aurif. Gravels of Sierra Nevada*) is so strong, and his careful, conscientious method of investigation so well known, that his conclusions seem irresistible. Whether the Pliocene strata he has explored so fully on the Pacific coast corresponds strictly with the deposits which bear that name in Europe, may be a question requiring further consideration. At present, the known facts indicate that the American beds containing human remains and works of man, are as old as the Pliocene of Europe. The existence of man in the Tertiary period seems now fairly established.”

This is pretty explicit. Man existed in America in the Tertiary period, and, what is yet more startling, it is not the savage of the Palæolithic epoch of Europe, but it is the man of the Neolithic period—the respectable barbarian of the Lake-Dwellings. We are called upon by the first scientific authorities in the United States to believe that, before the mantle of ice which destroyed the fauna of the Tertiary age was spread over Northern Europe and America, man existed in the western part of North America in such a condition of advancement (we might say, perhaps, civilisation) that he worked in the hardest stone, and fabricated out of the obdurate granite mortars and dishes of perfect form, weighing from 20 to 40 pounds, and 12 inches in diameter. He also used a vessel (described as a “skillet”) made out of a lava “hard as iron,” which was circular in form, and had three legs and a spout; and polished stone axes, perforated to receive a handle, and “ladles” of steatite, and various other stone implements exceedingly difficult to manufacture, as, for example, the perforated discoidal disks or quoits found at Gold Springs Gulch and elsewhere.

It is a fact, says Mr. Bancroft (who, however, equally with Prof. Whitney, believes in the vast age of these objects), that

the mortars have "in almost every instance been found by miners in their search for gold."

Another point to be remarked is that they seem always to be found in the auriferous gravels.

We know very well that Cortez found the temples and palaces of ancient Mexico resplendent with gold, and Dr. Daniel Wilson, in his charming but incautious work on *Prehistoric Man*, tells us that "the metallurgic arts were carried in some respects further by the Mexicans than the Peruvians. Silver, lead, and tin were obtained from the mines of Tasco, and copper was wrought in the mountains of Zacotollan by means of galleries and shafts opened with persevering toil where the metallic veins were imbedded in the solid rock."

A thousand years, perhaps, before Cortez landed in Mexico the Toltec civilisation flourished in Central America, in Anahuac, and on the Pacific coast, and centuries before the palaces of Montezuma glittered with the precious metals the precursors of the Aztecs had mined into the auriferous gravels of the Sierra Nevada and the Sacramento Valley. The relics which I have described were evidently left where they have been found by gold-hunters, and it is hardly credible that gold excited the cupidity of man in the Pliocene epoch.

If it were impossible to suggest an explanation of how these granite mortars and dishes got into the heart of Table Mountain, could persons having no theory to maintain accept the conclusion of Professor Marsh and Professor Whitney that the human bones and stone mortars and the geological stratum in which they are found are of the same age? If we should find a vase of gold coins in the same position, would it be reasonable to draw the conclusion that there were human beings in the Tertiary age who had some idea of finance and made use of coined money? Would it not be more sensible to seek some other explanation, and, if none were found, still to refuse to believe that gold was coined into money before the Glacial Epoch?

It seems to me that we already have the clue to the presence of these mortars and pestles in the auriferous gravels in the fact I have cited, that they seem always to be found in these gold-bearing gravels and nowhere else.

I have quoted also from Dr. Wilson to show that the primitive inhabitants were capable of boring into the bowels of the mountains to obtain gold and silver.

Mr. Bancroft, in his great work to which I have referred, testifies to the same fact. Both gold and copper, he says, were mined in Mexico from veins in the solid rock, extensive

galleries being opened for the purpose (*Native Races, Pacific States*, vol. ii. 474).

They carried their excavations, we are told, to the depth of 200 feet or more, to procure the chalchinite (or turquoise) so much prized as an ornament. Obsidian they obtained in the same way, the mines at the Cerro de las Navajas, near Monte Jacal, being described as opening three or four feet in diameter, and 110 to 140 feet in extent (horizontally), with side drifts as occasion might require.

The copper mines and the mica mines of much ruder tribes in the Northern and Eastern parts of the United States illustrate these facts.

One more statement on this subject would seem to render the violent hypothesis of Professors Whitney and Marsh wholly unnecessary.

One of these ancient shafts has been actually discovered in this very Table Mountain which figures so largely in these accounts, and where the celebrated Calaveras skull itself was discovered under such remarkable circumstances.

The discovery in question was made in 1849, long before the discussions about the existence of man in the Tertiary strata had ever been dreamed of. I quote from Schoolcraft's *Archæology*, vol. i. p. 105:—

“It was late in the month of August, in 1849, that the gold-diggers at one of the mountain diggings called Murphy's were surprised, in examining a high barren district of mountain, to find the abandoned site of an old mine.

“‘It is evidently,’ says a writer, ‘the work of ancient times.’ The shaft discovered is 210 ft. deep. Its mouth is situated on a high mountain. It was several days before preparations could be completed to descend and explore it. The bones of a human skeleton were found at the bottom. There were also found an altar for worship and other evidences of ancient labour. No evidence has been discovered to denote the era of this ancient work. There has been nothing to determine whether it is to be regarded as the remains of the explorations of the first Spanish adventurers, or of a still earlier period. The occurrence of the remains of an altar looks like the period of Indian worship.”*

* While reading these proof-sheets, my eye has fallen on the following item in an American newspaper, which seems to me pertinent to the matter in hand. It is a fresh illustration of the existence of these ancient mines. (From *The Interior*, Chicago, November 4, 1880):—“An old mine, supposed to have been worked by the ancients, was discovered last week by a prospecting party in the Sangre de Cristo range of mountains, Colorado. In

It appears to me that this is an abundant explanation of all these mortars and spear-heads which have been found at great depths in Table Mountain and elsewhere in California, and it is a matter of great astonishment to me that such men as Whitney, Marsh, and Winchell should on such evidence rashly assert that "the existence of man in the Tertiary period seems now fairly established," and that not only Le Conte, but even Dana, in the last edition of his incomparable *Manual of Geology*, should deem it worth while to incorporate such discoveries in their chapters on the antiquity of man.

I may add to what has been said that Lesquereux refers some of the fossil plants found in the gravels described to the Miocene period, so that we might fairly infer, if Marsh is correct, that the human race in California is as old as the beginning of the Pliocene—the contemporary of the three-toed *Anchitherium* and the *Hipparion* or *Protolhippus*, whose saddles and bridles we may yet hope to find if the skillets, and dishes, and mortars we have been considering were manufactured at that time.

The animal remains found in the lower gravels under the basalt also belong to the Miocene age.

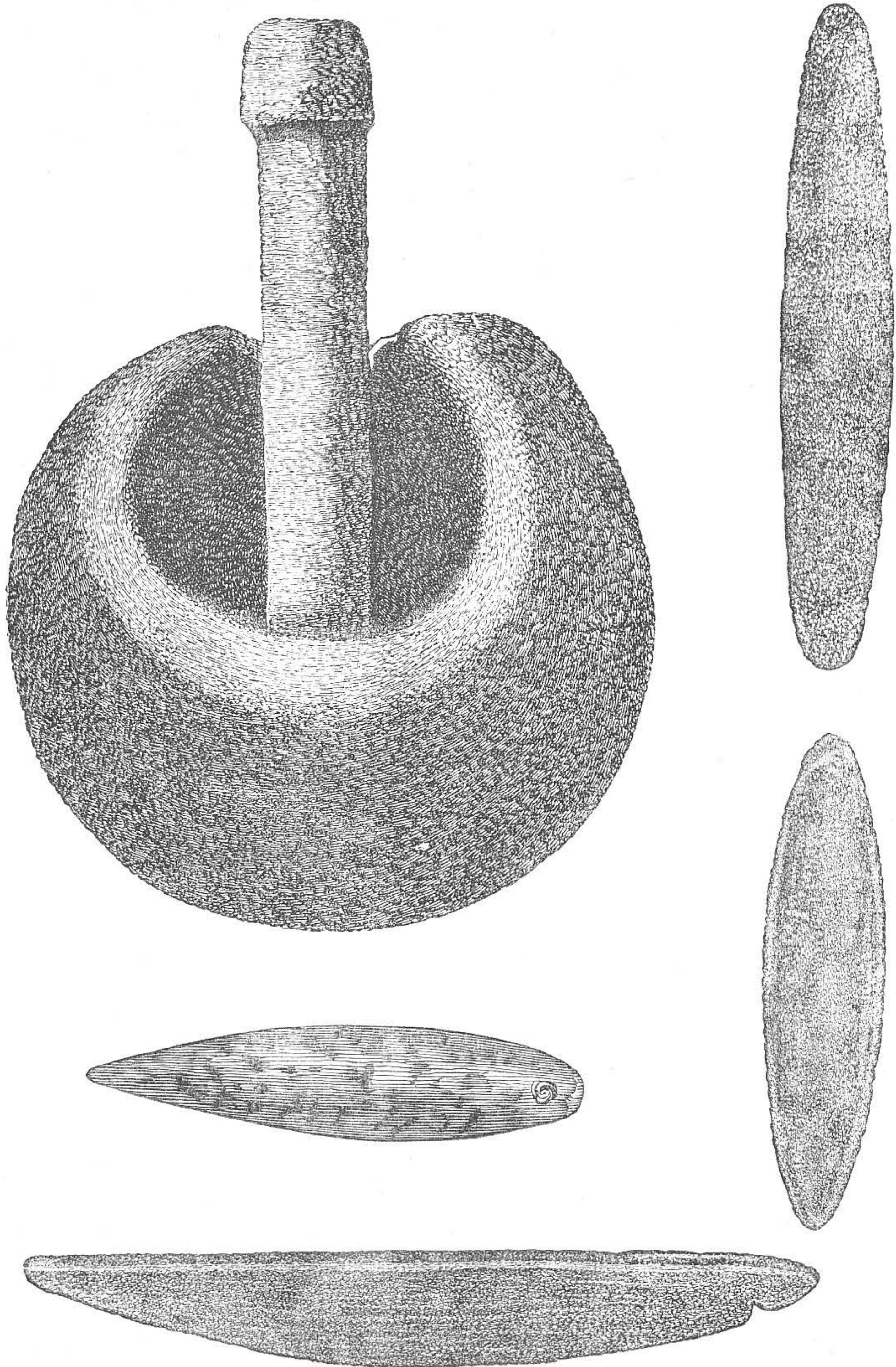
With regard to the Calaveras skull, Professor Whitney observes, that "it presents no signs of having belonged to an inferior race. In its breadth it agrees with the other [modern] crania from California, except those of the Diggers, but surpasses them in the other particulars in which comparisons have been made." "Man," he says, "existing at that remote time . . . was still the same as we now find him to be in that region."

What becomes, then, of the doctrine of Evolution? If the human skull was exactly the same at the beginning of the Pliocene, or the close of the Miocene, that it is now; on the theory of evolution, how shall we explain the absence of all progress or change? and what margin of time is there for man's development from the generalised lemurs of the Eocene? There is no doubt whatever that the confirmation of Professor Whitney's opinion as to the age of this skull would be fatal to the evolution theory.

I append a few cuts of the mortars and other objects found in the gold gravels of California, and which are believed by

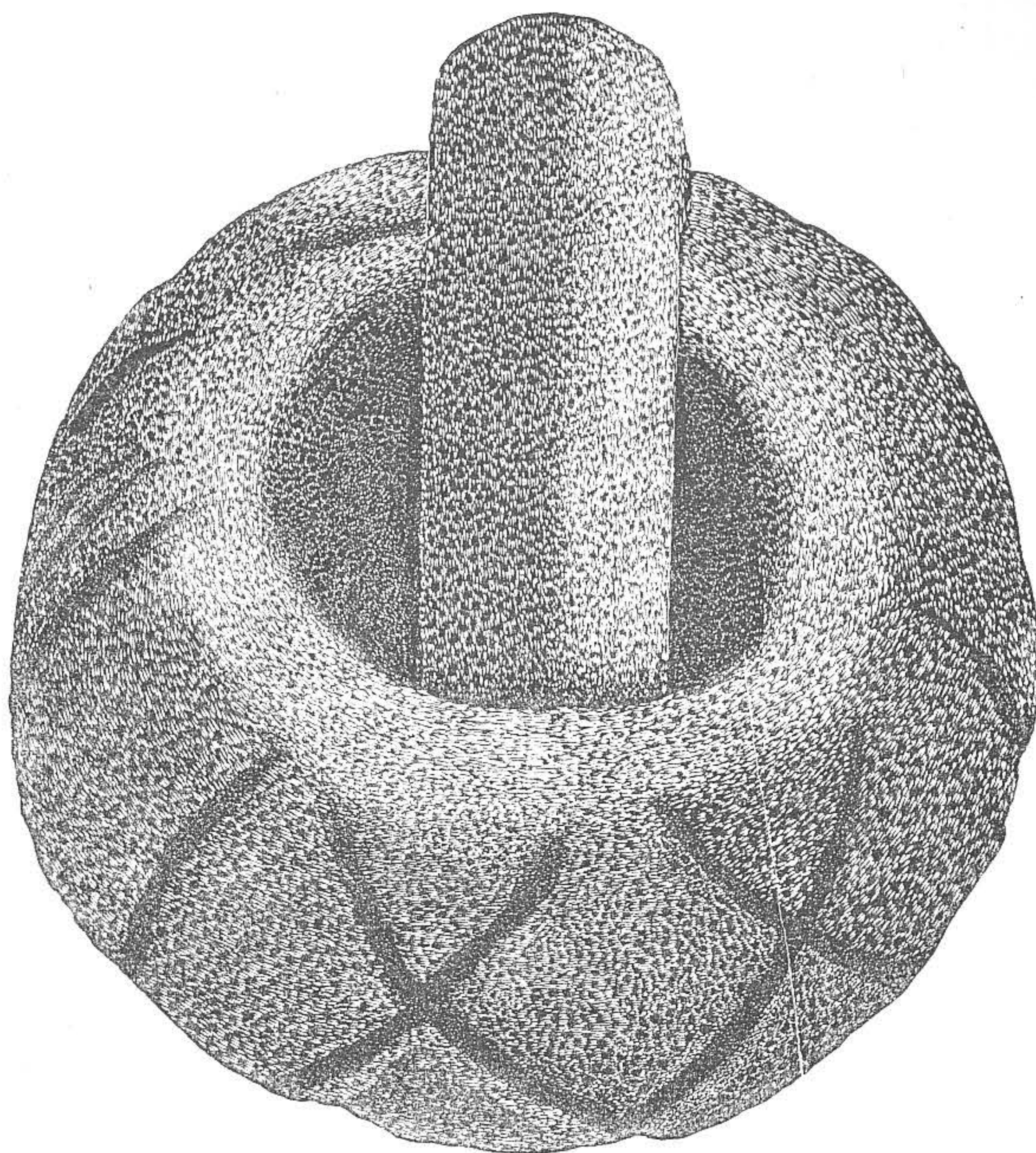
the mine are two large chambers from 10 to 20 feet high, and double that number of feet in breadth. Stones, bones, skulls, and gold were found, the value of the latter being about 900 dollars. A further investigation will be made."

Professors Whitney and Marsh to be of early Pliocene age. They are taken from Bancroft's work. I am compelled to say that I think it requires a very unsuspecting and credulous



mind to believe that these beautiful mortars were produced by man when not a single land mammal now living other than man (the one exception) had made its appearance in the palæontological procession.

Perhaps I may remark before closing this brief paper that I am not unaware that flint implements of palæolithic type have been discovered in the valley of the Delaware, in the United



States, by Dr. C. C. Abbot, which have been referred to the Glacial epoch.

With regard to these, a thorough examination and study of the gravels in question have been recently made by Mr. Henry Carvill Lewis, of the Second Geological Survey of Pennsylvania, and a paper on the subject was read by him before the Mineralogical and Geological Section of the Academy of Natural Sciences of Philadelphia, November 24th, 1879.

It appears from this examination that the Trenton gravels in which the alleged implements were found are the latest of four gravel beds in the valley of the Delaware. The formations of this region are divided into five clays and four gravels, which, beginning at the oldest, succeed each other as follows: 1. Jurasso-cretaceous plastic clay; 2. Tertiary clays (Brandon period); 3. Bryn Mawr gravel (Upper Tertiary); 4. Branchtown clay; 5. Glassboro gravel (Pliocene); 6. Philadelphia

NOTE.—The blocks of the illustrations have been kindly lent by Messrs. Trübner & Co.

red gravel (Champlain or Palæolithic epoch); 7. Philadelphia brick-clay (same date); 8. Trenton gravel (equivalent to the Reindeer period of Lartet).

Mr. Lewis remarks:—

“It is thought that the hypothesis of a second and more local glacier, long subsequent in age to the first great glacier, will explain all the facts observed. The Trenton gravel cannot be assigned to the First Glacial period except by assuming that there have been no river gravels deposited since that time,—an assumption that can hardly be maintained. Some European archæologists have held that the *Palæolithic era*, the era of the river gravels, is antecedent to the *Reindeer period*, the period of the Cave-men. No such distinction has been observed on the Delaware. The period of the Trenton gravel flood, whether contemporaneous with a glacier or not, is the period of the last geological deposits here known; the recent mud-flats being alone excepted” (p. 13).

With regard to the age of the Trenton gravel, he says:—

“The same reasoning that showed that the modern river channel might have been excavated in hundreds rather than in thousands of years, will indicate that no great length of time is necessary to produce all the surface features of the Trenton gravel. While the writer may venture to express the opinion that there is no reason geologically for carrying the age of this gravel and the antiquity of man on the Delaware farther back than a very few thousand years at the most, he is fully aware that any close approximation can safely be arrived at only by extended comparison with other river gravels and by a much more complete series of observations than has yet been possible” (p. 15).

If Mr. Lewis is correct in his reading of the sequence of the geological phenomena in the Delaware valley, and in his conclusion that the gravels in this region are of different epochs, it corroborates a conjecture made by me elsewhere with regard to the European river gravels, and I shall not be surprised if a more careful study of the European beds shall show that the gravels in which the so-called palæolithic implements have been found are the newest and latest in a series of beds running back into pre-glacial times.

Mr. S. R. PATTISON, F. G. S. (having read the paper in the author's unavoidable absence, then added):—I will not detain the meeting more than a few minutes by my remarks; but I wish to state that since this paper was written—in fact, within the last few days—there has been a very important addition made by Professor Whitney to the materials that are here put forward. That addition is so important that I feel justified in at once bringing it under the notice of the Institute. It occurs in the second part of his "Report." In this he carefully goes over his surveys—the whole of the area of the Pacific slopes, from the plains of California to the summit of the Rocky Mountains—and he adds to his conclusions those of another of the State geologists who worked with him. Professor Whitney contends that the auriferous gravels from the Pacific slopes of the Rocky Mountains (gravels which are now worked for gold, and which have been so worked very extensively) represent the whole tertiary period. He thinks he has found out this, and in laying it before the world brings the following evidence in support of his conclusion. He says that series of gravels, from the very highest point where gravel is found—which he terms the "high gravel series"—down to the lowest, all form one series. He finds that they were deposited before there is any evidence of the action of ice having taken place; and he makes the gravel period comprise the whole period of the tertiary deposits—the eocene, the miocene, and the pliocene. He states that, in fact, these gravels are all mastodon gravels. He also says that there is no distinction between the gravels of the different levels; and, therefore, draws the conclusion that the remains of man found in the gravels on the Pacific slopes indicate the existence of man all through the tertiary epoch. He says the course of the streams was the same at the commencement as now; and accounts for the gravel as having been made by the streams, the "slow and ordinary working of the streams," interrupted by grand paroxysmal action during which large quantities had been dropped and spread over a large area. In the lower parts of these gravels, in the "pay dirt," gold is found in large quantities, and some gold in the upper parts also; and because the remains of man have been found at various places in both these gravels he attributes the remains that have been found to the same period as the gravels, *i.e.*, the tertiary period. I have myself had an opportunity during the last autumn of visiting the eastern slope of the Rocky Mountains, and of examining these gravels with the haste which a casual traveller can only regret to be obliged to use in his investigations. But I will just mention two facts of observation which I made as to Professor Whitney's discoveries, and which I mention with very great submission, because he has been almost all his life at the work. In the first place, on going over the prairies to the Rocky Mountains, you rise

6,000 feet, and you have under you, nearly all the way, tertiary formations pretty evenly spread over the whole district. These tertiary formations are a little tilted when you come to the Rocky Mountains. Over these formations there is spread, for hundreds and thousands of miles, a layer of gravel, and above the gravel a layer of brick earth, both together constituting the gravel period. From the Missouri up to the Rocky Mountains, and up and down the river Missouri for thousands of miles, you tread upon deep gravel—at least deep brick-earth and gravel, lying upon the tertiary. Now, it is almost unaccountable that the gravel on the Rocky Mountains should be like some ill-assorted couple,—May and December,—that there should be one epoch on the one side and another on the other; that it should be extremely old on the one side, and but reasonably old on the other. It is quite out of the question to conceive that that is the case. That is the first thing that strikes one; and the other is, that in following up the abundant gold gravel deposits in that magnificent country I can perceive nothing, except in the enormous scale of things, different from that which abounds in Switzerland and in our own country. You have a gravel which is laid out over the district, becoming fine as it is at a distance from the mountains, and becoming coarse as it is near the mountains, and which is laid out as running water will lay out gravel; and this process is evidently going on now, the course of streams being constantly changed by the operations of the gold-diggers. But underneath that gravel, which is mastodon gravel, no doubt, and which contains the implements of which we have heard, I found a tumultuous mass of boulder gravels, which, if we had seen them in this country or in Europe, we should have attributed to the action of ice. Not only did we find these gravels, but we found very numerous basins and terraces cut out, giving proof of the enormous power of water in a paroxysmal manner, operating far more suddenly than anything we have instance of now; so that we have presented to us the same state of phenomena as we have in Europe, and I do not know any reason for calling the one tertiary and the other post-glacial. Then as to the excavations for mines. There are old excavations for mines spotted over nearly the whole of this district, which clearly indicates that the early inhabitants derived their gold from diggings, as the Cornish people did their tin from the streams. They found it in the same gravel at the bottom of the mud. In Cornwall, in the same situation, we find deer-horns and the remains of man; and at first you would say, "Well, man must have lived at that epoch, upon that floor, when that tin was deposited; but, beyond a doubt, these were the remains of the men who were the workers of the tin," but they are all transported or transposed remains, from a more modern surface. And so, the extraordinary jumble that you get in the Rocky Mountains, by reason of the enormous rush of the streams down those gulches and cañons, really accounts for everything with regard to the position of these things; for, if the implements had been here this year, they would have been there the next, and somewhere else the following

year, carried by the force of these streams. This is a fact that strikes one on visiting these places, and it seems to me to dispose of the evidence for extreme antiquity which is proposed by Professor Whitney. One really is almost afraid to advance anything against the State geologist of California; but my own view is that simply of an observer, and when I observe the tertiary strata, which he says are contemporaneous with the gravel on one side, are on the other side covered by the gravel, I think there must be a mistake; and when I observe the displacements which have been taking place in these drift deposits in the search for gold, I think he must have been mistaken also in supposing that any chronology can be established from them.

The CHAIRMAN.—My duty is, first of all, to return our thanks to Dr. Southall for his admirable paper, and then to Mr. Pattison, not only for the able manner in which he has read it, but also for the interesting remarks which he has added. Before the discussion commences, some "communications" have to be laid before you: Principal Dawson's is taken first, as the others refer to it.

The following communication from Principal and Vice-Chancellor J. W. Dawson, C.M.G., LL.D., F.R.S., of McGill University, Montreal, was then read:—

"December 30th, 1880.

In answer to your communication accompanying Dr. Southall's paper on Pliocene Man, I have much pleasure in stating that I concur in general in the conclusions of the paper, several of which I have indeed already argued for in previous publications.

There should, I think, now be no doubt as to the modern and even historic character of the remains of man usually known in Europe as 'Neolithic.' Their nature and mode of occurrence are in no respect different from those of the historic aborigines of America, no material physical or faunal changes have occurred since their time, and the identity of the Neolithic men with tribes still extant in Europe, as the Basques and Lapps, has been again and again insisted on. I regard the whole of these remains as coming within the dates of the historic empires of the East, and as being historically post-diluvian, and geologically recent.

As to the so-called 'Palæolithic,' or, as I have preferred to call them, *Palæocosmic* men, those of the older cave and gravel deposits; while I can see no good reason for the view recently advocated by Dawkins, that the race of the gravels is older than that of the caves, I agree with him that both are in all probability post-glacial, and referable either to the close of the Pleistocene or the beginning of the modern period. For reasons which I have stated in a recent review of Dawkins's valuable work on 'Early Man in Britain,' I prefer the latter classification, and have stated the arrangement adopted by me, in various papers and other publications as follows:—'On

the one hand, while the whole Tertiary or Kainozoic, up to the present day, is one great geological period, characterised by a continuous though gradually changing fauna and series of physical conditions, and there is, consequently, no good basis for setting apart, as some geologists do, a Quaternary as distinct from the Tertiary period, on the other hand there is a distinct physical break between the Pleistocene and the Modern in the great glacial age. This in its arctic climate and enormous submergence of the land, though it did not exterminate the fauna of the Northern Hemisphere, greatly reduced it, and at the close of this age many new forms came in. For this reason the division should be made, not where Dawkins makes it, but at or about the end of his 'Mid-Pleistocene.' The natural division would thus be:—

I. PLEISTOCENE, including—

(a) *Early Pleistocene*, or First Continental period. Land very extensive, moderate climate.

(b) *Later Pleistocene*, or glacial, including Dawkins's 'Mid Pleistocene.' In this there was a great prevalence of cold and glacial conditions, and a great submergence of the northern land.

II. MODERN, or period of Man and Modern Mammals, including—

(a) *Post-glacial*, or Second Continental period, in which the land was again very extensive, and Palæocosmic man was contemporary with some great mammals, as the mammoth, now extinct, and the area of land in the Northern Hemisphere was greater than at present. This represents the Late Pleistocene of Dawkins. It was terminated by a great and very general subsidence accompanied by the disappearance of Palæocosmic man and some large mammalia, which may be identical with the historical deluge.

(b) *Recent*, when the continents attained their present levels, existing races of men colonised Europe, and living species of mammals. This includes both the Prehistoric and Historic periods.

On geological grounds the above should clearly be our arrangement, though, of course, there need be no objection to such other subdivisions of the Recent Period into local Historic and Pre-Historic ages as historians and antiquaries may find desirable for their purposes. On this classification the *earliest certain indications of the presence of man in Europe, Asia, or America, so far as yet known, belong to the Modern period alone.* That man may have existed previously no one need deny, but no one can positively affirm on any ground of actual fact.'

It will be observed that a consideration of the distribution of the post-glacial gravels, the character and extent of the post-glacial denudation, and the faunal changes between the post-glacial and the recent periods, lead me to infer that a submergence of the land occurred at the close of the post-glacial period, and that it is not improbable that this submergence may have

been that otherwise known as the historical deluge. Further, since it is impossible to suppose that the great submergence of the land of the Northern Hemisphere, to an extent known to have exceeded 4,000 feet, before the post-glacial age, nor that second submergence, which followed it, can have proceeded at the slow rate of modern changes of level, it seems necessary to admit an abrupt or paroxysmal character for these great changes of the relative levels of land and water in the later Tertiary time, and thus to modify very much the estimates of the absolute antiquity sometimes assigned to post-glacial, or Palæocosmic man, who, as I have elsewhere argued, becomes, on the views above stated, the representative of the historical Antediluvians.

The evidence adduced by Prof. Whitney and others for the Pliocene age of human remains found in the gold gravels of California, I have never held to be valid, and have regretted that able geologists should have committed themselves to so startling and otherwise improbable conclusions on grounds apparently so insufficient. I have studied with care the facts detailed by Prof. Whitney in his recent memoir on the Auriferous Gravels of California, and have stated at length my objections to his conclusions in the appendix to my book, entitled "Fossil Men" (pp. 344 to 347). These objections may be summarised as follows:—(1) None of the specimens can certainly be affirmed to have been found *in situ* in the undisturbed gravel. (2) The fossil fauna and flora of the deposits consist, so far as known, of extinct species, with the exception of man and of a modern snail found in association with the Calaveras skull. (3) The human remains found belong to a somewhat advanced race of modern type. (4) The manner in which Prof. Whitney accounts for the deposition of the Calaveras skull on the supposition that it is contemporaneous with the gravel, is fanciful and improbable. (5) The so-called "fossilised" condition of the skull proves nothing. That it afforded on analysis 62 per cent. of calcium carbonate, merely shows that, after decay of the animal matter, its pores became infiltrated with that mineral, a change not requiring a long time.

I have also much pleasure, in this connexion, in referring to the interesting paper recently communicated to the Academy of Natural Sciences, Philadelphia, by Mr. H. C. Lewis, of the Geological Survey of Pennsylvania, in which, for the first time, the age of the 'Trenton gravel,' which has afforded the rude flint implements described by Dr. C. C. Abbott, is accurately determined. As Dr. Abbott's discoveries have been extensively quoted, both in America and Europe, as evidence of pre-glacial or interglacial man, it is satisfactory now to be assured that the gravels in which these interesting relics occur are altogether post-glacial, and are really modern fluvial deposits. This age I had already assigned to them, in the appendix to "Fossil Men," on analogical grounds, but it has been fully proved by the observations of Mr. Lewis.

The above remarks are necessarily condensed, and refer to conclusions which I have elsewhere supported at greater length, in publications, the

greater part of which have, I think, been placed in the Library of the Institute. We are much indebted to Dr. Southall for his previous labours on this subject, and also for the facts and reasonings contained in his present paper.*

To Capt. F. PETRIE,
Hon. Sec., Victoria Institute."

The following from his Grace the Duke of Argyll, K.G., was then read :—

"January 17th, 1881.

SIR,—I had intended to attend this evening on the occasion of Mr. Southall's paper being discussed, but the severity of the weather and a cold prevent me from doing so.

The human implements which seem to have been found in the auriferous gravels of California can hardly be supposed to be contemporary with the deposition of those gravels, unless they are found under conditions which make it certain that they could not have been introduced at a later epoch.

I regard such an assumed contemporaneity as in the highest degree improbable, considering the change which we know to have passed over the mammalian fauna since the probable epoch of those gravels; and generally, I agree entirely in the view taken in this paper, and in the letter from Principal Dawson, of Montreal.—I am, dear Sir,
ARGYLL.
Capt. F. Petrie."

The following from Professor W. Boyd Dawkins, F.R.S., was then read :—

"Owens College, Victoria University, Manchester,
14th January, 1881.

I regret that my engagements forbid my hearing Dr. Southall's interesting and impartial paper, and of expressing my entire agreement with his views as to Professor Whitney's 'Pliocene Man,' of California. In the Lowell lectures in Boston, last October, I pointed out that the auriferous gravels of California offered no evidence on the question, because none of the human remains have been proved to be contemporaneous with them. The human remains belong to the class of relics left behind in California, Arizona, and New Mexico by the ancestors of the present native tribes, and imply a rude civilisation of the same kind. They have, in my opinion, either been embedded in the gravel by the action of streams, or of slips from the mountain sides in modern times, or are the result of interments, or of the mining operations which Dr. Southall describes, carried on by the native tribes in modern times and not in the Pliocene age. With regard to the Calaveras skull, I feel inclined to the view of Mr. Bret Harte rather than to that of Professor Whitney. There is, in my opinion, no satisfactory evidence in the New or Old Worlds of the existence of man in the incalculably remote Pliocene age.—I am, dear Sir, yours truly,
W. BOYD DAWKINS."

* In another communication, Dr. Dawson, F.R.S., commenting upon the whole question, remarks :—"I think the tide is decidedly turning as to the antiquity of man, as well as with reference to the origin of species, and the Institute has certainly done its part in contributing to this result."

The following from Professor T. McK. Hughes, F.G.S. (Woodwardian Professor of Geology at Cambridge), was then read :—

“The Palace of St. Asaph, North Wales, January 10th, 1881.

I am much obliged to you for sending me the interesting paper of Dr. Southall on Pliocene Man in America. His explanation seems reasonable and well supported. It is the old story of the toad in the rock. It was true, I dare say, that men had found a toad in a hole in solid rock to which apparently there was no access except along the line they had newly broken. But they did not consider that in their quarrying they had destroyed all evidence of the fissure along which the toad crept, and in fact that they would not notice such a thing until the question had been raised ‘How did the toad get there?’

I think Dr. Southall shows that it was highly probable that, in all the cases recorded of mortars, &c., being found in the old auriferous deposits, the discoverers had only cut into ancient disused and perhaps collapsed mining levels. I am sorry that the author has gone out of his way in his first paragraph to sneer at the cautious Lyell and the clear-headed Lubbock. I confess I do attach great importance to the evidence they bring forward on the points referred to by the author; though, of course, I do not think that any term of years can be assigned either to the earlier or later human periods of which they were writing.—Yours, very truly,

THOMAS MCK. HUGHES.”

The following from Mr. N. Whitley, C.E., was then read :—

“Penarth, Truro, January 12th, 1881.

The conclusion arrived at by Dr. Southall that the stone mortars and dishes found in the gold-bearing gravels of California are the relics of ancient mining operations is supported by the analogous case of somewhat similar bowls and dishes having been found in the tin-bearing gravels of Cornwall.

The ancient tin trade of Cornwall can be traced back with a considerable degree of certainty to a Phœnician origin, and the earliest operations appear to have been the extracting of the ‘stream tin’ by open excavations from the lowest stratum of the valley gravels. This tin-bearing bed resting immediately on the oldest rocks of the county, was usually from two to four feet in thickness, and was covered by ordinary river gravel for a depth varying from four feet in the upland valleys, to sixty feet at their mouths. In addition to a plentiful supply of detrital tin-ore, small quantities of gold have been found mixed with the tin-ore.

No relics of man’s frame or of his implements have been found in the tin-bearing stratum, but low down in the overlying gravel some few human skulls have been found; and almost at as low a level a bronze crucifix was found in the gravel and is now in the museum at Truro.

From the imperfect manner of working adopted by the ancient ‘streamers’ it has been found remunerative to work some of the gravel beds over the second time; and thus relics of the implements of the ‘old men’ (as they are called) have been found; consisting of shovels and pickaxes formed wholly of oak timber, and others of a more advanced type, of wood tipped with iron, also many stone bowls, mortars, and dishes, mostly of granite, and varying much in size, form, and workmanship.

In 1879 I obtained a fragment of a very symmetrical bowl from a small valley in the parish of Zennor: it was made of granite, and when complete measured twelve inches in diameter at the outside of the top, and would hold about two-thirds of a gallon. Three others, all of hard stone, have

lately been found by my son at places near the tin-bearing valley of the Fal, of larger size, rougher form, and may more correctly be termed mortars.

The late Mr. Bryant, of Trebetherick, near Padstow, collected a considerable number of such granite mortars; of these he kindly, some years back, sent me a photograph.

Such bowls, or mortars, might have been used to pound up the coarser materials in order to separate the crystals of tin from the matrix; the smaller dishes for washing out the minute particles of tin-ore from the earthy matter with which they are mixed; or perhaps, with a greater degree of certainty, to determine by measurement the proportion of tin-ore due as 'toll' to the landowner. This might be a tenth part or otherwise as agreed on; the agent who collected it was called 'the Toller,' and the agreement would have described it as the tenth *dish*.

Putting all these circumstances together, I think it is an analogous case to that described by Dr. Southall, and tends to support the conclusion to which he arrives in his paper—that the stone mortars found in the gravel beds of California are the relics of ancient mining operations.

NICHOLAS WHITLEY."

Rev. J. M. MELLO, F.G.S.—I had hoped that some one would have relieved me from the necessity of getting up to address you on this occasion, as I am not very well up to the work of extemporary speech; at the same time I may say that I have much pleasure in being present and taking part in the discussion of the paper we have had read this evening. I have read the paper with some care, but unfortunately I have not been able to obtain access to the original documents; for, really, in order to pronounce a definite opinion upon the subject, one ought to be able to say that one has examined all the evidence that has been adduced, and I am not able to say that, as I do not know what evidence the American geologists have brought forward to show that the remains they have found are contemporaneous with these gravels. To my mind, however, everything is against that assumption. I agree with Dr. Southall and the Duke of Argyll in what they have brought forward, and which, I believe, has proved, as far as it can be proved by argument, that the remains which have been found are certainly not of the pliocene age. We may argue on *à priori* grounds that it is almost impossible—of course, we have no right to say that it is absolutely impossible—but it is almost impossible that man could have existed in those days. I most thoroughly agree with the arguments of Professor Dawkins, that it is not likely, when no genera of mammals exactly similar to those of the present day are known to have existed, that man himself could have been in existence, and I do not think we have any right to look for man before we find these mammals making their appearance on the earth. Another argument, which is also an *à priori* argument, is that, as far as we can learn, geological history in America does not seem to be in such an advanced condition as it is in Europe. Professor Dana has made some remarks to this effect, showing that we Europeans are in advance of the New World, as well as other parts of the Globe—for instance, Australia. Australia has its marsupials at the present day, and, as far as its other fauna are concerned, it is said to be still in the tertiary period. In North America we get a grand

development of herbivorous mammals, and we do not find in that part of the world the great diversity of mammalian life which is found in the Old World. But, supposing man did exist in those ages in the highly-cultivated condition referred to, who preceded him? There must have been men of a lower grade, according to the view which many hold as to the development of man, and his remains ought to be found in beds yet earlier than these which are supposed to be tertiary; so that in order to find the earliest man of all we should have to push our researches back to the oolitic period. We know that although the North American Indians, not only at the present time, but for a considerable number of centuries, have been in a semi-civilised condition, their civilisation has been of a very low order—that is to say, they have made either no very great use of metals or none at all. But, although this is the case, it has been pointed out in Dr. Southall's paper and elsewhere, that there was a time—and that not so very long ago—when the North American Indians were in a far more civilised state than they are in at the present day. We find scattered over the greater part of North America great tumuli and mounds, and we have in these mounds apparent relics of civilisation among the Indian tribes of a far higher character than that which now prevails. It is also, I believe, a fact that, although we now find the greater part of America to be new forest land and waste, there was a period when the greater part of this forest district was to a certain extent cultivated; the mounds erected by the mound-builders, and by those who constructed those old tumuli, were in all probability the sites of cities and towns; and we know for certain that there was a very considerable use made by those earlier tribes of certain metals, although the use of them seems to have died out. We know that copper was used, and probably lead and silver—copper, and occasionally silver, being found in the tumuli, while mines have been found near Lake Superior in which copper used to be worked. This shows that there is no reason why we should not look for the existence of men having a tolerable civilisation who were able to mine to a considerable depth in certain parts of America, at a period not so far removed from that of those mound-builders and, probably, contemporaneous with them. But I do not see any decided proof that the men whose remains are found in these gravels were by any means contemporaneous with the gravels themselves. If you find remains, unless those remains are found by competent observers, it is almost impossible to say for certain that the things found are contemporaneous with the gravels and have not been introduced since, because in the very nature of the section of a gravel-pit it is impossible to see any decided lines. In almost all cases it is impossible for those gravels to give any proofs of the existence of contemporaneity between the remains found and the gravels themselves. Suppose a mining level had been driven into those old gravels of the Rocky Mountain district, and supposing the mining level had fallen in, which I think, in many cases, would have undoubtedly taken place, then no trace whatever would be left of the existence of the level so driven. If there had been timber props put

up in the level they would, under the influence of moisture, soon have decayed, so that there would be no proofs whatever of there having been a level there; and, in subsequent mining operations, miners might come across these old levels, and, finding the implements that had been left there, regard them as contemporaneous with the gravel itself, and so jump at once to a conclusion as to a fact which has had no existence. I think the suggestion of Dr. Southall's a most likely one, namely—that all these implements and other things found in the gravels were introduced by the old miners in old mining galleries, and all the circumstances seem to point in that direction. With regard to the Calaveras skull, we should not expect to find any recognisable disturbance in the overlying bed, supposing the object had been introduced by a gallery or level in the way I have described. The overlying bed would have been, of course, untouched. With regard to Dr. Dawson's communication, I think it an interesting one, and I agree with most that is in it. There is not much difference between his views and those of Professor Dawkins, except that one draws the line at one period and the other at another. I should like to know what argument Professor Dawson can adduce to show that the submergences of land he speaks of were not slow submergences. He says, without giving any proof, that it is impossible to show that. Of course, I do not say that it may not be so; but I should like to know what proof he can give of it; because all the geological changes, as far as we can follow them, have been slow changes. I think I have now said nearly all I need put before you, for I do not feel able to add very much to the arguments that have been adduced by others. I hope some other gentleman will now take up the subject.

Mr. T. K. CALLARD, F.G.S.—I should like to make a few remarks in the same direction as those of the last speaker. On pages 6 and 7* of the paper we find it stated that the mortars have “in almost every instance been found by miners in their search for gold”; this is important. Again, it is said that the relics seem always to have been found in the auriferous gravel, and I should like to add that they are just such as we should have expected the ancient miners to have used. Now, if it be established that ancient miners have been there, all difficulty with regard to these relics is removed. In addition to the evidence before us, Mr. Bancroft says that the new Alamaden quicksilver mines are said to have been worked by the natives for the purpose of obtaining vermilion long before the coming of the Spanish. I would also call attention to the skillet spoken of on page 4,—“An ancient skillet, as we are told, made of lava as hard as iron, with a spout and three legs, was washed out of a claim at Forest Hill”; and on page 6 it is said, “He,”—that is, Pliocene man—“used a vessel described as a skillet, made of lava, hard as iron, which was circular in form, and had three legs and a spout.”

* See numerals at the foot of each page.

This identical skillet, a writer quoted by Bancroft says will be sent to a state fair in America as a specimen of crockery used in the mines several thousand years ago. If there were mines, as I said before, the difficulty is gone. The finding of relics in a Pliocene stratum no more proves that man was Pliocene than the finding of a pickaxe in a coal-mine would prove that man belonged to the carboniferous period. Reference is made on page 2 to my having sent to the author a piece of the tusk of a mammoth, part of a specimen sent to me from Archangel, in which the ivory is in so fresh a condition that it has been shaped into a chequer by an ivory-turner, which indicates—I do not say proves—that the extinct mammal has not been so long extinct as is generally supposed. I have brought a chessman here that has been turned out of a mammoth tusk, and it has such an appearance of freshness that neither the eye nor the tongue can detect any indication that the animal to which it belonged lived 200,000 years ago; and the finding of certain implements along with the mastodon, mentioned in this paper, would not to my mind convey the idea of any considerable antiquity. On page 3 reference is made to the views of Professor Dawkins, who has given, from a zoological point of view, his reasons for believing that man did not exist in the Miocene period. The first appearance of man, according to Professor Dawkins, is in the Pleistocene. But whilst Professor Dawkins does not hold that man lived in the Miocene period, yet he does hold to the antiquity of man; and it is a very considerable antiquity that he would claim for man, the proof of which rests on the finding of assumed stone implements. At Erith, now, these implements are not to my mind at all convincing. I have a figure of one here. It must be remembered that chipped flints were found in the Miocene period, flints so chipped that good authorities believe them to have been chipped by the human hand. If flints chipped so as to resemble human implements are found in the Miocene strata, and man was not there at that period, then the finding of chipped flints must no longer be regarded (without some collateral evidence) as sufficient proof of the existence of man at the period to which they relate. Professor Gaudry, I presume, saw this difficulty; neither he nor Professor Dawkins believe in the existence of man in the Miocene period; but yet there was the fact before them that chipped flints had been found; and if somebody must have chipped them, and no man existed to have done it, it must have been done, suggests Professor Gaudry, by some anthropomorphic ape. Professor Dawkins thinks that this is highly probable. I think it is very improbable, and I would on this point ask the question, if an ape chipped these flints in the Miocene period, why may not an ape have chipped the flint, the drawing of which you have before you? And if he could have done this, then I say the finding of the Erith flint does not prove that man existed at the time that it was chipped. Professor Dawkins seems to have anticipated this remark, for he suggests that the ancient ape might have been much in advance of the existing ape: he admits that the ape of the present day could not have done it. And this leads me to another point.

Professor Dawkins appeals to those who believe in the doctrine of evolution, and thinks that they will see the force of his remarks on the non-existence of man in the Miocene period. I do not believe in evolution, but see the force of his remarks. Still, this point arises. How does this fit with the doctrine of the "survival of the fittest," if there were such apes once; according to the evolution theory, they had no right to go out of existence prior to the appearance of man. It is contrary to all rule that they should have done so; they ought to exist now if the principle of evolution be right, and we ought at the present moment to have the highest type of ape along with man. But I do not feel that we are shut up to either conclusion. We have had evidence that flints have been naturally fractured, so as to resemble implements made by man. If we have *some* evidence of this and *no* evidence of apes having chipped flints, I think it is more in accord with the principle of arguing from the known to the unknown to suppose that the Miocene flints were chipped by nature and not artificially, and I would say, by way of caution, if the Miocene implements were naturally fractured flints, would it not be befitting of us to be exceedingly careful how we receive these chipped flints of the Quaternary period when there is no collateral evidence to show that they were the work of man?

The HON. SECRETARY said,—Mr. E. Hepple Hall, F.R.G.S., who has not been able to stay, has given me permission to mention that he accompanied Professor Whitney in his explorations over the Rocky Mountains, but that, so far from his opinion being the same as Dr. Whitney's, he must confess to being obliged to agree with Professor Dawson and Professor Hughes.

Mr. E. CHARLESWORTH, F.G.S.* (a visitor), said he had from an early period of his life taken up with great interest the study of natural history, and as a branch of natural history that of geology. In his early days geology was comparatively a new science, and it was then that a number of persons who had time and ability were turning their attention to it. He was much interested in what was going on, and now for a period of something more than half a century had been, more or less, personally in communication with all the great lights in the geological world. If the meeting would allow him, he would tell them the conclusion to which he had come was that geological science,—what might be termed the grand truths of the science,—were completely established, just as were the truths of astronomical science, but when you got beyond that, when

* Mr. Charlesworth is well known as a painstaking geologist. He attended the meeting as a visitor. His intimate relations with such men as Professor Owen, and others amongst those scientific worthies of whom all Englishmen are justly proud, are well known. The freedom with which he alludes to their errors—and all are liable to err—shows how strong can be the language of a fellow-worker in regard to a colleague's mistakes, even when under no circumstance can the most hypercritical antagonist say that such language indicates disloyalty to Science.—ED.

you got to matters of minor detail, the conclusions often arrived at demanded the most serious sifting before they were generally adopted; and while he was quite prepared to find that man did exist in the Pliocene period or did go even lower yet, having had very considerable opportunity of looking into this matter, he had come to the conclusion that there was no evidence worth a straw, to give man a place in the Pliocene system of the earth's history. The history of geological science was, more or less, a history of extraordinary blunders, and these blunders not committed by men who were tyros just beginning to work at one department of geology, but by men who stood at the very highest pinnacle of knowledge of the science. He would not have attempted to address the meeting to-night had others present taken the question up, but perhaps the Chairman would stop him if he detained them at too great length. He was trying to show that little dependence was to be placed upon the opinion of men of the highest eminence who came forward and said they had found, under such and such a surrounding, such and such an object, and it must certainly justify such and such a conclusion. Suppose some great man of the geological world came and told one a thing of that sort, the popular idea would at once be, "Oh, we must believe that." Forty years ago Professor Owen brought out his important work on the history of British fossil meat-giving animals, and in it he mentioned that there was in the York Museum the skull of a badger, agreeing in all respects with the badger of the present day, and that this skull had been found in an undoubted Pliocene formation in Suffolk,—that was, in the famous deposit known as the Suffolk Crag. Well, he had read that work of Professor Owen's with the greatest possible delight and instruction, but he happened to know something about the Suffolk Crag, and something about the badger, and he thought he should like to see that Pliocene badger's skull. Well, a short time after that, Professor Phillips was translated from the York Museum to succeed Dr. Buckland at Oxford, and they then wanted a successor to Professor Phillips. He accordingly said that he was willing to take the office, and, on appointment, went down to York, and, of course, over the Museum. The very first thing he rummaged for was that Pliocene badger's skull, which, on examination, proved not to have the slightest claim to be Pliocene. It was nothing more than an ordinary badger's skull. The fact was, that one or two hundred years ago living badgers were very abundant in the neighbourhood, which contained numerous crags and old quarries, not being worked, and the sides of which had fallen in and become overgrown with bushes. These crags and quarries were charming places for the badgers to burrow in. This badger had taken up its abode in one of these quarries, and died in its hole; and then, twenty or thirty years after, the Pliocene quarry was worked again, and the workmen, of course, came across that badger's skull, and they, finding it buried in the crag, turned it out and said, "Here is a fossil." He ought to tell the meeting how he knew that this was not a fossil at all. All the bones found in this Suffolk red crag were

most beautifully mineralised. A geologist could swear to them when he saw them in any part of the world, but Professor Phillips being a Yorkshireman, and not being, like himself, thoroughly acquainted with this Pliocene deposit, when this skull was put into his hands, and he was told that it had been taken from the Pliocene, he, as a matter of course, thought there could be no doubt about it. Professor Owen then got hold of it, and published it as a genuine crag fossil. Now, there was a name that he dared to say was familiar to many of the members of the Institute—that was the Rev. W. B. Clarke, of Sydney in Australia, who had done so much with regard to the gold-discoveries in that country. In one of his (the speaker's) early papers on this Suffolk crag, he had mentioned that no mammalian remains had ever been found. Mr. Clarke at once rushed into print to say that Mr. Charlesworth had made a most extraordinary blunder, and said that from one of these quarries near Hoxne he had a collection of bones. He (the speaker) was very much amused when he saw that, because he knew the quarry very well, and he knew that, like all other quarries in Suffolk, there were two deposits—there was a bed of sand and gravel, 15 feet or 16 feet deep, and then the older formation underneath, which was Pliocene. Therefore the question was, had these bones come from the sands above, or from the lower part? and he immediately replied to Mr. Clarke's paper and said, "Will Mr. Clarke be so good as to tell us if he took those bones out of the quarry himself? and, if so, if he took them out of the sands or from the bottom of the quarry?" In reply Mr. Clarke said that it had never occurred to him that there were two formations. He would like to go into the other department. They would understand that what he had been saying all related to what might be called the physical surrounding under which these things were said to be found, but let him say something about the objects themselves. He could go on all the evening, giving them the history of mistakes in regard to these, and these mistakes only showed how extremely necessary it was to thoroughly sift the statements made to you before you receive them. They must not think that what he was going to say was intended to disparage what Professor Owen had done, but the misfortune was, that every now and then, when a case of the kind occurred, a man thought that, because he had a great name, he was bound to tell you what a thing was when he saw it. At Manchester, Professor Owen read a paper on "An Anaplotherium," found in the Cliffs at Cromer, in Norfolk. He (the speaker) had not seen the beast, but he had seen a picture of it, and he doubted its being an Anaplotherium. That was one of the extinct animals that Cuvier described as found in the neighbourhood of Paris. As soon as the British Association was over at Manchester, he (the speaker) went to Norwich to see the animal, which he found had been purchased by subscription for the Norwich Museum, and was just being mounted; asking permission to examine it closely, he did so, and what did they think it was? A roebuck. He thereupon wrote a letter to the *Athenæum* and to the *Literary Gazette*, describing what he had seen, and that he had found it to be a roebuck; but Professor Owen would not have it, and

the fight went on for six months, and then he was obliged to admit that it was a roebuck. He (the speaker) fully agreed with the general results at which Dr. Southall and Mr. Dawkins had arrived. There was one feature in the history of Pliocene upon which he would like to say something, and it was this. In the Suffolk Pliocene crag there had been discovered, during the past forty years, countless millions of sharks' teeth. In his young days, he used to go and look in the Suffolk Crag quarries for fossils, and he was in the habit of finding any number of shells; but his greatest prizes were the sharks' teeth. When Professor Henslow, who was very fond of geology, was presented, in the year 1842, to a living in Suffolk, he came to the conclusion that certain stones in the Pliocene crag contained phosphates of lime, and he maintained that the stones, if ground up, might be used for manure. The result was that all that part of Suffolk where the Pliocene crags existed was found to be extremely wealthy, for all the farmers dug up these stones and utilised them for manure. One of the results of this was that, whereas in his (the speaker's) early days, he would occasionally find a shark's tooth among the shells, the men engaged in shifting the stones found them by thousands. He bought up about 20,000 of them, and, on turning them over was surprised to find that some had a hole drilled through them. Some might be familiar with the dreadful weapons made by the South Sea Islanders. These weapons were made thus;—a piece of wood was cut into the shape of a dagger, and a groove was made down each side of it; into this groove the teeth were placed, and, in order to keep them in position, a hole was drilled through each of them, and a strong piece of binding put through the holes, the result being a most dangerous weapon. Well, the moment he found the drilled hole in his sharks' teeth he thought,—“Why, surely primitive man was here. Here we have really Pliocene man.” He went through all his sharks' teeth, and altogether he thought he found eight with the hole drilled through them. He sent them to Professor Owen, who wrote a report stating that he really believed the drilling was human work. There was not a shadow of a doubt that these teeth were really of Pliocene age. The workman who sold them knew nothing about the hole, and did not know that the teeth were of any extra value when pierced in this way. Now came the question: were these holes, which exactly agreed with the holes in the South Sea Island teeth, human work or the work of some animal,—some mollusk or a worm which had the power of drilling hard substances? This was a matter of the greatest possible interest. If it was human work, then man was undoubtedly of Pliocene date. But was it human work or not? They all knew there were certain shell-fish which had that wonderful power of tunnelling their way into the hardest rock. One took a stone and threw it into the sea, and a year or two afterwards found that it was tunnelled through and through. He was not now speaking of the ship-worm, but a worm that drilled through the hardest rock, and that, a creature no harder than an oyster and with its early shells as thin as a piece of paper. Had those shell-fish tunnelled into the

sharks' teeth? The difficulty was, that when the shell-fish went into the stone it went there to live, and did not drive its way through; like a rabbit, it made a burrow. In the case of these teeth, whatever had made the hole had gone in at one end and out at the other. He had brought with him an ordinary tumbler containing about 100 of them. The sharks' teeth of the present day were about an inch and a quarter in length.

The CHAIRMAN.—With regard to what Mr. Charlesworth has said about caution, I do not think I can do better than read a part of the Address of Mr. John Evans, F.R.S., before the Conference on the question of the Antiquity of Man, of which he was President; it was held in May, 1877. He says, after alluding to several recent discoveries in France, Spain, and Switzerland, "Each successive discovery, or presumed discovery, must be received in a cautious but candid spirit, and, looking to the many sources of doubt and error which attached to isolated discoveries, our watchword must for the present be,—'Caution, caution, caution!'"

The meeting was then adjourned.

DR. SOUTHALL'S REPLY.

I do not desire to add anything to what I have said, except to notice a remark of Professor Hughes, that he "is sorry that the author has gone out of his way . . . to sneer at the cautious Lyell and the clear-headed Lubbock." I had said in the beginning of my paper, as an introduction to what followed, that "I presumed that few now attach any importance to the evidences for the antiquity of the race derived by the late Sir C. Lyell, Sir J. Lubbock, and others, from the ancient stone graves, the objects found in the Danish peat, the shell-mounds of Denmark, and the lake dwellings of Switzerland."

Sir Charles Lyell suggests, in his *Antiquity of Man*, an antiquity of several thousand years for the mound-builders of the Ohio valley. Sir John Lubbock suggests "three thousand" years, intimating that it may be perhaps far more.

Sir John Lubbock devotes a large space to the tumuli and stone graves. He indicates his opinion of the remote antiquity of some of them by referring them to the stone age, and, speaking of the circle of Abury, he cites Stukeley as of the opinion that it was founded in 1859 B.C. I have no doubt, however, that he regarded that as far below the truth.

Both of these writers, while abstaining from very specific figures, imply a very high antiquity for the stone implements found in the lower layers of the French and Danish peat. Both of them refer to the fact that the vegetation of Denmark has changed several times since the Stone age in that country, and they both cite the calculations of M. Boucher de Perthes with regard to the time required for the formation of the peat of the Somme valley, whose estimate involved the lapse of some 30,000 years.

As to the lake-dwellings, they both imply in all that they write of them, that those of the Stone age go back some thousands of years before our era,—perhaps some 4,000 to 7,000 years,—but they are cautious about committing themselves absolutely.

As to the Danish shell-mounds, Lyell brings forward various considerations to show that they are “very old”; he suggests that they may be 16,000 years old. Sir John Lubbock makes them older than the Neolithic Age; he calls them “Pre-Neolithic.”

Now, in the light of the investigations which have been made since the works of Sir C. Lyell and Sir J. Lubbock appeared, all this appears very extravagant, and we cannot help feeling that it is not fair to the public to be drawn into such wild and unwarranted opinions by our most eminent scientific men. It was in this spirit that I felt called upon in the foregoing paper, which I have had the honour to lay before this Society, to protest against the manner in which the human relics found in the auriferous gravels of California have been treated by distinguished American geologists. The names that I have given as endorsing or countenancing the opinion that the mortars and skillets found in these California gravels were manufactured by men with highly-developed skulls, in the Tertiary period of the geologists, are the highest among the scientific men of America. We are just authoritatively told that “the existence of man in the Tertiary period seems now fairly established.” It is absolutely impossible that science shall command the respect to which it is entitled if it proceeds in this incautious spirit. It is a serious matter to be told that man was living in the Tertiary period, and the declaration ought not to be made lightly.

I regret that I should have been construed to have sneered at Sir C. Lyell or Sir J. Lubbock, because I entertain for both of them the very highest admiration.

I intended to point to them as warnings in these discussions about the antiquity of our race; as teaching us by the errors into which they have fallen the necessity of more caution on this subject. Why, both Sir C. Lyell and Sir J. Lubbock mention, in their argument for the antiquity of man, the skeleton of the Red Indian found by Dr. Dowler in the delta of the Mississippi, “beneath four buried forests of cypress-trees superimposed one upon the other,” and estimated by Dr. Dowler to be 57,000 years old. They also cite the human bones found in the coral rock of Florida, said by Agassiz to be 10,000 years old; also the *os innominatum* of a man found with the bones of the mastodon in the Mississippi valley, near Natchez; also the cone of the Tinière, in Switzerland; also the pottery found by Dr. Horner in the mud of the Nile, at the depth of 60 feet. Sir C. Lyell also brings forward certain antique boats found in the plain of the Clyde, 20 feet above high-water mark, which he regards as extremely ancient, but one of which had a hole in its bottom stopped by a piece of cork, which must have come from Spain or Portugal. Sir C. Lyell also brings forward the case of a raised beach at Cagliari, in Sardinia, where fragments of antique pottery

were found associated with marine shells of living species, at the height of from 70 to 98 metres above the sea. He concludes that this pottery is 12,000 years old, "even if we simply confine our estimate to the upheaval above the sea-level, without allowing for the original depth of water in which the mollusca lived." Sir Charles was mistaken in this, as in the other instances cited. In 1878 M. François Orsoni ascertained that what Sir C. Lyell took to be a raised beach at Cagliari is, in fact, the site of a kjökkenmödding of the Neolithic age.

ORDINARY MEETING, FEBRUARY 7, 1881.

THE REV. PREBENDARY CURREY, D.D., MASTER OF THE
CHARTERHOUSE, IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced:—

MEMBERS:—J. Caudwell, Esq., London; Rev. C. Elliott, D.D., Chicago, U.S.A.; Rev. R. Taylor, New South Wales.

ASSOCIATES:—Rev. H. East, New Zealand; Rev. H. G. Grey, Oxford; W. Griffith, Esq., London; Rev. S. M. Jackson, United States; Kyneton Rural Deanery (Rev. J. E. Herring, R.D.), Australia; F. I. Waring, Esq., M.Inst.C.E., Ceylon.

Also the presentation of the following work for the library:—

"Journal of the Royal United Service Institution." *From the same.*

A lecture, entitled, "The Advancement of Science confirms the Inspiration of the Scriptures" (illustrated by diagrams), was then read by S. Kinns, Esq., Ph.D., F.R.A.S. A discussion ensued, in which the Right Hon. the Earl Fortescue, Mr. T. K. Callard, F.G.S., Mr. D. Howard, F.G.S., and the Rev. T. M. Gorman took part. The author having replied,

The meeting was then adjourned.

ORDINARY MEETING, FEBRUARY 21, 1881.

H. CADMAN JONES, ESQ., IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced:—

MEMBERS:—H. J. Sanderson, Esq., M.D., London; Rev. T. Taylor, South Africa.

ASSOCIATES:—Rev. W. F. Edwin, King's Lynn; Rev. J. Fordyce, M.A., Great Grimsby.

Also the presentation of the following works for the library:

“Proceedings of the Royal Society.” *From the same.*

“Proceedings of the American Philosophical Society.” *Ditto.*

Also Pamphlets *from the Rev. J. H. Barker, M.A., and the Rev. C. B. Brigstocke, M.A.*

The following papers were then read:—

*WHAT ARE SCIENTIFIC FACTS?** By J. E. HOWARD, Esq., F.R.S. F.L.S., &c. Being a Reply to W. PENGELLY, Esq., F.R.S., in a Paper read before the Institute, January 3rd, 1881.

THIS question occurs as a suitable introduction to some observations to which I beg to call the attention of the Institute, in reference to my paper on “The Caves of Devon.” These Caverns have been claimed as furnishing proof of an antiquity of immense (and, I may add, incredible) length for the race of man on the earth. Such proof is supposed to be afforded by *Scientific Facts*; established *as such* by reiterated assertion on the part of some men of science—of course, all honourable men; and yet it appears desirable, in the interests of truth, that their statements should be subjected to a sifting process—such as might take place in our higher law courts—

* Remarks supplementary to a paper on the Caves of South Devon.

before they are handed down as facts to succeeding generations.

I am not aware how this can be accomplished, except through the medium of the Victoria Institute. In bringing my views on the subject before this body, it was, of course, open to Mr. Pengelly to have attended the meeting at which my paper was read, and to have challenged any of my statements. This was not done; but, instead of this, Mr. Pengelly occupies from p. 594 to p. 651 of the Report and "Transactions of the Devonshire Association for the Advancement of Science, Literature, and Art," in strictures on my pamphlet of not more than forty pages. I take this as an admission that my reasoning is not very easily disposed of.

Further, I may add, that it appears to me the criticisms of Mr. Pengelly tend very much to establish the main points of my argument. In the first place, it may be recollected that I contended that the stalagmite—on the rate of the accumulation of which by successive drops such vast theoretical deductions were made to rest—was to a large extent *not stalagmite at all*; that much of it could not have been formed by dropping from rock through which it had passed in a state of solution; and I showed before the Institute specimens to prove my assertion.

Now I find that Mr. Pengelly is forced to admit the truth of this, for he says (p. 614, as above) under head,

"Stalagmite versus Magma,"

"If the word Stalagmite is to be strictly confined to the meaning its etymology justifies, it must be admitted that it may have been applied to calcareous precipitates in Kent's Cavern, which have no literary claim to it,"—that is to say, have no *real* claim to it at all. This word "literary" (literal?) refers to a quotation from Page's Handbook of Geological Terms, in which this Author describes *Stalagmite* as derived from the Greek, *Stalagma*, a drop.

I trust that Mr. Pengelly will not dispute the accuracy of my quotation. I wish that many pages could be transcribed. In the meantime, it will be well to remark how this bears upon the whole case. This has been stated probably many hundred times; but I quote from a pamphlet, called "The Ancient Cavesmen of Devonshire," headed by an "Illustration of the Entrance to Kent's Cavern."

"The important point which we have established is, that relics of human art are found *beneath* the floor of Stalagmite. After taking every precaution, by sweeping the surface and examining most minutely whether there were any traces of

the floor having been previously disturbed, we broke through the solid *Stalagmite* in three different parts of the cavern, and in each instance found flint knives, closely resembling those in the most ancient barrows. The thickness of the *Stalagmite* is about two feet."

To this extract from the Report of a Committee of the Torquay Natural History Society, appointed to make an exploration of the Cavern, is added the following information.

"*Stalagmite*, it may be explained, is a deposit of limestone formed by the dropping of water from the roof, the water having dissolved the lime in sinking through the rocks above."

But what if the two feet of *Stalagmite* is not in a literal sense *Stalagmite* at all, but a mass of calcareous deposit formed in some other way than by dropping in a fluid state from the rocks above?

What proof remains that "the three feet of thickness to which the floor sometimes attains, or even the sixteen or twenty inches which it averages, must be of very good chronological value?"*

Mr. Pengelly himself tells us (p. 602) that "Science, whose very essence is accuracy, cannot be advanced by gratuitous beliefs"!

In the next page of this work (which Mr. Pengelly acknowledges† (p. 615) (though it does not bear any signature), I read "that the time required for the formation of a sheet of stalagmite 2 feet thick, added to that which has elapsed since, falls short of his antiquity," i.e. of the Antiquity of Man.

But now a truer light seems to have dawned on the observers; for in their twelfth report (quoted from p. 617) the Committee of the British Association, describing the exploration of the portion of the cavern known as the Labyrinth, say, "It was necessary to break up all the bosses of stalagmite, with the exception of the largest of them, of which a portion has been left intact, it being believed that it shows strikingly the utter inadequacy of the data derived from a *boss* to solve the problem of the amount of time represented by a *floor*, and *vice versa*."

I have no doubt that this is a most formidable source of

* See the Ancient Cave Men of Devonshire, under the description of "The Crypt of Dates" (pp. wanting).

† Rep. Britt. Ass. 1876, p. 5 (quoted by Mr. Pengelly p. 617).

error; but how is any person reading the previous statement about the *two feet* of floor, and seeking to calculate the rate at which it might have been formed from the amount of concretion or inscriptions on the *bosses*, to be enabled to rectify his errors? When he enters the cave he will find that almost everything has been carried away,* and that what is really important is *withheld from his examination* lest he should incur peril in climbing a ladder, or in otherwise penetrating into dangerous recesses! The important crypt of dates has, according to Mr. Pengelly, “been visited by *less than a dozen persons*”! (p. 599).

As it will be seen in my case, there are yet more formidable perils to be encountered. To drive a stick into *stalagmite* and find that it is nothing but *magma* (that is to say, a mass, as it were kneaded together, *μάσσω*) without arrangement or crystallisation, *this is real treason*, and absolutely forbidden by Mr. Pengelly. What, then, am I to expect when I avow that, in addition to my trespass, I brought away a handful of the said *magma*, and retain a portion of the same in my library for the inspection of all inquirers? Further, I obtained specimens from the outside showing the transition from pure crystalline substance, formed by percolation through the rock, to a mingled mass adherent, which never could have filtered through the stone, but must have drained through chinks and crevices in a much more rapid transit.

I am glad to find similar views expressed by Dr. Geikie (*Prehistoric Europe*, p. 84):—“Stalagmites, so far from being always comparatively pure, are often so highly impregnated with earthy ingredients as to assume the character of calcified earths. Such impurities may *have been introduced in various ways*. Most limestones, when they are dissolved in carbonic acid, leave a red residue behind, and there can be little doubt that much of the earthy matter in stalagmitic accretions is of this nature, and to *that we may add the red earth, mud, and silt introduced by rains and freshets through fissures in the roofs and sides of caves*, and even in many cases by their more open mouths.” (The italics are mine.)

* “How can Mr. Howard pretend to say what may have been found in the Cavern? From 28th March, 1865, when the committee began their exploration up to 11th June, 1878, when he made his last visit, upwards of thirteen years, during which the work had been carried on continuously from day to day, the workmen had destroyed vast specks and bosses of stalagmite, broken them into small pieces, and taken them out of the Cavern; and about their character Mr. Howard is necessarily and utterly ignorant.”

Mr. Pengelly's attention (on my last or third visit) was chiefly directed towards his more appreciative companions; though he was so far from neglecting me that he records the distance at which my eyes were situated from the inscription* he was showing us as 7 feet; near enough, it would seem, for any purpose of information that could be gained from this particular case; for the whole profession of explanation resulted in our being elaborately shown an incision which Mr. Pengelly now tells us is of no importance whatever (p. 602), whilst the really important inscriptions are withheld from view! The *importance* of these inscriptions may be judged from the following quotation from p. 3 of my Paper.† So difficult is it to ascertain what are *scientific facts*, and what are those which, on the other hand, possess only an illusory character.

The result was that I was entirely led astray, and when I came to read up the literature of the cavern I supposed that what had been shown me was an inscription in the "*crypt of dates*"; and consequently confounded that recess with the "*Cave of Inscriptions*," which is in a distant part of the cavern. This error was pointed out by Mr. Pengelly, and corrected *before my paper was read*.

Mr. Pengelly thinks that I made both too little and too much of my opportunities of personal investigation of the cave, which "when with [him] me could not have exceeded (on my last visit) half an hour" (p. 596). I certainly should have given a different estimate of the time; but it shows, at all events, that Mr. Pengelly, when particularly invited to show the cave, does not take too much pains to unveil its secrets. This matters little; but I cannot say the same of his *apparent* insinuation that I (not mistook, but) made a gratuitously false assertion of my having first visited the place in 1869, under his guidance. He says that he has no recollection of it, and that my name does not occur in his journal, which may very well be; but it happens that I have a *very distinct recollection* of the circumstance, and that, moreover, I have an entry in my pocket-book for the year, which would be valid proof, in any court of justice, that I visited Kent Cavern on the 31st of August, 1869.

On my second visit (with the guide) I was stirred up to take

* Robert Hedges, of Ireland, February 20, 1688.

† "Taking the correct data (that of the Report of 1869) we have twelve feet of stalagmite formed, *let it be assumed, from the dates on its upper surface*, at the rate of .05 inch in 250 years, and thereby arrive at the *conclusion* that the accumulation of the whole required 720,000 years." (!)

more interest in the research. The results of my subsequent inquiries I have given in my Paper on the Caves. Although I "made no examination of anything," I must *somehow or other* have discovered some formidable faults and flaws in the Cave theories which have been so abundantly propagated.

The truth is that my "long investigation," *not* of the cave, but of the literature of the cave, brought me into acquaintance (through the kindness of a friend) with the results of the explorations of the Rev. Mr. McEnery, who, in the course of five years' investigation, seems to me to have anticipated, in his discoveries, all that has since been explored by Mr. Pengelly and others, to whom the merit has been assigned by the scientific world. I certainly appeal from Mr. Pengelly to this well-known authority; who was not led by his investigations to any such conclusions as to the antiquity of man, as have been so zealously propounded by his successors. Moreover, I thank Mr. Pengelly for reminding me that Mr. McEnery traced to the influx of waters from *the deluge of Noah* much that is otherwise sought to be explained by Mr. Pengelly and his friends. In this and in other respects, particularly that of his apparent want of fluency in English, he was placed at a disadvantage; and his papers were left in a very unfinished state. Such as they are, we have to thank Mr. Pengelly for rescuing them from entire oblivion. I know not how to procure a copy by purchase, and have not one at hand now to refer to. If the Rev. Mr. McEnery were still living, I think the *κῦδος* which rightly belongs to him would not be withheld.

As an illustration of what I have been saying, occurs the following. Mr. Pengelly (p. 612) calls in question my statement (p. 6, "Caves"), that no stalagmite had been formed over the band of black mould, on the ground that, *in one place*, "the overlying black mould was itself overlaid by a cake of stalagmite, which was attached to the wall of the cavern, from 1 to 2 inches thick, and which measured 7 feet from north to south by 6 from east to west. In many instances stalagmite, fully as thick, had been found on the large blocks of limestone lying on the black mould; but this was the first, and indeed is at present the only, example of such a cake immediately on the black deposit itself."

This may all be correct without impeaching the general accuracy of my statement. Indeed, when we look at the formations "fully as thick" which may be seen under the bridges of our railways in the limestone districts, it would be strange if no coating of real stalagmite should occur on stones lying on the surface in a cave such as Kent's Cavern, for one

or two thousand years, as in this instance. But what if this cake of "*stalagmite*" should prove not to be stalagmite at all?

On the page opposite to Mr. Pengelly's unceremonious denials I find the following quotation from Mr. McEnery:—

"Mr. McEnery says in other places the drop from the roof acted *concurrently* with the *oozings from the sides* in forming the floor, which consequently partakes of both manners."

May I not presume to think that a cake of calcareous limestone, *attached to the wall* of the cavern, was probably formed in the latter manner, and therefore not, in any proper sense, stalagmite at all?

If Mr. McEnery had been living, he would have been able to reply to Mr. Pengelly's strictures, and to relieve me of the difficulty of counter statements. As it is, Mr. Pengelly freely bestows his blows on the dead excavator, who had "neither science nor philosophy" at his command. This refers to some passage about a boar spear, which for the present I must let stand on Mr. McEnery's authority. Mr. Pengelly here accuses Mr. McEnery of writing "in a very speculative vein" "when he entered on his calculation," but I must say Mr. McEnery's speculations seem to me much better founded than Mr. Pengelly's theories. Mr. McEnery's calculations rest on something definite,* Mr. Pengelly relies on non-literary scientific facts.

It was scarcely worth Mr. Pengelly's dignity to call in question Mr. McEnery's statement, that the animal remains during the early explorations emitted a fœtid odour, seeing that it is notorious that the remains of mammoths in Siberia are reported in one instance to have "smelt abominably," and in others were sufficiently fresh to have been devoured by dogs. As an advocate of the long chronology, he should first meet and dispose (if he can) of the Siberian accounts, before impeaching the credibility of his predecessor (see p. 638). He ought also to *explain* the consistency of the following "scientific fact" with his views:—It is reported in *Nature* (January 20, 1881) that the body of a colossal rhinoceros has been discovered in the Werchojanski district, Siberia. It was found on the bank of a small tributary to the Jana river, and was laid bare by the action of the water. Like the mammoth washed ashore by the Lena River in 1799, it is remarkably well preserved, the skin being unbroken and covered with long hair. Unfortunately only the skull of this rare fossil has reached St. Petersburg, and a foot is said to be at Irkutsk,

* *Transactions of the Victoria Institute, Paper on Caves of South Devon, by J. E. Howard, Esq., F.R.S., vol. xiii., page 172 (p. 10 of "People's Edition.")*

while the remainder was allowed to be washed away by the river soon after it had been discovered. The investigation of the skull gave the interesting result that this rhinoceros (*R. Merckii*) is a connecting form between the species now existing and the so-called *Rhinoceros tichorrhinus*, remains of which are not unfrequently found in the gravel strata of Eastern Prussia. It is supposed that *R. Merckii* is the now extinct inhabitant of the eastern part of Siberia.

I will now add a few words as to the Literature of the Cavern and my quotations. I know not what may be the experience of others, but to my mind the "investigation" of these was a work of labour and difficulty. The want of indexes, and in some cases of pages, and of the names of publishers, and the constant restatement in lectures of supposed facts and argument made the inquiry doubly difficult. The Notes, &c. (p. 1) noticed (p. 596) I purchased at Torquay, but do not remember that my attention was called to subsequent numbers. So in the case of the Annual Reports of the Committee of the British Association. I contented myself with the first three, which happened to be in my possession, out of fourteen that have been published; and, even if it had been possible to possess myself of all that has been published,* I could but have touched the margin of that immense mass of confident assertion which has tended, the whole world over, greatly to encourage the enemies of revealed religion.

This is all *patent*, and my quotations do not in any way distort the opinions of the Examiners of the Cave. But that which was *hidden* is, the opposition to these (as to their most important aspects) in the views of the Rev. Mr. McEnery. I do not belong to his church, but shall not be deterred by this or any other consideration from doing justice to the memory of a real man of science. I admire his respect for the Scriptures, and am more than willing to share in the opprobrium thence arising. In considering the important results to the cause of religion to which I have referred, it is right that I should say further that I entirely disclaim any imputation of improper motives to my opponent; and that I regret the amount of personality which has unavoidably mixed itself up with the controversy. I accept without reserve his correction of mistakes in my quotations, which, however, are

* Page 609, Mr. Pengelly says "He has no means of knowing except by studying the reports published annually from 1865 to 1879 inclusive, or by reading the various papers which, in addition, I have printed during the same period."

for the most part too trivial to be introduced here; but I must say that I have not the materials at hand thoroughly to test these corrections. In page 603 Mr. Pengelly, says "Mr. Howard copies correctly my estimate of ".05 inches in 250 years," the estimate, when he subsequently refers it, is multiplied by ten and appears as 0.5 inch instead of .05 inch (see page 6). [This very obvious error should be corrected, though immaterial to the context.]

Page 605 Mr. Pengelly says that I have thought fit to change his words "Mr. James Farrar" into "James Farrar" and "deposits" into "deposit." Mr. Pengelly refers to the Trans. Devon Ass. vi. 665. These, in the original, I have never seen: and certainly disclaim all want of courtesy to the individual named! Though it might have been desirable to take the quotation from the original, I failed to do so in this and other instances. I am glad, however, to see Mr. Pengelly's admission that "the passage as rendered is essentially correct" (p. 606). As to the next quotation that strikes me (p. 615), Mr. Pengelly remarks "the words he professes to quote are *substantially the same*" (pp. 9 and 10 of my paper).

In p. 616, Mr. Pengelly detects a manifest blunder either mine or the printer's, 500 is put for 5,000. It is evident that my *calculation* is founded on the correct number.

P. 620. Mr. Pengelly corrects 350 flint implements into "upwards of 350." The exact number, he says, was 366. He says that I *suppressed* the first words. But what motive could I have for so doing?

P. 623. "*Inmates*" is misprinted for "*initiated*." This, as Pengelly observes, is "germane to nothing." P. 626. Mr. Pengelly discusses the tangled question of the number of entrances to the Cavern,* and I have no hesitation in receiving from him the corrected account as follows:—

"I conclude, in almost the same words as in 1872, that, at least, the great bulk of the cave earth was washed in through the two long-known, high level, eastern entrances, because there were no other available channels of ingress, and also because its highest level is at these entrances, being nowhere higher than the entrances, and declining rapidly from them in all directions."

All this tells in favour of Rev. McEnery's view, that this torrent of liquid mud was poured in by the waters of the

* Page 622, Mr. Pengelly says: "It is now known, therefore, that the Cavern has seven distinct entrances of which two only are now open."

Deluge rising above the highest of these entrances. I cannot say that I find no difficulty in believing this; but it at all events gives us a *sufficient* explanation, if such a view of the Deluge is admitted.

Mr. Pengelly's hypothesis of the gradual admission of small portions of earth is, I confess, *inexplicable* to me, and *inconceivable* also.

Mr. Pengelly (p. 632) finds me "very troublesome in the matter of quotations;" but why should he bestow so much pains on me as to write pages in correcting the errors in the *early* proof of my paper (which had been sent in order to afford him as much time as possible to prepare any observations thereon) when the People's Edition, *already corrected*, had been sent a few days afterwards, and was, as he says, in his hands? This was surely a work of supererogation!

May I not hope that he sees some promise or potency of good in me after all? for he says (p. 651), "Mr. Howard * admits the genuineness of the 'flint tools,' and the contemporaneity of the men who made them, with the extinct cave mammals, *I ask for no more from him.*"

This, then, I would hope is *the end of the lesson*, for all that I have omitted may be read in the report above alluded to, to which I direct my readers.

My conclusion is, that the calculations supposed to be founded on scientific facts, observed in the Caves of Devon, in favour of the vast antiquity of the human species are entirely illusory; and that, instead of refuting my paper, Mr. Pengelly has assisted my argument in several ways. I am satisfied that his theory is equally deceptive in other respects besides that part of it which concerns the stalagmite; but I rest here!

I find in Dr. Geikie's Prehistoric Europe (p. 83) the following passage, which, considering the strong *penchant* displayed by the writer for the long chronology of man's residence on the earth, is certainly remarkable.

"Thus, it is evident that the present scale of stalagmitic accretion in Kent's Caverns cannot be safely relied upon as a standpoint by which to judge of the time required for the formation of the old pavements underneath which the pleistocene cave-earths lie buried. The question of age, as we see, is not so easily settled, for we have to take into account the effect produced by previous climatic conditions; and, as we

* This I admitted *without examination* on the authority of Mr. Pengelly and his friends.

can form only a more or less uncertain estimate of these effects, it is impossible that our conclusions can be other than vaguely approximative. Even on the most extravagant assumption, however, as to the former rate of stalagmitic accretion, we shall be compelled to admit a period of many thousands of years for the formation of the stalagmitic pavements in Kent's Cavern."

In the previous pages (81-83) Dr. Geikie reduces the estimate of 240,000 years for the upper layer of stalagmite, and 576,000 years for the underlying layer (arising from "the rate at which the large boss in question has accreted") as "excessive" to 60,000 for the upper stalagmite, "and the lower bed 144,000 respectively for their growth." "In other parts of the cave, however, we have evidence to show that the stalagmite has accreted at a more rapid rate," but "we should still have a period of 20,000 years for the formation of the upper, and of 48,000 years for the lower. But on the supposition that, owing to an excessive rainfall, the stalagmites formerly increased four times more rapidly than they do now, the first period would be reduced to 5,000 years, and that of the lower stalagmite to 20,000 years." (!)

The "scientific fact," then, is reduced to the *probability* of "many thousand" years for the formation of the above pavements—which nobody can deny!

The CHAIRMAN.—It is now my pleasing duty, on behalf of the meeting, to convey our thanks to Mr. Howard for his paper, and to invite discussion thereon.

Mr. T. K. CALLARD, F.G.S.—I have on two occasions very carefully examined Kent's Cavern, and after having done so, and having also heard Mr. Howard's former paper, I wondered what Mr. Pengelly would say in reply to that paper. And I wondered still more when I read the reply, for it scarcely referred to Mr. Howard's arguments. I certainly think it was unbecoming in a scientist to deal with a paper like that of Mr. Howard's as Mr. Pengelly has done. There could hardly be stronger evidence that he had nothing important to say in reply to Mr. Howard than that he felt it necessary to spend so many pages over the correction of such errors as "350 implements," for "upwards of 350," and which Mr. Pengelly tells us really was 366. If Mr. Pengelly thought it so important that the exact number of 366 should be given, why did he not himself give it as 366, and why did he himself say "upwards of 350"? It appeared to me to be mere trifling. Had Mr. Howard raised the question whether these things were implements or not, Mr. Pengelly should have met it; or if Mr. Howard had said there were no implements there at all, that would have affected the question; but whether the number was 350 or 450 did not matter a straw—

it had nothing to do with the argument ; and whether Mr. Howard calls a man "James Farrar," or Farrar, leaving out the "Mr.," in no way affects the question, and was not worthy of remark in a scientific paper. It certainly has struck me that if Mr. Howard, instead of writing another paper, had simply brought that of Mr. Pengelly here, and read it, we should have arrived at the conclusion that if that were all Mr. Pengelly had to say, Mr. Howard's former paper must have been one of considerable weight. (Hear.)

Mr. D. HOWARD, F.C.S.—I am glad that this question has again been brought before the Institute, because I think the admissions made by Mr. Pengelly are important to the issue. Surely the whole ground of the argument based on Kent's Cavern is this,—that there was a floor of stalagmite which was formed at a certain infinitesimal rate, and that, therefore, any human bones or implements, or the bones of any animals contemporaneous with those of human beings, found under that stalagmite, must put back the age of man for so many thousands of years. I confess it is a little bewildering to find that a supposed accurate estimate will bear dividing by ten without any serious interference with the result, as appears to be the case here. When we are told that the period may have comprised 250,000 years, or that it may have been only 25,000, one is apt to leave out one or more of the zeros that still remain, if one should be so inclined. I am certainly of opinion that scientific accuracy fails in this case. But of far more importance appears to be the question that now seems to be conceded, namely, that the so-called stalagmite floor is not a stalagmite floor at all. If this were a question of the construction of a wall of a certain thickness and height, and if the calculations as to how many bricks it contained, and the time it took to build, were made entirely on the basis that it was formed of bricks joined with cement, would not the result be very naturally affected if it were shown that the wall had been run up with thin outer lines of bricks and cement, and the intervals filled in with cartloads of concrete ? It appears to me that the stalagmite is in a similar position. There are shown to be traces of stalagmite, the age of which is very uncertain ; but the bulk of the floor is simply composed of *magma*. Under these circumstances, the argument seems to me to have failed, because the major and the minor premises having given way, the calculation naturally goes with them, and any argument in favour of excessive antiquity that might have been deduced from a stalagmite floor falls to the ground with the admission that the floor is not stalagmite, but *magma*. (Hear, hear.)

Captain F. PETRIE (*hon. sec.*).—I think that there is one part of the controversy which has taken place upon this subject that requires a little explanation. Early in 1879, when Mr. Howard read his first paper "On the Caves of South Devon" before this Institute, Mr. Pengelly was invited to be present, and with that invitation was forwarded an early and uncorrected printer's proof of Mr. Howard's paper. It was sent thus early, although uncorrected, in order that Mr. Pengelly might have time before the meeting to prepare any remarks that he might wish to make. His brief letter acknow-

ledging the invitation appears in the thirteenth volume of our *Journal*, published at the end of 1879. He was subsequently offered several weeks in which to write any comments he might desire to send for insertion in the *Journal*; but he stated that he would take another opportunity of replying. About four weeks after this a copy of the *People's Edition*, fully corrected, was placed in his hands, and he was informed that any printer's or other errors in the original proof sent to him, had been expunged from this issue. However, Mr. Pengelly, I think erroneously, preferred, in criticising Mr. Howard's paper fourteen months afterwards, to base his criticism on the early printer's proof, instead of the *People's Edition*. I may here mention that, when Mr. Pengelly expressed his intention of taking another opportunity of replying to the paper, I wrote to him as follows:—"I hope I may be permitted to see your reply when it is published, and if it be read at a meeting I hope for permission to be present." To this he replied three days afterwards:—"Your letter of the 30th of March [1879] is to hand. I shall have great pleasure in complying with your request relative to any reply to Mr. Howard's paper that I may read or publish."—Towards the end of November, 1880, I received a letter from a friend calling my attention to the fact that Mr. Howard had been taken to task by Mr. Pengelly in the "*Journal of the Devonshire Association for the Advancement of Science*," of which my friend (a Vice-President of that Association) sent me his own copy, and on looking into it I found that it contained Mr. Pengelly's "reply," which he had read at a meeting held during the summer of 1880, and by unfortunately forgetting to carry out his promise as to sending an invitation to the meeting in question (a proof copy of his paper would have been welcome), he had deprived Mr. Howard of that opportunity of replying in the journal of which he, Mr. Pengelly, is Editor, which we on our part had been so ready and anxious to accord to him in the *Journal of this Institute*. I venture to say what I have because I conceive that the whole of the *Victoria Institute's* proceedings in this matter exemplify the open and impartial way in which we conduct our discussions. There is one point in Mr. Howard's paper to which I would refer. Mr. Whitley has written in regard to what Mr. Howard says about the flint tools, and has sent these two specimens of flint implements [producing them]. One is termed "a neolithic arrow-head" and the other "a palæolithic implement." Mr. Whitley regards the first as having been chipped artificially, the last naturally. I should not, perhaps, have alluded to this, but for the fact that we have a visitor in this room who has been in South America, and has seen the savages forming their arrow-heads.

The CHAIRMAN.—If he would kindly oblige the meeting by offering a few remarks I am sure we shall all be pleased to hear him. (Hear.)

Mr. F. R. MACKENZIE.—I have been called on very unexpectedly; but shall be happy to relate a fact of which I was once witness. A good many years ago I happened to be in the Straits of Magellan for a period of seven or eight months, and during that time I saw a good deal of the Fuegian savages, a race of beings whom I should be inclined to put very low in

the scale of humanity, from what I observed amongst them. I was very much struck with one of the weapons which I saw in the possession of a native ; these people use bows and arrows, and the arrow-heads are shaped something like the one just produced, except that they have a longer stem for fitting into the shaft. [The stem of the arrow-head produced had been broken.] This [drawing a small arrow-head about the size of the section of a walnut shell] is the exact shape of the arrow-heads I saw, and these heads are inserted into a reed or stick, and then bound with a piece of sinew to complete the arrow. I never saw one so large as the specimen on the table. I was, on one occasion, very much astonished at finding in a man's sheath,—in which he was carrying half a dozen arrows,—one of the arrow-heads made of glass. I consequently got a broken bottle and took it to him. It was of the same sort of glass as that of which the arrow-head was made, not the dark description, but the light green, of which so many bottles are manufactured. I made the man understand by signs that I wanted to have some of the arrow-heads made. To my astonishment, after breaking the bottle into a number of pieces, he took a piece of glass that was nearest to the size he wanted, and having chipped it a little nearer to the right size with a stone, he began to bite it with his teeth, in order to form it into shape, after which he handed it to one of the women who were on board with the party, to be finished. He did the best part of the work himself, but it was finished off by a woman, and the entire arrow-head was thus bitten into shape while I was looking on. That savage had only one arrow-head of glass ; the others were of flint, and there is no doubt in my mind that they were made in the same manner. I brought some of those specimens home, and gave them to a gentleman who was greatly interested in such things, and whom, probably, some of those around me may recollect, though he has been dead for some years. His name was Saul, and he had a sort of museum of curious things. Among the bows and arrows I gave him was the particular arrow-head which I have mentioned as having seen made, and I have every reason to believe it may yet be found in his museum, if it still exists. Perhaps I should add that Mr. Saul was a wine-merchant, and had a place of business in Aldersgate-street, a good many years ago.

Rev. F. C. Cook, D.D.—It may not be a matter of much importance, but from my knowledge of the locality of Kent's Cavern, it has occurred to me to mention that any number of flints may be found on Hoxne Hill, which is within sight of the cavern. There are large beds there, where great numbers of shattered flints are to be found, from which one may pick out any number curiously edged and shaped by natural action. People wishing to make flint weapons could get flints at that spot already half made.

Mr. J. E. HOWARD, F.R.S.—I have nothing to reply to, and need therefore only thank you for your patient attention.

This discussion then terminated,

. Since the foregoing paper was read I have received "a sample of deposit from clear running water," as likely to be of interest in reference to cave deposits. "It was formed in eight weeks to a thickness of one inch and a half; the water flowing behind an iron casing in a pit-shaft passed through a large quantity of lime, but flowed a perfectly clear water to the pump at the bottom. The deposit was formed uniformly over the surface of a four-inch pipe, reducing its diameter in eight weeks to less than one inch; but it has crystallised and grown in lines like the section of a tree, just as if it had taken a few thousand years to do it. No doubt a very few more weeks would have exhausted the supply of lime placed in the shaft or behind the casing, and it would have taken a great many thousand years to add as much again to the deposit in question."

A section of this deposit, from Hampton Colliery, near Wednesbury, I shall have the pleasure of depositing in the library of the Institute. It illustrates in a remarkable manner the formation of the "*old floor of crystalline stalagmite*" (see page 10, *ante*).

The following paper was then read by Mr. T. K. CALLARD, F.G.S. :—

*IMPLEMENTS OF THE STONE AGE A PRIMITIVE
DEMARCATIION BETWEEN MAN AND OTHER
ANIMALS.* BY JOSEPH P. THOMPSON, D.D. LL.D.*

WHEREVER on the face of the globe there is found an implement of any sort, we say, at once, Man has been here. It may be that, as in the caves in the Dordogne, there are rude sketches of art to associate the flint and bone implements with the handiwork of man; or, as in the lake findings in Switzerland, there may be traces of human habitations to identify the stone utensils with the building of the pile-dwellings; or, as in the shell-mounds (Kjokkenmøddings) of Denmark, a ruined hearth-stone and the bones of birds and animals of

* The late.

the chase, skilfully opened for their marrow, may point to man as the maker and user of the implements found in these heaps of refuse; and it may even happen that sometimes in the same place of deposit with the primitive implements of stone is found an indubitable relic of man himself, in a small fragment of the human skeleton. Yet in all these cases the implement itself, apart from its accessories, is an argument for the presence of man. The implement certifies the man as really as the man certifies the implement. This no one would think of disputing; but I give emphasis to the unanimity of science on this point, because of its bearing upon the primitive *differentia* of man as a species. We say, If man was indeed contemporary with these wild denizens of the caves, then these are the weapons with which he slew them, the implements with which he prepared them for his food; and the finding of the implements imbedded with the animal remains is evidence that man was contemporary with such animals.

If we go back to the river-drift gravels, as, for instance, in the valley of the Somme, where we have no trace of human habitations or other works, and perhaps no authentic specimen of a human bone, but simply compare one stone with another, we say, again: Man was here at the remote period of this formation; for these flints are shapen, adapted to a use, and are no longer stones, but implements. We may raise the question whether the findings are genuine or forgeries, whether "the flint implements are of the same age as the beds in which they are found," or have come there by accident, or have sifted down from some later deposit; but if they are genuine, and of the same age with the drift, we hold them for conclusive proof that man was there in that age.

But in making this decision, do we not unconsciously impose upon ourselves with the tacit presumption that only man is capable of making and using an implement? Science cannot admit a presumption, except as a tentative hypothesis; she must rest all her conclusions on the known basis of fact. But that only man is capable of making an implement is a fact of observation and experience, and not merely a presumption *à priori* from something in the nature of man. Such a presumption is, indeed, valid as against physical nature. Wherever we perceive adaptation to an end we do immediately ascribe such adaptation, or the thing so adapted, to an intelligent purpose. Whether this reference of adaptation to intelligence is intuitive, or the result of cumulative experience, this is not the place to argue. Suffice it to say,

that wherever adaptation is found, the conviction of the human mind is immediate, universal, and absolute, that there was enough of foresight and skill to produce that adaptation. But we never ascribe such foresight and skill, such intelligent purpose, to physical nature. Nature furnishes the stone and the iron; but nature does not make the hammer, the knife, the axe, the spear. Nature abounds in materials of which man can build himself a house; but beyond the cave in the earth and the leafy covert in the wood, she provides nothing for his habitation. The crude material lies in the lap of nature; but the shaping of this material to any use or end requires a degree of intelligent purpose of which we do not find in inorganic nature any trace or suggestion. Hence as against inorganic nature, the presumption does hold *à priori*, that man, as a creature of intelligence, is alone capable of making an implement, of transforming inorganic matter into a tool for use.

But this presumption from the nature of man does not hold as against other animals. For, though intelligence must be presupposed wherever we perceive adaptation, yet whether other animals than man possess the kind or degree of intelligence requisite to fashioning an implement for a specific purpose, is a question of fact that only observation can determine; and observation has decided this in the negative. There is no instance on record of any animal making an implement for a special use or end. There are animals and birds that use the materials of physical nature with much ingenuity and skill in building their houses and nests. It is enough to instance the intelligence of the beaver in adapting stone, wood, earth, and water to his wants, and in surmounting the obstacles to his task in some less favourable site. There are tribes of *Simiæ* that use stones and sticks for cracking nuts or as weapons of defence. But all this is far removed from the making of implements for a purposed use. The beaver chooses his stones and breaks or twists his sticks; but he never shapes a stone with which to cut and shape a stick. The chimpanzee takes a stone to crack a nut; but he takes it up a stone, and lays it down again a stone; he never shapes it to a hammer, fits it with a handle, to be reserved for this special use. The baboon throws a stone to wound or frighten his enemy. He never shapes the stone to a spear-head or a battle-axe, to be kept by him for the service of war. No animal goes beyond using the crude material that nature furnishes. He may use this skilfully and well, adapting it to his own necessities; but he does not improve upon nature, does not change the form of

her crude material, making of this an instrument for higher ends; does not make an implement in the sense which we attach to that word in the hands of man. Hence the implement is a line of demarcation between man and other animals. This fact, again, is well-nigh universally accepted by differing schools of scientists; though Mr. Darwin gives it but a qualified assent,* and Sir John Lubbock suggests that tool-making was at first a matter of accident.

But though the use of implements is acknowledged to be a line of demarcation between man and all contemporary animals, it is argued that existing species of *Simiæ* have reached the limit of their development, but, there were prehistoric species which by natural selection attained higher and yet higher stages of progress, until the first type of man emerged, when the antropoidal progenitor gradually became extinct. Hence it is said to be unfair to make the use of implements a demarcation between man and pre-existent animals, or a characteristic of his standing in the scale of being.

To this objection there are two replies. First, in the present state of scientific knowledge, there is no tangible evidence of the existence of any such higher kind of apes. The links between the highest known species and man must have been many and long; but no trace of these has yet been found. True, this is a merely negative reply. But the existence of such species of apes is a pure *assumption* based upon analogy. Now the want of *data*—that is to say, negative evidence—is logically valid against an assumption. Since then, the links of connexion are wanting, this antropoidal pedigree of man must be held in suspense as only a hypothesis. Darwin presents it with his accustomed modesty.† But Hæckel goes so far as to say, “we must necessarily come to the conclusion that *the human race is a small branch of the group of Catarrhini, and has developed out of long since extinct apes, of this group in the Old World.*”‡

Now there is danger that an unproved inference put forth with such authority shall be prematurely accepted as the verdict of science. But though we would concede much licence to hypothesis, yet in the name of science as well as of logic, we must protest against putting assumptions in the

* *Descent of Man*, vol. i. p. 49.

† *Ibid.*, vol. ii. chap. xxvi.

‡ *The History of Creation*, vol. iii. chap. xxii. (The italics are his own.)

same category with facts, and drawing authoritative conclusions from hypotheses as if these were facts established before our eyes. Until, therefore, some trace is found of a tool-handling ape, we are warranted by all known facts in adhering to the use of implements as a primitive demarcation between man and other animals.

My second answer to the objection is, that it proves too much for the objector himself. The whole argument for the derivation of man from a lower form of animal is drawn from the correspondences between man and the inferior animals as we see those animals to-day. This correspondence is traced by Darwin in almost every particular,—intellectual, emotional, and even moral. Huxley says, “No absolute structural line of demarcation, wider than that between the animals which immediately succeed us in the scale, can be drawn between the animal world and ourselves; and I may add the expression of my belief that the attempt to draw a psychical distinction is equally futile, and that even the highest faculties of feeling and of intellect begin to germinate in lower forms of life.”*

It is the homology of man with the animal world *as it is*, and the manifold correspondences of known species of animals with man, as well as the general analogy of nature, that lead to the theory that man is derived from some lower animal progenitor. Well, we go back to the Stone Age, and there find man differentiated from animals in a most pronounced manner. The implements are evidence that man was there; but directly we come upon this demarcation we are told not to compare man *in this particular* with existing animals which he resembles in so many other particulars, but to presuppose extinct species of a higher grade that paved the way from the stone to the tool! To use a homely adage, “One cannot burn the same powder twice over”; and one cannot use the same facts to establish both the positive and the negative side of his argument. Mr. Wallace has set forth the lessons of the Stone Age with rare felicity. Having described the long processes of development in nature, he says, “At length there came into existence a being in whom that subtle force we term *mind* became of greater importance than his mere bodily structure. Though with a naked and unprotected body, *this* gave him clothing against the varying inclemencies of the seasons. Though unable to

* *Man's Place in Nature.*

compete with the deer in swiftness or with the wild bull in strength, *this* gave him weapons with which to capture or overcome both. Though less capable than most other animals of living on the herbs and the fruits that unaided nature supplies, this wonderful faculty taught him to govern and direct nature to his own benefit, and make her produce food for him when and where he pleased. From the moment when the first skin was used as a covering, when the first rude spear was formed to assist in the chase, the first seed sown or shoot planted, a grand revolution was effected in nature, a revolution which in all the previous ages of the earth's history had had no parallel; for a being had arisen who was no longer necessarily subject to change with the changing universe,—a being who was in some degree superior to nature, inasmuch as he knew how to regulate and control her action, and could keep himself in harmony with her, not by a change in body, but by an advance of mind.”* This we see already in the Stone Age. But whence came this capacity in man, or whence came man having this capacity?

It has been suggested that man came by accident to the use of implements; that the savage, beginning like the monkey with using a round stone for cracking nuts, accidentally discovered that he could crack other stones also, and sharpen these for cutting; and, moreover, by thus eliciting sparks he made the accidental discovery of fire.† Now all this may have been; but it is an unscientific method to take our present knowledge of implements and their uses and prescribe from this the way in which the primitive man must have invented his tools. It is, to say the least, a curious accident that no such accident as is here imagined for the savage ever happened to the monkey; that it never occurred to *him* to crack a stone and shape it into a knife, or to gather sparks for kindling a fire. And it is still more curious—indeed unaccountable upon the theory of a kindred intelligence—that no monkey, baboon, or chimpanzee has profited by the example of man in learning to make implements of the crude native materials about him. Different tribes of savages, it is believed, have separately stumbled upon these inventions; but in all the ages since the Stone

* *Anthropological Review*, May, 1864, p. clxvii.; also reprinted in *Natural Selection*, p. 325.

† Sir John Lubbock's *Pre-historic Times*, chap. xiv.

Age, no tribe of *Simiae* has either stumbled upon such inventions or copied them from man. The most savage tribes learn from civilized man to improve their weapons of warfare; sometimes copy with deadly effect the weapons and tactics of their superiors; but no tribe of *Simiae* has yet learned to make the simple weapons of stone that even the rudest savage manufactures for himself. All experience teaches us that man is the only animal capable of fashioning an implement for a specific purpose; and hence the implements of the Stone Age are a primitive demarcation between man and other animals.

This fact has no necessary bearing upon the question of man's derivation as to his bodily frame; but it does mark very distinctly a point of departure in the crude pre-historic data of our race. The Stone Age is, after all, an age of human capacity, discovery, invention, and also of prophecy, and we need not be ashamed of our connexion with it. Admitting that the first suggestion of a knife, the first hint of fire, came of the accidental striking of two flints together; in the same sense it may be said that the invention of the steam-engine was accidental, being suggested by the vapour lifting the lid of a tea-kettle; and if we may accept the legends about Newton and Galileo, the discovery of gravitation was due to the accident of a falling apple; the suggestion of the heavenly motions, to the accidental swinging of a chandelier. In every case there was something in the man for the accident to work upon; the accidental sharpening of the stone sharpened his capacity into a purpose for adapting inorganic nature to his use; the first spark struck from the flint elicited a spark from his consciousness that kindled to a flame of invention. What we see in the Stone Age is man asserting his supremacy over nature by taking into his own hands her raw materials and shaping these to his higher uses. The first attempts are crude enough, and the progress to polished and ornamental implements, and to works in metal, is toilsome and slow. But the germ of great possibilities is there; the science of architecture is there; the science of engineering is there; the science of husbandry is there; all arts, manufactures, inventions are potentially there; for in building the cathedral, the fort, the viaduct, in forging Krupp's cannon and the armour of the Thunderer, man is but carrying to higher and yet higher perfection that which he began to do when he first formed the rough materials about him into tools and weapons for his own use. He then began the mastery of nature through his adaptive intelligence and his purposing will. All that he has yet accom-

plished in subordinating and adapting nature to his ends has been through the development of the faculty that first taught him to shape an implement out of a stone. That line of demarcation separates man on the one side from physical nature by all that is possible in invention, and on the other side separates him from other animals by all that is actual in achievements over nature.

Hence the prominence given by science to the Stone Age involves no controversy with the philosophy of man. That age is not derogatory to man as philosophy would present him in his intellectual and moral attributes. The surveying, measuring, choosing, purposing, conquering intelligence is already there, discriminating him from the brute not only quantitatively, but qualitatively also. The old arguments of philosophy for the exaltation of man are indeed brought in question by modern science. Consciousness, language, reason, reflection, memory, imagination, the domestic affections, the emotions, and even the moral feelings,—all these, once assumed to be distinguishing prerogatives of the human species, are now claimed in some degree for different animals. I shall not trespass here on this debatable ground. Science has first of all to do with facts, without regard to their bearing upon theories of philosophy and ethics. But it is science that offers us the Stone Age as an incontestable witness for man. And surely, the germs of the spiritual and the ethical are given in an intelligence that first addressed itself to the mastery of rude nature for human ends. The conquest of thought over matter began in the making of implements; and the first rude scratches to record memory, feeling, or fancy foreshadowed that supreme implement of thought by which man gives permanence to knowledge by the written page, records the phenomena of nature and the discoveries of science, and transmits to other ages the history of the race.

The CHAIRMAN.—I am sure that the meeting will allow me to return thanks to Mr. Callard for the manner in which he has read this short but interesting paper, written by one of our members who has now gone to his rest.

Mr. D. HOWARD, F.C.S.—I think we must all agree that the paper is a very interesting one, inasmuch as it calls attention to what is the weak point in the doctrine of evolution, which requires the continuous natural evolution of species linked altogether but with no gaps, because in this theory a single gap is fatal. It is of no use to tell us that there

is a high road from London to Dover, and at the end of the Admiralty Pier at Dover it is continued to Rome. No doubt, the Admiralty Pier shows an intention of getting to France; but the road ceases there, and we must look for some other means of getting to the Continent. So it is with regard to what we see in nature, where we find everywhere evidence of chains, and then gaps. These things undoubtedly point to unity of purpose, but not to unity of origin. Therefore, I think that a paper like this is valuable, because it points out one of these gaps, which it certainly lies with the propounders of the evolution-theory to get over. It is not sufficient to say there is such an immense difference between the lowest savage who makes a rude flint tool and the forger of a modern cannon. This, I repeat, is not enough. You must show how to get over the gap between the animal, however intelligent, that has not made nor used a tool, and the man, however unintelligent, who has. There are plenty of things which equally mark material physiological differences. Supposing the doctrine of development to be true, there are these curious questions:—How is it conceivable that a simple circulation of the blood becomes more and more complex? How, where you have a given and simple form of heart, is it developed into the fourfold heart of the upper and superior animals? It is almost impossible to conceive how one can become two, two become three, and three become four. This illustration may serve to bring out more forcibly the question as to how a non-toolmaking animal can become a tool-making animal. There is no sign or trace of any such thing having ever happened. It may be true, as Professor Huxley has said, that “no absolute structural line of demarcation, wider than that between the animals which immediately succeed us in the scale, can be drawn between the animal world and ourselves.” This may be perfectly true, but then the word “wider” covers a somewhat wide gap. For example, there are the wide gaps that exist between the lower animals—gaps almost as great as that which we find between the ape and the man. I do not say quite so great, but certainly quite as awkward to get over. Therefore, there is a hidden depth of meaning in that one word “wider,” to which I would call the attention of those who are prepared to accept the doctrine of evolution. I am not prepared to say that evolution is not conceivable; but I do say that there is no known process of nature which can carry out the whole process from beginning to end. And even if we could conceive evolution, we should still require to know how to get over these gaps. If there has been evolution, which I am not prepared to assert or to deny, it requires a distinctively creative act to bridge over these gaps,—a creative gap as distinct as a fresh creation of new animals. It is these gaps, the existence of which are so studiously ignored by those who are popularising the doctrine of evolution, that ought always to be kept fully in mind by those who really wish to arrive at any sound and scientific conclusion upon this matter. (Hear.)

Mr. T. K. CALLARD, F.G.S.—About the middle of the paper, reference is made to the progress of the anthropoid ape until he reached that stage in

which the first type of man emerged, and the anthropoid progenitor gradually became extinct. The only man I know who has ever suggested that the anthropoid ape made implements is Professor Gaudry, a French geologist, who says that it is probable. He says the anthropoid apes must have made the implements, if they were made at all in the Miocene period, for he believes that man did not exist in that period. The idea that these anthropoid apes lived on to be the progenitors of man, and then gradually became extinct, must be a fiction; because these apes passed away in the Miocene period, and man did not appear till long afterwards. As I remarked some time ago, in this room, if the anthropoid apes reached such a stage of progress as has been asserted, they ought not to have died out, but should have lived on, on the principle of the "survival of the fittest." I think the author of the paper deals ably with this error. I agree with what he has stated, that when any implements were made, man made them, and not a monkey. The author has said:—"The chimpanzee takes a stone to crack a nut; but he takes it up a stone and lays it down again a stone; he never shapes it to a hammer, nor fits it with a handle to be reserved for this special use." I have an implement with me, and wherever such an implement is found there ought to be no question whether it is the work of man. This [producing an implement] came from the Swiss Lake Dwellings. The stone is polished and fitted to a handle. Professor Gaudry would not suppose for a moment that any ape could have made it. The author of the paper has said,—“If we go back to the river drift gravels, as, for instance, in the Valley of the Somme, where we have no trace of human habitations or other works, and perhaps no authentic specimen of a human bone, but simply compare one stone with another, we say again, man was here at the remote period of this formation; for these flints are shapen, adapted to a use, and are no longer stones, but implements.” I am not quite so sure of this. I am sure that the ape did not make them, but I do not, therefore, arrive at the conclusion that man did. If I see an implement such as has been described here to-night, I am quite prepared to believe that it was made by man, or that man made this [holding up a flint arrow-head], because here is a tang. But when I come to this [holding up another flint which had been sent by Mr. Whitley as being called a palæolithic implement], I see that there is no fitting into a handle here, and that such a thing was never intended. I have brought two specimens, one from St. Acheul, in the Somme Valley, and another from Moulin Quignon, where M. Boucher de Perthes first found flint implements. I will not say, with the writer of this paper, "man was here." I can understand that their appearance of having been worked into form may induce a person to pause before arriving at the conclusion that these things are not the work of man. Here is a photograph of one of the implements [pointing to it], and here, beside it, is the representation of another flint nearly of the same form, which was evidently not fashioned by man, for it has never yet been released from its matrix of silicious sandstone. In the second photograph another accepted implement is compared with a similar form

still in its matrix. The fact that in these cases the forms are so similar ought, I think, to lead us to doubt whether we should say unhesitatingly, when we see these specimens, that they are human work. In this, a third photograph, Professor Hughes takes No. 1 to be an unquestionable implement, No. 2 he rejects, and he is doubtful about No. 3. I think that they are too much alike for any one to be able to speak very positively as to one being an implement and the other merely a fractured flint. Then there are other little difficulties that will arise, and which we are bound to look at. The writer of this paper has said, "We may raise the question whether the findings are genuine or forgeries." I have brought a forgery, if that be the proper term for it. This [producing it] was not made by palæolithic man. It came from the Somme Valley, and I do not think it is ten years old. It was made by one of the workmen, and will not aid us at all in solving the question of the antiquity of man. The man from whom I obtained it did not try to impose on me; he said that it was made by one of his fellow-workmen. I asked, "How did he make it?" and the man replied, "He used an iron punch and a hammer." I said to him, "But, you know palæolithic man had neither iron punch nor hammer." "No," said the man; "I suppose he had not." "Then how," said I, "do you suppose palæolithic man made his implements?" "Well," replied the man, "he must have cut them out with a stone." I asked him to show me how, and he at once got a stone, with which he struck off three or four chips on this side and three or four on that, and after this had been done, it certainly did look a little more like human workmanship than it had done before. When he had done this, the stone went back into the basket among the other implements, and if any one had gone there a fortnight afterwards, he might have picked up that very flint and said, "It really does look as if there had been some human workmanship here," and he would have been right; but it was not the work of palæolithic man. We have had a great many of the forgeries of the notorious "Flint Jack"; in the Salisbury Museum there are a number of them; I do not mean to say that all that have the appearance of being artificial are forgeries: all I want to impress upon the meeting is that a considerable amount of caution is required in dealing with these specimens,—it must be borne in mind that geologists have rarely found them *in situ*. I have only taken two or three from the gravels, the rest I have received from workmen; and if a workman perceives the importance of one of these things being a little sharper than it is when he finds it, and knocks a little off the edge and puts it back again into the basket as in the case I have referred to, the person who comes afterwards must be careful he is not guided simply by the form of the flint, and its chipping. We must also bear in mind that there is no collateral evidence going with those flints, as is the case with the implements found in the Swiss Lake dwellings, where wheat has been found, with them, and many other things are brought from the lake to strengthen the supposition that these implements were the work of man. There is nothing of this kind found associated with the Somme flints. I would advise caution.

If the doctrine of the antiquity of man is to rest on these implements, I do not think the evidence is sufficient. You may observe in this natural stone that there is an approach to a tang, and if you were left to choose which of the two was the artificial stone, you might be inclined to choose the natural one. (Applause.)

Mr. L. T. DIBDIN.—I am afraid that Mr. Callard has demoralised us upon the subject of flint implements. There is one point mentioned on the last page but one of the paper which I wish had been enlarged upon, and that is where, in speaking about the difference between man and the lower animals, and showing that, whereas man makes tools animals do not, the author has drawn attention to the very important point, that not only do animals not make tools of their own accord, but there is no evidence of monkeys ever having imitated man in making even the rudest implements. I regard this point as one of importance, because we all know that monkeys are very imitative animals, and even admitting fundamental distinction between the instinct of animals and reason, we might still have expected that if they could not imitate the manufacture of tools, they could, at any rate, with man's example before them, imitate the making of those tools.

Mr. R. W. DIBDIN.—In the second page of the paper it is stated,—“Yet, in all these cases, the implement itself, apart from its accessories, is an argument for the presence of man.” If that is so, surely it shows the extreme importance of the line of study which several of our members, and more especially Mr. Callard, have taken in sifting the evidence as to whether the stones found are really implements that have been made by man, or whether they are not accidentally fractured, or forgeries, or are the product of modern times, and not of the extreme antiquity of which some of their advocates and possible inventors claim for them. I think we cannot be sufficiently grateful to those of our members who have so thoroughly searched into this subject, and prevented our being carried away by what at first may seem very plausible arguments in favour of the antiquity of certain flint implements, and necessarily also for the extreme antiquity of man.

The meeting was then adjourned.

ORDINARY MEETING, MARCH 21, 1881.

H. CADMAN JONES, ESQ., IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced :—

ASSOCIATES :—Colonel H. Hume, C.B., London ; Rev. T. Robinson, D.D., Morpeth.

Also the presentation of the following Works for the Library :—

“Glacial Moraines.” By J. F. Frisbie, M.D. *From the same.*
“The Cliff Dwellers of Ancient America.” Professor J. K. Richardson. *Ditto.*

The following paper was then read by the Author :—

METEOROLOGY: RAINFALL. By JOHN FREDERICK BATEMAN, Esq., F.R.S. L.&E.

METEOROLOGY is a subject in which every dweller in Great Britain must feel an interest, and though it will probably never be subject to such laws as will make it an exact science, yet a great deal of valuable information has been collected by patient observers which is useful to many classes of the community. All are interested in the crops of the land and the fruits of the garden, the productions of which greatly depend on rain, cold, heat, and sunshine.

Without rain our rivers would become dry beds, and our springs would be exhausted. Those only who have lived in rainless countries know the privations that are suffered, and

the annoyances that are felt, by reason of the absence of rain.

It is not uncommon to hear the climate of this country inveighed against as if it were one of the worst upon earth; but I will venture to say that, notwithstanding all its drawbacks, there is none which admits of so many days in the year in which out-door exercise or enjoyment can be indulged in. Surrounded by water as our islands are, the cold is seldom excessive, or of very long continuance, nor are the heats of summer so over-powering as they are in many parts of the world.

The sea not only supplies us with perpetual moisture, but moderates all extremes of temperature.

The position of our country in the temperate zone and surrounded by water is not the least of the blessings which God has showered upon this favoured land. We do not suffer from the heats of the tropics, nor the cold of the Arctic regions.

The south-westerly winds, which are the prevalent winds during a large portion of the year, come to our shores charged with the moisture they have acquired in their passage across a broad stretch of ocean. Impinging against the mountain sides which they meet with on the south and west coasts of Ireland and of England, they part with their watery contents in copious showers. For the hills are huge natural condensers. The air at the level of the sea is charged with aqueous vapour, which is kept in a state of suspension by the warmth of the atmosphere. On meeting with high land, it is compelled to rise into colder strata, condensation takes place, and rain is the result. Thus the verdant green of our country is maintained, and our springs and rivers are kept supplied with water. Throughout the Holy Scriptures there are constant references to the blessings of water, and the horrors attendant upon a thirsty and dry land where no water is.

The want, or the deficiency of rain, produces the arid deserts of many parts of the world, and districts which in former times abounded in fertility are now destitute of vegetation and deserted by the inhabitants.

These districts were principally maintained in fertility by artificial means, and to obviate the evils which accompanied want of moisture much has been done, both in former and modern times, by irrigation. The remains of tanks for storing flood waters are evidences of the value which in former days was attached to an abundant supply of water for fertilising the soil. Egypt has been created by the judicious application of the periodical overflowings of the river Nile.

In that very interesting work on Ceylon, by the late Sir Emerson Tennent, are accounts of the stupendous works which were constructed in that island by former kings and chiefs, for the purpose of irrigating that country.

Similar tanks, and for the same purpose, were constructed in various parts of India, and in the present day, under the benign government of this country, irrigation canals are constructed with a view to producing food for the inhabitants of districts liable, in consequence of the want of water, to frequent famine and to great consequent misery. The rain which falls in India is confined to a few months in the year, during which period several hundred inches are frequently registered. The remainder of the year is almost rainless, and it is especially at such periods that the inhabitants suffer. We, in this country, can scarcely comprehend the calamity of 25 inches of rain falling in forty hours, which is stated to have been the case at the recent accident and land-slip at Naina Tal.

We have no such fluctuations in our more favoured country. The rain, though not equally distributed, is generally sufficient for all our wants, and enables us to produce most of the fruits of the earth in moderate abundance.

In Sir Emerson Tennent's work on Ceylon, he states (page 27, vol. ii.) that in the north of that island, where the influence of the monsoon is felt with unequal force and regularity, the uncertainty of rain has been counteracted by prodigious artificial works for irrigation. Many of the tanks constructed for this purpose, though partially in ruins, cover an area of from ten to fifteen miles in circumference.

Kings and petty princes attested the interest they felt in the promotion of agriculture by giving personal attention to the formation of tanks and to the labours of cultivation.

On page 422, vol. i., he states:—"The labour necessary to construct one of these gigantic works for irrigation is in itself an evidence of local density of population; but their multiplication by successive kings, and the constantly-recurring record of district after district brought under cultivation in each successive reign, demonstrate the steady increase of inhabitants and the multitude of husbandmen whose combined and sustained toil was indispensable to keep these prodigious structures in productive activity."

On page 423 he states:—"Cultivation was almost entirely dependent on the store of water preserved in each village tank."

He further writes as follows:—

"The desolation which now reigns over the plains which

the Singhalese formerly tilled was precipitated by the reckless domination of the Malabars, in the fourteenth and following centuries. The destruction of reservoirs and tanks has been ascribed to defective construction, and to the absence of spill-waters and other facilities for discharging the surplus-water during the prevalence of excessive rains ; but, independently of the fact that vast numbers of these tanks, though utterly deserted, remain, in this respect, almost uninjured to the present day, we have the evidence of their own native historians, that for upwards of fifteen centuries the reservoirs, when duly attended to, successfully defied all the dangers to be apprehended from inundation. Their destruction and abandonment are ascribable, not so much to any engineering defect, as to the disruption of the village communities by whom they were so long maintained. The ruin of a reservoir, when neglected and permitted to fall into decay, was speedy and inevitable ; and as the destruction of the village tank involved the flight of all dependent upon it, the water, once permitted to escape, carried pestilence and miasma over the plains they had previously covered with plenty. After such a calamity any partial return of the villagers, even where it was not prevented by the dread of malaria, would have been impracticable, for the obvious reason that, where the whole combined labour of the community was not more than sufficient to carry on the work of conservancy and cultivation, the diminished force of a few would have been utterly unavailing, either to effect the reparation of the water-courses, or to restore the system on which the culture of rice depends. Thus, the process of decay, instead of a gradual decline, as in other countries, became sudden and utter desolation in Ceylon."

The same account might be given of similar works in India and other parts of the world ; for, like fire, water is an excellent servant, but a bad master. Held under proper control and made to contribute to the service of man, it may be attended with very great advantages and benefits ; but if allowed to have its own way, it is frequently destructive of much that would otherwise contribute to the pleasure or welfare of mankind.

It is not, however, so much with the rain of the world as with that of our own country that I wish now to treat. We have, in some parts of our islands, rain almost as great as that which falls in the tropical climates of the world, and we have in other parts not more than a sixth or eighth of the quantity of rain which falls in such districts ; but we have nowhere to suffer the annoyance and inconvenience which attend a rainless land, and excessive falls of rain are commonly confined to

mountain regions where, generally, the floods are moderated by large natural sheets of water and by short runs to the sea.

There have recently been introduced into the Houses of Parliament two Bills for the conservancy of rivers and for the prevention of floods,—one in the House of Lords, and another in the House of Commons.

These Bills testify to the public anxiety felt in these matters. They are now under consideration, and there is, perhaps, no question which better deserves the careful consideration of the community at large. It is, however, essential that every district should be considered with reference to its peculiar circumstances; for, great as have been the achievements of science and the knowledge which has resulted from the application of those mental gifts with which God has blessed us, no scientific research has been able to reduce the various alterations to which our climate is subject to any fixed law.

We have seasons of comparative drought and of heavy rain, and though our sufferings from these causes are not so great as they are in many countries, we very much depend upon the state of the weather; and the native energy of our people is constantly called into requisition to counteract the evil influences of either too much rain or too little.

Cultivation in this country is carried on by the application of labour which contributes to the hardihood and perseverance of our people, the necessity for which is one of the many benefits which we enjoy.

Our population is constantly increasing, and is perhaps more numerous upon the ground on which they live than that of any other country.

In the first fifty years of this century, the population of England and Wales increased from less than nine millions to nearly eighteen millions: so that in those fifty years the increase in population was equal to the whole increase which had taken place since these islands were inhabited.

The ordinary decennial census will be made this year; but in 1871 the population of the district which, in 1851, was not 18 millions, had increased to about 22 $\frac{3}{4}$ millions.

While the increase has been general all over the kingdom, the aggregation of people in large towns has been most remarkable, and the produce of the land has not kept pace with the products of manufacturing industry. Food has, therefore, to be imported from foreign lands, but water for the supply of the towns and for the general purposes of agriculture cannot be imported. It is fortunate, therefore, that the rain which falls is sufficient, if properly utilised, for all the wants of the inhabitants. When this fails to meet such wants,

we may expect that the period has arrived at which further increase of population will be absolutely impossible; but I trust we are as yet far from that position.

The increase of towns, and the sanitary improvements which have taken place, particularly those which have been carried out with reference to sewerage, and various manufacturing operations, have so polluted the rivers that many of them are no longer fit for the domestic wants of the inhabitants. Still, there is upon the hills and in the bowels of the earth sufficient pure water to be collected for all these wants.

It may be of some interest to take a general survey of the means which may be adopted for obtaining such supplies. Water may be collected in reservoirs or tanks as it used to be and still is in Ceylon and India and elsewhere; it may be obtained from rivers which are yet unpolluted, or from natural lakes; it may be collected, as it is in some instances, from springs; and it may be extracted from some geological formations from the bowels of the earth; but all water, whether that in rivers or in lakes, or in springs, or in the earth below the surface, depends upon the quantity of rain which falls, and it is, therefore, matter of interest to ascertain what it is that we have to depend upon.

The rain varies, as I have said, to a very considerable extent. Apart from those mountain regions in which the rain may be said to be excessive, that which falls upon the western coast of England and in Ireland measures between 30 and 40 inches in a year, while that which falls on the east coast of England will not much exceed 20 inches, being little more than half of that which falls in Ireland or upon the western coast of England.

The agricultural produce of the districts varies in great measure, in consequence of this different deposition of rain. Ireland and the western coast of England are essentially grazing-countries, while, generally speaking, the eastern coast of England is devoted to the production of grain.

The reason why Ireland and the western coast receive more rain than the eastern coast is because the prevalent rain-bearing winds are from the Atlantic ocean. The mountains and the high lands, which are generally colder than the low lands, condense the vapour contained in the rain clouds, and cause an early precipitation upon the land. As the clouds are driven on by the wind, they gradually lose their watery character, and the rain which is precipitated is consequently constantly decreasing as the clouds pass from west and south-west to the east or north-east.

Thus the rain which falls upon low hills not exceeding

2,000 feet in height, or on the first or second trough or valley behind such hills and to the eastward of them, is greater than in similar hills or troughs to the east.

Dr. Miller, of Whitehaven, who was a great observer of the fall of rain, and to whose researches we are indebted for much of what we know of the heavy rainfalls in the Lake District of England, concludes from observations that the maximum density of the rain cloud is at about 2,000 feet above the sea level. That up to this height the rain increases as a general rule, and then rapidly decreases as you ascend to a greater height. For instance, in twenty-one months the rain, which at the coast was between 60 and 70 inches, amounted at 1,900 feet above the sea to 208 inches, at 2,925 feet it had diminished to 137 inches, and at 3,166 feet it had further diminished to 128 inches.

From the observations which he made, it may be inferred, as a general conclusion, that the rain will increase as you ascend, to about 2,000 feet, and will then decrease; but, although this may be a general conclusion, local circumstances exercise a very important influence upon the quantity falling. It may, therefore, be expected that under ordinary circumstances, apart from local influences, the greatest fall of rain will be on the westerly slopes of mountains which exceed 2,000 feet in height, and that where the hills do not rise so high as 2,000 feet the rain clouds will be driven over, and will discharge their watery contents in the first trough, or on the easterly sides of the mountains, where they will be protected from the winds. Again, such observations would lead to the conclusion that in a succession of ridges and valleys running from north-west to south-east, and therefore opposing themselves abruptly to the prevalent winds which are from the south-west, but where the summits are not high enough to arrest the progress of the rain cloud, the rain will constantly diminish as you proceed to the east. Thus, a ridge exceeding 2,000 feet high, and so rising above the rain cloud, will have comparatively little rain on the east side, while those of a lesser height will show that the greatest fall of rain is upon the easterly slope.

Many instances of the truth of these conclusions may be adduced. The Liverpool Waterworks are formed upon the western slopes of the Rivington Hills, which do not exceed some 1,600 or 1,700 feet in height. The Bolton Waterworks are in the first trough over these hills. The westerly winds impinging upon the hills deposit upon the westerly slopes of the hills $48\frac{1}{2}$ inches of rain upon ten years' average, while in the same time the rain at the Bolton Waterworks, which are

situated at the back of the hills, and in the first trough, the rain is 53 inches per annum. Between the Bolton Waterworks and the Blackburn Waterworks, which have been constructed in the next valley, there is a ridge of high land, but under 2,000 feet, and the mean rain at the Blackburn Waterworks in the second trough, with two ridges of hills intervening between them and the sea to the west, is only 42 inches.

Further on to the east, the rain diminishes to 30 inches per annum.

The Manchester Waterworks are formed in the long valley called Longdendale, running from west to east, being landlocked to a great extent at each end. The hills on each side of this valley rise to nearly 2,000 feet at their highest summits.

The rain at Manchester in 1859 was 38 inches. At the foot of the hills on the westerly side it was $46\frac{1}{2}$ inches. At the head of the valley, nearly 1,000 feet above the sea on the west side, it was $53\frac{3}{4}$ inches, and on the east side, just over the summit, it was $58\frac{1}{2}$ inches. The land which there intervenes between Longdendale and the valley of the Dun rises to a height of 1,300 or 1,400 feet. At Penistone, a few miles to the east of the hills, the rain was 39 inches. At Sheffield, still further to the east, 25 inches, showing that there is a constant decrease from west to east.

Across another portion of the Pennine chain of hills, commonly called the backbone of England, the rain at Rochdale in 1848 at the westerly foot of the hills was about $39\frac{1}{10}$ inches. At Whiteholme and at Blackstone Edge toll-bar at the top of the hills, about 1,200 feet above the sea, the rain varied from $66\frac{6}{10}$ inches to $67\frac{1}{2}$ inches. At the easterly foot the rain had diminished to $32\frac{1}{4}$ inches, and at York, in the same year, it was little more than 20 inches.

The same results are observed in the mountain ranges which surround the Scotch lakes. The mountains here run across the line of the prevailing wet winds, and every successive ridge and trough or valley to the east shows a diminishing quantity of rain.

Loch Katrine, from which the city of Glasgow is supplied with water, is hemmed in by mountains varying from 2,000 to 3,000 feet in height.

In 1854, at a rain-gauge at 1,800 feet in height, on the slope of Ben Lomond, which rises to 3,192 feet above the mean level of the sea, the rain was 109 inches. This rain-gauge was placed on a ridge on the westerly side of Loch Ard, which intervenes between the gauge and Loch Katrine. On the hills between Loch Ard and Loch Katrine the rain was 67 inches.

On the hills near Glenfinlas, which form the eastern summit of the land draining to Loch Katrine, and further to the east, at an elevation of 1,800 feet, the rain was reduced to 62 inches. In 1857, the rain on the first ridge was $84\frac{1}{2}$ inches, on the second $74\frac{2}{10}$ inches, and on the third $48\frac{3}{10}$ inches. In 1859, two years subsequently, it was 92 inches, $85\frac{1}{3}$ inches, and 48 inches respectively, and so for every year.

This shows the importance of bearing in mind that it does not do simply to calculate on increased elevation giving an increased quantity of rain, but the whole question is affected by the geographical disposition of mountains and valleys.

The heads of all valleys, too, in mountainous districts, give larger quantities of rain than the mouths of valleys. Thus at Loch Venuchar, at the mouth of the great valley in which this Loch and Loch Katrine lie, the rain in 1872 was 78 in. at an elevation of 275 feet above the sea, while at Glengyle, 380 feet only above the sea, at the head of Loch Katrine, the rain was $127\frac{8}{10}$ inches, and in the same year, on the flanks of Ben Lomond, 1,800 feet above the sea, it was $96\frac{1}{2}$ inches. In the year 1866, the rain at Loch Venuchar was 64 inches. At the head of Loch Katrine 101 inches, and on Ben Lomond 100 inches.

From these observations it will be seen that the rain varies very much in the same district irrespective of elevation, the variations depending upon the physical and geographical features of the country.

Much of the rain which falls, however, is lost by absorption, evaporation, and other causes. Part of it runs away in floods; some enters the bowels of the earth, to be reproduced in springs; and some supplies the wants of vegetation. The result greatly depends upon the quantity of rain which falls, and upon the greater or less declivity of the ground on which it falls, as well as upon the character of the vegetation. Where the hill-sides are steep and the rain is considerable, the loss is least; where the declivities are gentle, the growth of herbage heavy, and the quantity of rainfall small, the loss is greatest. It varies, according to these qualifying circumstances, from about 8 inches to 20 inches per annum. It therefore follows that in regions of small rainfall nearly the whole is evaporated, leaving barely sufficient for purposes of vegetation. Where the rainfall is great, much of that which falls runs away in floods; but all water, no matter how found, is the produce of the rain which falls upon the surface, and we are therefore happy in this country in being so surrounded by water that we have always an abundant rainfall for all purposes of life and enjoyment.

The constant evaporation from the seas which surround us, and the precipitation which takes place when the rain clouds are driven over the land, produce sufficient for all purposes.

My observations have been confined almost exclusively to rainfall; but there are many other questions connected with meteorology which are more or less interesting to the inquirer into natural phenomena and the causes to which must be assigned the fertility of lands, and the perseverance, activity, and hardihood of the people who inhabit them. We are specially favoured in this part of the world by the combination of causes which contributes largely to the energy of the people and the enjoyment of life.

The CHAIRMAN.—I am sure that the meeting authorises me to return our thanks to Mr. Bateman for his interesting paper. If there are any present whose studies have lain in the direction of the subject dealt with by the author, all will be much gratified to hear any remarks they may have to make.

Sir JOSEPH FAYRER, K.C.S.I., M.D., F.R.S.—I wish, first of all, to say how much pleased I have been with the paper we have just heard. The only thing I should demur to is that the author said he thought the paper hardly a fitting one for this Society. I regard it as a most fitting one, and can hardly conceive of a better way of dealing with so important a subject. One can only hope that Mr. Bateman will, in furtherance of what he has so well begun, give the Society another paper on some of the other meteorological questions that have not been touched upon in this. He has told us that the question of rainfall is one of great importance. He has reminded us that the welfare of our crops and fruits depends upon it; indeed, our very existence is dependent on it, for without it we could not exist. Where there is no moisture there can be no life; the tree cannot bear, and the seed cannot germinate. Were there no rainfall, our planet would, in fact, be reduced to the condition of an effete and worn-out globe resembling, probably, the present state of our satellite, the moon. Happily, however, this is not the case. The author of the paper has selected what is, of course, the most interesting portion of the subject to us,—the meteorology, or, at all events, the rainfall of our own islands, which are peculiarly situated, being so far distant from the equatorial regions that the supply of water is more varied, more inconstant and subject apparently to greater modifications of the great laws which govern the formation and distribution of rain, than is the case in other climates. But, as Mr. Bateman has pointed out to you, it is one of the main sources of the present greatness of our nation,—one of the reasons why our people are strong, hardy, and energetic,—why, indeed, they have become what they are, is owing to the climate they enjoy; that climate is owing to the rain and the way in which it is distributed over our islands. (Hear, hear.) Of course, it is attributable to other things; but the rainfall is the subject with which we are now dealing. This is a very comprehensive subject,—one

on which one might speak for hours ; but I shall not venture to trespass on your patience so long as that. I should, however, like to allude to one or two points in connexion with the rainfall with which I have been most familiar,—that of the great portion of Asia known as British India. In that part of the world, very much what has been described by Mr. Bateman, only on a much more extensive scale, takes place. You have there a country which is entirely dependent on the rainfall for its crops, its animal life, and the existence of its people. You have probably heard of late years a good deal about the famines which devastate India at recurring periods. These famines have been mainly due to an imperfect rainfall which in some seasons is experienced there. In that great country, which is not visited by uncertain rains at every season of the year, or on any day, such as may be the case in this country, but where there are three distinct seasons of cold, heat, and rain, the climate is under the influence of laws that are much more certain than in this northern country. The monsoons,—those great trade or seasonal winds,—the word “ monsoon ” being a corruption or alteration of the Arabic word “ maussim,” a “ season,” come laden with moisture from the equatorial regions, and which they carry over the great continent of India. The moisture is brought up by the south-west monsoon,—that is to say, a great current of hot air rushing upwards from the heated regions at the equator, takes with it a quantity of moisture abstracted from the heated ocean ; meeting with mountain ridges something like, only infinitely higher than, those described by Mr. Bateman, a vast change then takes place in the condition of this south-westerly wind. For example, the monsoon from the south-western extremity of India, on the Malabar Coast, at Cape Comorin, begins to set in in May, when a great deposit takes place. This is what is called the “ bursting ” of the monsoon. The clouds come up suddenly, the air is intensely electrical, and very heavy rain falls. In passing over the hills that run along the western coast of India, those known as the Western Ghauts,—hills of from 3,000 to 5,000 feet in height,—a great part of the moisture is squeezed out, and in so doing the winds part with so much rain that on the Coromandel Coast there is at that time literally no rain at all. The air being thoroughly desiccated, and deprived of its moisture by the mountains over which it passes, the result is as I have said, that there is, at that period, no rainy season at all on the Coromandel coast. Travelling in a north-easterly direction it reaches the Himalayas and those great mountains which separate India from China and Siam, when, striking against the hills, it is deflected to the north-west. Here a most marvellous phenomenon takes place ; for we then have the most extraordinary rainfall in the world, to which anything ever seen in Europe is a mere bagatelle. There is a station there,—or, at least, there was ; for it is now no longer a station, its physical conditions being such that it was obliged to be abandoned,—situated at an elevation of about 4,500 feet. Now Mr. Bateman has stated that an elevation of 4,500 feet was that at which the deposit of rain in India most readily took place, and that in that country this elevation corresponded with 2,000 feet in England,

and he is right. At the place I have referred to, which rests on the very edge of the chain of mountains south-east of the Brahmapootra, at an altitude of 4,500 feet above the level of the sea, at a station called Cherra Poonjee, which is, as nearly as I can recollect, from 200 to 250 miles north of the Bay of Bengal, the rainfall is enormous. The intervening land between this mountain-chain and the sea is a level plain traversed by rivers, and over this comes the south-west monsoon, which has been gathering vapour from the Bay of Bengal,—not that portion of the monsoon which has passed over the Western Ghauts, but that which has escaped them, and which takes up the moisture evaporated from the Bay of Bengal. Passing over this level land it impinges at once on the mountain at a height of about 4,500 feet, and the result is that within a period of from five to six months the rainfall at the station I have mentioned is rarely ever less than 600 inches in amount. It happened that I spent my first year in India at that station, and I kept a rain-gauge, which recorded 610 inches. I somewhat doubted the result, as I had not then had any great experience with regard to rainfall, and I was inclined to mistrust my own reckoning; but the figures were entirely confirmed by the observations of the late Professor Oldham, director of the geological survey, who, about a quarter of a mile from me, made the rainfall within only a few inches of the total I had recorded; I have no doubt that 600 inches is about the average rainfall at that particular station; which I should say is, beyond all doubt, the greatest recorded. I believe there is no other part of the world that has ever been known to be nearly or even half so wet. Well, when you get further inland, only fifteen or twenty miles, or even less, and ascend some 300, 400, or 500 feet, the rainfall drops at once from 600 to 200 inches, showing that the difference is due to local conditions and circumstances. In the West of India, among the Western Ghauts, at a station called Mahabuleshwar, there is an average of from 250 to 300 inches deposited by the south-west monsoon. Beyond these Ghauts there are great tracts of country that are not altogether rainless, but which are so dry that I dare say my friend General Maclagan will tell you that the rainfall is so small that, were it not supplemented by irrigation, of which, I know, he could tell you a great deal, there would be no crops and no cultivation, and, as a matter of course, not much animal life. Mr. Bateman has spoken of the works constructed in Ceylon and other parts of India for irrigation purposes. No doubt the Mahommedan Government of India under the Great Moguls carried out great works of irrigation; and happily we have taken up the same subject, and are working out a great system that will be far more effective even than the older works that were referred to. It was about 1822 or 1823 that the British Government began to repair and re-establish the old works, and to construct a new system of irrigation; and having made this commencement, the project has gone on, and is proceeding still, to the great advantage of enormous areas of country now under cultivation, which would otherwise have been a desert. There are many other points to which I might allude in

reference to this subject of rainfall in India, and there is, perhaps, no other country in the world where its importance is more felt; but I am afraid I should weary you. There is, however, one that is of peculiar interest to me, and that is the question of health. There is no doubt that the rainfall has a most marked effect on health. Those who have had to do, as I have, with the sanitary returns of India, and who have seen how immensely the fluctuations of disease, the spread of epidemics, the increase and decrease of such diseases as cholera, are influenced by the rainfall, will recognise that in India this matter of rainfall is of the greatest importance. I do not say that the disease I have mentioned is due to the quantity of rainfall; but that the rain has a material and appreciable influence in originating, increasing, or diminishing the amount of epidemic disease, is, I say, beyond a doubt. Epidemic cholera is almost certain to diminish, if not altogether to die out, when the rains become heavy; and it is equally certain that where the heat and evaporation are great, and the air dry, epidemic cholera, being present, it will spread and increase. I would not say that the increase or decrease of epidemics is due to rain alone; but I would say that this is one cause which, combined with others, exercises potential influence, especially in the case of fevers. You will hardly believe me when I tell you of the amount of death from fevers in India. They destroy more than any other disease, and, compared with them, cholera is a mere cypher; many other forms of disease may be immensely influenced by climate. When the season is dry and the evaporation is great, fevers diminish, that is to say, for a time; but the effects of climate, whether the weather be dry or rainy, are not immediate, and the result of an accumulated or heavy and continuous rainfall is always to increase and intensify the amount of deaths from fever. Only the other day I was looking at some returns on this very subject, sent to me from the Army Sanitary Commission, and I found that the increase in a number of diseases during the dry season was great. In fact, it is known to everybody living in India that the time of danger from climatic fevers is not when the rain is on the ground, but when the drying-up takes place: it is then that fevers abound. Then, as to the question of vegetation. Not only is the botanical part of this question, one having reference to the plants themselves, of interest, but that which materially concerns the climate is of great importance: not only is vegetation regulated by the rain, but the rain is regulated by vegetation. Many parts of Europe have become dry and arid and desiccated and depopulated, or very nearly so, by the destruction of the vegetation. This is because the vegetation being destroyed and the trees gone, the rain ceases to come; it is no longer attracted there, and the consequence is that the face of the country is entirely altered. In Scinde and the Punjab, where vegetation is defective, though we have not found the districts rainless, yet the fall is defective, whilst at Mooltan there is but 10 inches of rainfall in the year, which is not sufficient to supply the wants of the people. It is a well-known fact, that wherever vegetation is increased it brings moisture: not very long ago, in passing through the Suez Canal, I observed that, in that dry and rainless country,

there were little grooves in the banks of the cutting. I asked, "What they were?" and was told, "They were produced by rain." I then asked, "What about that vegetation?" and the reply was, "That has all come since the cutting of the canal." Even the small accession of moisture caused by the canal has brought some rain into the desert; and so it would be in India if, instead of destroying the vegetation, they were to preserve it; if, instead of cutting down the trees and burning them as they do for fuel for the railway-engines, they preserved them, and increased the growth and development of the forests, the tendency would be to cool down the climate and temper it. A most remarkable example of this is seen in the case of the Terai, which runs along the outer range of the Himalaya chain. There is a dense belt of forest there, which varies from fifteen to twenty and even thirty miles in breadth, though sometimes it is very much less; but the ground is always moist, and produces a rank and luxurious vegetation. I believe they could do nothing worse than take away that belt of forest, because, although elsewhere the air is so dry and hot that it is like a furnace, and everything is dried up, as you approach this district of vegetation the air is tempered and becomes cool and moist. But it is not for this reason alone that I would preserve it. Its importance is very great from another point of view. I feel that here I am perhaps trenching on a subject that has to do with engineering, and on which my friend General Maclagan could give better information than I could offer; but I would say, with reference to this dense vegetation which grows on the very margin of this chain of mountains, that not only does it temper the air and bring a vast quantity of moisture which would not otherwise be there, but it also regulates the moisture that trickles down the hills; and, were it not for the trees and vegetation which clothe the lower sides of the mountains, the water would rush down in torrents that would overwhelm the country, bridges would be swept away, and the district would be desolated, instead of which there is now an equal distribution. The result is that the water finds its way gradually to the level ground below, rising up in springs and producing the wide belt of vegetation of which I have spoken as in the Terai, which is a term meaning moisture, or damp ground. There are other points connected with the rainfall on which I might speak the whole evening. I will not now trespass further on your patience except to say that I have had very great pleasure in listening to Mr. Bateman's paper.

General R. MACLAGAN, R.E.—I may say that my own experience enables me to confirm some of the remarks made by Sir Joseph Fayrer, and of the statements contained in the very interesting paper of Mr. Bateman. In some parts of India there is even a smaller amount of rainfall than has been mentioned. At Mooltan there is an average of 8 or 9 inches, but in the province of Scinde the average rainfall is little over 4 inches, a remarkable contrast to the enormous rainfall that has been spoken of as taking place at Chirra Poonjee. A brother officer of mine, who wrote an article in one of the journals on the rainfall in that part of India, took the opportunity of saying it was scarcely worth while to talk of the inches of rain there, the

better way was to speak of it by the number of feet. With regard to the different effects of the rain falling on the bare and treeless hill sides, and that which fell on slopes covered with wood and undergrowth, we have in India illustrations of both. Where there is this vegetation the water is checked and well distributed, and the rivulets flow in an ordinary and more equable way, but in places where the undergrowth has been cut down, the water-courses fill with rapidity, and the flooded rivers do much damage. At several places where valuable buildings have been threatened, protective works have been constructed to preserve them. In one part of the paper reference is made to the manner in which the rainfall is affected by the ranges of high hills. In a tour I made some years ago across the hills during the rainy season, for the first nine days we were exposed to exceedingly heavy rains, and the hill sides were covered with rank vegetation. On crossing the hills we entered a rainless country, and for the next six weeks had not a drop of rain. On our return, immediately on crossing to the south side of the hills we again came upon abundant vegetation, and were immediately enveloped in clouds and rain. I think that this Society is greatly indebted to Mr. Bateman for the most interesting paper he has given us upon this important subject.

Mr. W. GRIFFITH.—The science of meteorology, though less comprehensive now than in Aristotle's time, includes all physical causes affecting or affected by the atmosphere. Etymologically, it signifies an account of the sublime. It deserves the name, for we cannot reason thereon without raising our thoughts from earth to heaven. When we consider the atmosphere as the medium which transmits light and heat, and retains or disperses moisture, and that without its aid in the dispersion of the rays of light the whole of the heavens above our heads would be one black canopy, we can understand the benefits we derive from it; and Mr. Bateman's paper is of value, inasmuch as it leads us to consider some of those benefits, one of them being that the atmosphere is a large reservoir of moisture, which produces the effects which we witness on the cultivation of the earth. If we were to go back to an early period in the earth's history, we should find how this moisture in times past has not only been productive of crops, but has positively produced the earth which has grown the crops. Some of the most fertile parts of England are formed of the new red sandstone, which is not generally supposed to be capable of growing crops; but we know that owing to the way in which the moisture of the atmosphere has worn it away, it has become one of the most fruitful of our soils. The facts that have been brought before us with regard to India are calculated to arouse the interest of all who have heard them. A few years since, when I had occasion to devote my attention to matters connected with Indian law, I extended my reading, and was much struck by the part played by the monsoons in the watering of that country during six months in the year. I noted that during half the year the melting snows of the Himalayas replenished the rivers, and during the other half the monsoons brought from the ocean the heavy rain-clouds, so that in each period the

supply of water was abundant, but that the idleness of man neglected to store it up for use, and that in consequence of that idleness famines were ever recurring. There is no doubt that Calcutta is well watered; but, with due deference to those gentlemen who have already spoken, I have always understood that the English Government have allowed great works of irrigation formerly established in other parts of India to go to ruin, and that we have been rather behind our predecessors in carrying out those public works which should be established and maintained for the benefit of the country at large. Sir A. Alison's "History of Europe" contains one or two interesting chapters on India, and he brings a strong indictment against those in authority for allowing the splendid reservoirs that were formerly constructed in India to fall into ruin, and for not rebuilding them.

Sir J. FAYRER.—Since 1822 or 1823 the Government have undertaken to resuscitate the old works.

Mr. GRIFFITH.—It is, of course, highly interesting to consider the benefits our own country has derived from its rainfall. The atmosphere not only collects the deleterious products of life, but it is also a reservoir of health-giving moisture, which, flowing down upon the soil, cleanses everything, and makes the country habitable and productive. I may add one other fact to those adduced by Mr. Bateman, namely, that the great quantity of moisture suspended over our heads, and descending in fruitful showers, is largely increased by the Gulf Stream, which flows into the Gulf of Mexico, whence it proceeds in an easterly direction, and surrounds the whole of the British Islands. That stream is heated in its passage across the tropics, and contributes not only to the quantity of moisture in the atmosphere which produces our rainfall, but also warms the air, and, so to speak, renders England a kind of hothouse in the midst of what would otherwise be an almost Arctic region, cold as Kamschatka. We are, therefore, very much indebted to the Gulf Stream for the exceptional position we enjoy. The subject of meteorology is, however, one which presents so many points of interest that it would be too great a tax on your time to attempt to discuss them all.

General MACLAGAN.—With regard to the irrigation works constructed in India by the Mahommedan emperors; Sir Joseph Fayrer is right in saying that it was about the year 1823 that attention began to be directed to them, after we came into possession of that part of the country, and their restoration was taken in hand. Originally those works were not altogether for purposes of irrigation; they were intended for supplying the pleasure-grounds of the rulers. To a place at the west of Delhi, which was a favourite resort of theirs, the water was carried a long distance from the Jumna. In 1826 the restoration of those works commenced. With regard to the effect of such works upon famines, it is quite true that irrigation by itself would not sufficiently supply what is wanted. We know that in times of great distress from deficiency of food, there has been, in other parts of India, which the famines have not visited, abundance of food, and what was

necessary was not so much more food itself, as the means of its distribution. India is now deriving great benefit in this way from the railways that have been constructed over the country, which convey the food wanted to those parts where famine exists. This combined use of camels and railways may be expected to do much for the prosperity of India.

Mr. D. HOWARD, F.C.S.—Mr. Bateman's interesting paper has brought before us the great problem of the rainfall—the tendency to diminution from West to East. Sir Joseph Fayer has interestingly supplemented Mr. Bateman's paper by explaining how the monsoons charged with wet, as they are on reaching the coasts of India, completely part with their moisture, so as actually to leave some parts of the country almost arid for want of the rain which has been extracted from them in their passage over the Ghauts. This occurs in India only at one period of the year; but, of course, it is exactly the same sort of process that goes on constantly in Switzerland. There you find two kinds of south wind. There is an intensely wet south wind, which in a small way imitates what we have heard of the Indian rainfall; and you also get what is called the *Föhn* wind, which is so hot in certain parts of the country that it has occasionally led to the destruction of villages, which have been burnt down in the Swiss valleys. The wind is so unaccountably dry and parching, that when the *Föhn* begins, the houses being built of wood, a fire will quickly spread from one to another. It was a puzzle to the Swiss meteorologists how it could be that this south wind, which is usually a wet wind, could, in certain places, be so intensely dry. The idea was that it was a sirocco, though how a sirocco could pass over some valleys and confine its work to those parts which suffered from the *Föhn* wind was not explained; but it was found that, after all, it was the same wind which was first so wet and then so dry. The south wind blows up the southern side of the Alps, and deposits all its moisture before it passes the top of the Alps, in an exceedingly rarified condition. As it descends, and the rarification becomes condensation, the air becomes hot, but there is no moisture for it to take up, and it consequently arrives in the valleys almost absolutely dry. So that we have this state of things, that the intense dryness, which is a danger on the one side, is brought by the same wind which causes the great floods of the Rhone Valley on the other side. This is one example of what has caused such great effects, and on so vast a scale, in India. It is an effect repeated on a smaller scale in the difference that exists between the great dampness noticed on the western side of England, and the dryness of the other side. There is one point I should like to put to the author, and that is, Whether he has gone into the question of the cycles of rainfall,—whether he thinks the sun-spots, of which we have heard so much, have any connexion with our recent rainy seasons? Of course, these sun-spots are connected with certain phenomena of terrestrial magnetism, and so forth; but what I want to ask is, whether any clear connexion has been made out between the cycles of the sun-spots and the cycles of rainfall?

Mr. BATEMAN.—In answer to the question just put, I may say that I have already stated that we have not, up to the present time, been able to reduce

meteorology to anything like an exact science. We can tell what has been, but I question very much whether we can tell what is to be.

Mr. BALDWIN LATHAM, M. Inst. C.E.—It makes no difference whether we collect rain from the roofs of our houses or from a large area of the earth's surface, called by engineers a "gathering-ground," or if we obtain water from springs, or take it from wells sunk into the earth; all these sources of water supply are entirely dependent, and are solely due to rainfall. The science of meteorology at the present day is making rapid progress, but there is little doubt that some centuries ago much more was known with regard to the laws of the atmosphere than is known at the present day. Hippocrates taught his disciples that they could foretell the state of the seasons, and, as a consequence, what diseases would afflict mankind at particular periods. This, he said, was due in a measure to the observations made of the motions of certain stars. What was the nature of these observations we do not now know; but Professor Balfour Stewart appears, from his investigation, to think that even the stars have some influence on the atmosphere, as they have some influence on the sun spots. Before the advent of Hippocrates, the influence of stars on the atmosphere seems to have been known. In the sacred books of the Parsees, the Khordah Avesta, the influence of a star is set forth as causing the presence or absence of rain, and the absence of rain is clearly shown as a condition of things which produces disease. In our own country the climate is, to a certain extent, uncertain, because of the smallness of the country, whereby the general laws in operation are everywhere modified and interfered with by our being surrounded by so much water; we also occupy a position in which a constant interchange takes place between currents of air moving from the direction of the tropics and the arctic regions, which cause great alternation in the climate, but the nearer to the equator and the sun's path we go, meteorological conditions are always much more defined and certain, and you can there predict with certainty, for many months beforehand, what the weather is likely to be. Rainfall is entirely due to the heat of the sun and the diurnal motion of the earth. The air travels with the motion of the earth, from west to east, and that is the reason why the storms travel in that particular direction, and why our western coasts receive the largest amount of rain. But rain falls on the sea as well as on land. Very heavy rains take place at sea, and the reason for it is that, if the rains were always following in defined lines, we should have tracts of country in which there would be a large amount of rainfall, and tracts in which there would be practically dryness. But the wind is not moving in straight lines, but gyrates in circles. When the wind gyrates in a circle in which the movement is in the opposite direction to the hands of a watch, we call it a cyclone; and when this movement takes place, the air is moving upwards from the surface of the earth. When the wind gyrates in the same direction as the hands of the watch, we call the period anti-cyclonic, and at such times the air is moving down from the higher regions towards the earth's surface. In a cyclonic movement, the air is moving from a warmer to a cold region, and this movement is usually attended with rain, for as the air

moves upward, the vapours are condensed and fall as rain. As the wind gyrates either in one direction or another, the air moves from warm to cold quarters, or *vice-versâ*, and rain or dryness occurs in consequence. In a cyclone there is a movement of air upwards from the surface of the earth, and this movement causes a diminution of atmospheric pressure which is indicated by the fall of the barometer, but when an anti-cyclone affects us, as the current of air is directed downward on to the surface of the earth, a rise of the barometer is observed, and so the barometer becomes a weather-glass. As air moves downward in an anti-cyclone, or from a cold to a warmer region, its capacity for vapour increases, and so a rise of the barometer is, under such conditions, likely to be accompanied with fine weather, but in a cyclonic period, which produces a fall of the barometer, as the movements of the air are from a warm to a cold region, so rain is likely to occur, and as the wind may be moving from the same quarter both in a cyclone and anti-cyclone, it is quite possible for a south wind in some districts to be a dry wind, and in another to be a wet wind. It is a natural law at work that causes the rain to descend and to be equally distributed all over the country. The rain in our own districts increases with the elevation of the ground on an average at the rate of two and a half per cent. for every 100 feet of elevation. But during the last three or four years the rate of increase has been very much more than that; we have passed through three or four of the wettest consecutive seasons ever known. As a natural consequence of all this, the country has enjoyed good health latterly. In the lake districts they have had less rainfall than their due, while in the southern counties of our country we have had more than belongs to us. With regard to the periodicity of the rainfall, there have been many guesses made. We have a suspicion that the climate of the country is regulated by the metonic period. With regard to my own observations, I find that, taking underground water as a guide, the number of observations collected from the year 1835 down to the present time give every ten years as a period of low water. For instance, the years 1844, 1854, 1864, and 1874, or 1844-5, 1854-5, 1864-5, and 1874-5, are the low periods, which run from the latter part of one year into the beginning of the next. These are periods of marked lowness, but whether they have relevancy to the sun-spot periods I do not know. During the last two years there have been very few sun-spots observed; but whether or not there is any connexion between them and the weather, just as there has been shown to have been an increase in the magnetic influence of the earth during the presence of sun spots, is at present doubtful. Nothing is known for certain on the subject; but I have little doubt that as time goes on we shall be able to place meteorological science on a firmer foundation than it now holds. As far as we know, the laws are extremely simple. Since Dr. Ballot discovered the law which governs the wind, the prediction of the state of the weather for a given number of hours is tolerably certain. With reference to the predictions which come to us from America, it may be taken for granted that so long as our country is under the influence of a cyclone, the tendency

is to draw the atmospheric current towards us, and at such times the predictions are likely to be correct, but when our country is under the influence of an anti-cyclone, as the movement is outwards, it repels the advance of the storm towards us, and at such periods the predictions are not likely to be fulfilled. The storms that were predicted for the 16th to the 18th of this month we did not feel, that effect being due to an anti-cyclone passing over the country at the same time. Again, the diminution of temperature also affects rain. The air, when warmed, holds a larger amount of vapour. When it cools, rain is the result. Our temperature diminishes about one degree of latitude as we pass northwards. It diminishes also one degree for every 300 feet of elevation, so that, if 2,000 feet is the elevation at which the maximum of rain occurs in the neighbourhood of Whitehaven, the same condition of temperature would produce the same effect in the neighbourhood of London, at an elevation of about 3,000 feet, if we had hills of sufficient height in this neighbourhood to receive it. There is one point with reference to the influence of elevation on rainfall which ought not to be lost sight of, and that is, that although rain increases with the elevation of the ground, yet, if you go upwards from a particular spot, it is found to diminish. This would seem to be paradoxical, but in 1766 Dr. Herberden placed a rain-gauge on the roof of Westminster Abbey, and he found it collected less rain than on the ground, and since that period numerous observations have been made which confirm the results. This diminution of rain with altitude above the ground has been ascribed to a variety of causes, but the real cause is that shown by Professor John Phillips, of Oxford, who pointed out that it is due to the difference of angle at which the rain falls, or in an elevated gauge the rain forms a small angle with the plane of the mouth of the gauge, and consequently does not present so large an area for collection of rain as is the case with a gauge on or near the ground, in which the angle is found to be larger than in the elevated gauges. With regard to the influence of rain on health, some persons attribute disease to an excess of rainfall; but in reality the intensity of disease in this country is always in proportion to the degree of dryness that has prevailed, and I may point to the fact that during the last four years we have had four remarkably wet seasons, and these years have all been remarkably good as far as the public health is concerned.

Dr. A. LONGHURST.—There can be no doubt whatever that we are all most materially influenced by atmospheric phenomena. The vegetable world shows the effects of this influence in all its features, especially the electrical conditions and all sudden and extreme changes of heat and cold, dryness and moisture, both of degree and duration; and doubtless the animal kingdom is equally sensitive to them, though the outward evidence of such change or influence may be less sensibly recognised by us. I think we ought to be grateful to the writer of the paper we have heard read for having brought the subject to our notice, and I feel sure that the more it is studied the more the human race will be benefited. With regard to the influence of the rainfall on health, I feel sure that great advantage will result from what has been said, and that there are many

places which have been loudly spoken of on the score of health that have gained their repute from insufficient observation. The observations that ought to be taken, in order to give any reliable degree of authenticity as to the healthiness of a locality, should be extended over a long period of years.

Mr. T. K. CALLARD, F.G.S.—I should like to ask the author of the paper if his observations have led him to notice whether, after long-continued frosts, we usually have a very large rainfall? The reason I put this question is that geologists generally accept the evidence of a pluvial period having followed the glacial period. It is estimated that at this pluvial period the rainfall was 125 times what it now is. I want to know, therefore, whether it has fallen within the range of Mr. Bateman's observation that there is any relation between a period of long-continued frost and a large rainfall,—whether he thinks the one is really the cause of the other? There is more in this question than may appear at the first glance, for one of the results of this pluvial period would be the rapidity with which the river valleys would be eroded; and upon this question arises another and a very important one on the antiquity of man; one of the arguments relied upon in support of that theory being the many flint implements found in certain spots where the river valleys have been eroded,—a process that would have taken a certain length of time under existing circumstances, which time would have been altogether altered if there had been a rainfall amounting to 125 times that of the present day.

Sir J. FAYRER.—I should like to ask a question which, probably, Mr. Bateman can answer. It is one that is germane to the subject under discussion. The west coast of Scotland is very wet; the reason for this being the Gulf Stream and the warm currents of air which that stream brings with it. I should like Mr. Bateman to tell me why it is that the northern part of the east coast of Scotland is mild and temperate, and displays an equable extreme, which is higher even than that of many parts of central England? Is it owing to the warm air blowing across from the west, or is the water warmed in coming round John O'Groat's House? I confess that this has always been more or less of a puzzle to me.

Mr. BATEMAN.—I am afraid I cannot answer Sir Joseph Fayrer's question, except by supposing that it is in some way owing to the effect of the Gulf Stream. There is no doubt that the temperature depends very much indeed on the rainfall. Rain is the consequence of the condensation and precipitation of the moist atmosphere, and therefore, properly speaking, when rain falls it is in consequence of aqueous vapour arising from the surface of land or ocean meeting with a colder stratum of air, when condensation takes place, and the moisture is precipitated in the form of rain, whereby the plain on which it falls ought to be cooled. But I remember a gentleman named Hopkins, who contended that whenever it rained it was warmer than at other times. This ought not to be, because, if we suppose the rain to be the consequence of condensation and precipitation in a cold

atmosphere, it ought properly to render the temperature colder, and, in my opinion, it must be so. Therefore, wherever there is a large amount of rain, it is reasonable to expect that inasmuch as aqueous vapour has been held in suspension by the warmth of the atmosphere and is condensed as it rises into higher elevations, there will be a cooler temperature where the air is dry, and probably cold on account of its dryness. Where you have a large stratum of air holding a large amount of aqueous vapour not precipitated on the earth near the hills, it is precipitated on the plains by reason of its rising into a higher elevation, where it is condensed. Therefore I can understand the fact that the valleys of the English lakes, where the quantity of rainfall is excessive, are warmer and more equable than in the Midland counties, and, in the same way, the rocky coasts of Norway and the West of Ireland, as well as the west and north-west of Scotland, must be a good deal warmer than the eastern coasts. I think the experience of every Englishman who has lived on the east coast, and who knows the circumstances best, will coincide with the opinion, that though more rain falls in the west than in the east, the warmth is greater in the west than in the east. I can only account for it in this way, that there can be little doubt, philosophically, that the vapour of the atmosphere is generated in the ocean and maintained by the warmth of the air on the surface of the ocean, or of land only a little elevated above the surface of the ocean; that it becomes condensed on the high lands, and as it travels towards the east the clouds are emptied of their contents, and the atmosphere desiccated and emptied of its watery contents, so that in the eastern part of the country there is less rain. I am glad to hear that the Indian experience corresponds with that of the British islands, and that as the wind goes east under certain circumstances there is less rain, the bulk of the rainfall being delivered on the western slopes of very high mountains, so that there is less to deliver in the east, and that, on the contrary, where the land is low, the clouds are driven over the summits and rain falls in the valleys beyond. I cannot help disagreeing with Mr. Baldwin Latham in the idea that the rain is due entirely to cyclonic action.

Mr. BALDWIN LATHAM.—I did not say entirely.

Mr. BATEMAN.—Because, as I have endeavoured to show, a very different quantity of rain falls on the tops of the hills and in the valleys. If the rain were due to cyclonic action the quantity ought to be the same whether in a valley or on the top of a hill. In my view it is owing to the formation of the hills and valleys. The clouds become hemmed in by the head of the valley, and they cannot escape except by rising to a higher elevation. Rising to that higher elevation, they get into a colder atmosphere, where condensation and precipitation take place, and consequently you have a large quantity of rain. In making these observations I have not indulged in anything like speculation. I have merely given dry results, on a wet subject, from observations I have had occasion to make in the course of my professional career. I have for a long time held the opinion that all water, no matter where it is found, whether in springs or whether it runs down the brooks and rivers, is due to the rain which falls on the surface, and there is no other source what-

ever except vapour which falls on the surface from the ocean. Chalk, sand, and some other of our geological strata are very absorbent, and to a great extent, though not entirely, they absorb the water which falls upon them. There are other measures, such as the primitive measures, including the granite, some of the slates and the millstone grit, where the country is very rugged, and where the great bulk of the water runs away and comparatively very little of it enters the surface of the ground. The consequence is, that in these districts there is very little spring water, while in the chalk and sand you have much spring water. In considering the quantity of the rainfall, and the useful purposes to which it may be applied, all these circumstances have to be taken into account. With regard to the reference made to the spots on the sun as bearing upon the rainfall, I believe that that is only a coincidence. There have been spots on the sun at all times, and I do not believe that these phenomena can have sufficient influence to affect materially the power of evaporation which acts upon the surface of the ocean, or the quantity of rain that falls. We have heard it stated that the felling of the timber in India has considerable influence on the climate, and that the droughts which have been suffered in that country are due to the destruction of the forests. We have had four or five uncommonly wet summers which may have been accompanied by spots on the sun, and the interference thus made with the sun's usual surface may have affected its action; but I can scarcely believe that the result is at all appreciable, and that if the sun has been thus affected, we can measure the extent of the interference. We are not yet in a condition to be able to determine any law as to the succession of droughts and wet weather. There are some districts which are rainless; there are, as we have heard, others where there are 610 inches of rain, so that the rainfall in the latter is not 125 times the ordinary amount, but between 500 and 600 times the average fall. Therefore I think that any calculations of the kind we have heard are as unstable and uncertain as the wind that blows, and which has so great an effect on meteorology. It may be that in some parts of the country the figures of the rainfall may be multiplied by themselves to produce the results met with in other parts. If you take 10 inches on the east coast as against the 200 inches found on the west coast the one figure can be multiplied by twenty to produce the other; and you cannot draw any conclusion from this beyond knowing that the figures have been taken for the purpose of multiplication. I do not believe we have any sufficient information at the present time to enable us to say that a period of frost or cold,—hardly a glacial period,—is followed by a period of wet. It may be, and it may in past times have been, that we have suffered from a glacial period at one time, and at another from a period of excessive rain and denudation, but we can only reason to a certain extent as to the past by what we see at the present time, by that of which we have some certain knowledge. I have not in this paper endeavoured to speculate on the circumstances I have adduced, but have merely narrated the facts, and I believe that the best way of promoting scientific investigation is to collect a number of absolute facts, and present them in their bearing on each other. A friend

of mine calls them positive facts, but I say facts are facts. If we collect facts, and not speculations,—undoubted facts,—we may perhaps in time be able to draw certain positive conclusions, but as long as we are merely painstaking observers of facts we are not in a position to draw conclusions. I am very much obliged to you for the way in which my paper has been received.

The meeting was then adjourned.

ORDINARY MEETING, MAY 16, 1881.

REV. R. THORNTON, D.D., VICE-PRESIDENT, IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced :—

LIFE MEMBER :—Rev. O. D. Miller, M.A., United States.

MEMBER :—Rev. J. P. Kempthorne, New Zealand.

ASSOCIATES :—C. Bryant, Esq., Cheshire ; Rev. W. C. Ley, M.A., Lutterworth ; Rev. M. W. Maclean, M.A., Canada ; Rev. J. W. Pratt, M.A., London ; F. J. Sowby, Esq., Gainsborough.

Also the presentation of the following Works for the Library :—

“Proceedings of the Royal Society.”	<i>From the same.</i>
“Proceedings of the American Geographical Society.”	<i>Ditto.</i>
“The Chain of Ages.” By Rev. W. B. Galloway, M.A.	<i>Ditto.</i>
A Work by Professor Reinsch.	<i>Ditto.</i>

The following paper was then read by the Author :—

RAINFALL AND CLIMATE IN INDIA. By SIR JOSEPH FAYRER, K.C.S.I., M.D., F.R.S.

THE subject of this paper was suggested by one read here on the 7th March last by Mr. Bateman in which he dealt chiefly with the rainfall of our own islands : in the course of his remarks he pointed out its importance in reference to the production of food, and the regulation of our own climate, which, as regards its peculiarly variable character, and notwithstanding its attendant drawbacks, is one of a combination of causes “which contribute largely to the fertility of the soil, the perseverance, hardihood, and energy of the people, and to the enjoyment of life.”

THE MAP.—The accompanying Map has been kindly prepared by the *Geographer at the India Office*, and is published by his permission : it is at once a map of the Physical Geography as well as of the Meteorology of India, coloured as regards the latter in accordance with the last published report of the Meteorological Department at Calcutta.

The author alluded to the meteorology of other countries, where the physical laws that regulate the production and distribution of rain are less subject to perturbation than in the northern latitude of our sea-girt islands, and referred to the benefit of a sufficient supply, and the evils that result from a deficiency of rain, as seen in some regions which are naturally almost rainless, or in others, which are in certain seasons the subject of drought.

In the discussion which followed, the remarks made in reference to the rainfall in other countries appeared to excite some interest; it therefore occurred to me that a brief account of this branch of meteorology in India—a country in which all are interested—might be acceptable as a supplement to Mr. Bateman's interesting paper, showing the results of excess or deficiency of rain, the operation of the meteorological laws that govern its distribution in tropical climates, and as affording opportunity for the further discussion of a subject which was far from being exhausted on that occasion.

As introductory to the meteorological question, let me say a few words on the geographical and physical features of that part of the world to which I am about to ask attention.

The physical peculiarities of a country have so much influence in determining the quantity, the distribution, and the periods of the rainfall, that it is expedient to take a brief general survey of them before considering details of the rainfall itself. It is necessary also to understand the conditions under which the atmospheric moisture originates, and the relations that the land and ocean bear to each other in respect of modifications of the air-currents and distribution of rain.

The subjects of climate and of meteorology are of great interest, and nowhere more so than in India; but, as even the most cursory glance at so comprehensive a matter would occupy more time than is allotted to a single communication, I must restrict my remarks chiefly to the rainfall, touching only incidentally on the climate and such other matters as may naturally be suggested by it.

A few words on the origin of rain. The gaseous envelope of nitrogen and oxygen by which our globe is surrounded, and which moves with it in its rotation and revolution, extends to a height or depth of forty to fifty miles in gradually decreasing density, where it may be considered, practically, to cease; though, doubtless, it extends further in an extremely attenuated form! This atmosphere is

permeated by another and no less important one of watery vapour, always present, though in varying quantities, according to circumstances of temperature, time, and place, derived from the ocean, the seas, lakes, pools, rivers, streams,—from the surface of the earth itself, and from all living things animal or vegetable. It is constantly rising and permeating the air up to the point where saturation is reached, or until it is condensed by cold, into the sensible form of dew, clouds, or rain. On the varying conditions under which evaporation, on the one hand, and condensation on the other, take place, the rainfall depends.

The ocean is the great source whence atmospheric moisture is derived ; it is the great bourne to which it all returns. As the wise king said,—“ All the rivers run into the sea, yet the sea is not full ; unto the place from whence the rivers come, thither they return again.”

The atmosphere is the great sponge that soaks up and holds the watery vapour, which, when condensed, falls into the ocean, or on to the earth, to fill the rivers, to sink into the ground, whence it rises again in springs, collects in wells, lakes, and pools, or runs off in streams and rivers, diffusing itself everywhere, ministering to the wants of nature, and supporting life and organisation ; finally, to return to the ocean, again to rise in vapour, and repeat the endless circulation, without which life would be extinct, and the earth reduced to the condition of the moon, or of some effete worn-out world.

Water is always evaporating ; expose a cup of it to the air and it will soon disappear,—all the sooner if the air be dry and warm. So will ice or snow, in regions where the cold may prevent it from melting, but not from evaporating ; it is not lost, but assumes the impalpable form of vapour, and mingles with the air. This process is going on wherever there is water, but more especially from that part of the ocean which, lying near the equator, is subjected to the continued heat of the vertical solar rays. Here vaporisation is most active, and the warm air, saturated with moisture, rising in constant currents to higher regions, is replaced by colder and heavier currents rushing in from towards the poles ; in turn to be heated, charged with moisture, ascend, and so keep up a constant circulation, making the equatorial rain-belt the great distillery of nature.

“The wind goeth towards the south, and turneth about unto the north ; it whirleth about continually, and the wind returneth again according to its circuits.” These perennial northern and southern currents, or trade winds, getting their

easterly direction from the earth's rotation, are always blowing towards the equator ; whilst there is a regularity of climatic phenomena unknown beyond the tropics, where many and varied changes occur.

The northern hemisphere, containing much more land than the southern, is subject, on account of deflected ocean currents and "thermal" changes, resulting from the varying radiations of the land and sea, to greater perturbation of the conditions that determine the formation and distribution of aërial moisture, and other meteorological phenomena ; and it is to one of the most remarkable of these, the monsoons of the Indian Ocean, that the climate and varying seasons of India owe much of their peculiar character.

Monsoons.

The great producers and distributors of rain in India, then, are the monsoons or periodic seasonal winds. The term is of Arabic origin, from "Mausim," a season, and is applied to the great air-current that blows for one half of the year northwards, carrying the moisture taken up from a vast extent of the Indian Ocean, extending from Africa to Malacca ; whilst for the other half of the year it blows from the opposite direction. The north-east monsoon corresponds to the north-east trade, and would be constant were it not for the counteracting influences which disturb the atmospheric equilibrium. Monsoons are not peculiar to India, but occur in other regions where there are similar distributions of land and water. The Indian monsoons are caused in the following manner :—About the commencement of April, when the whole surface of the continent of India becomes hotter than the sea, the rarified air rises, and is replaced by the comparatively cooler currents drawn in from, and laden with moisture taken up by evaporation from, the Indian Ocean. This is the south-west monsoon, which, rising to higher regions, or, being intercepted by the mountain ranges, condenses its moisture in rain on the Western Ghâts and on the coast of Aracan. Following a north-eastern course, it gradually loses its influence and its rain, as it approaches the northern limits of the continent. About October the winds are variable ; there is a reversal of the current, which begins to blow southwards for the most part as a dry wind, till on the Coromandel coast it brings moisture from the Bay of Bengal, which falls as rain on the coast of the Carnatic and on the Eastern Ghâts ; whilst some parts of the South of India receive a certain amount of rain with each monsoon.

This winter or north-east monsoon, which on land has a northerly or north-westerly direction, returns again as a south-westerly current in the upper regions of the atmosphere, having been heated in the south. It is sometimes called the anti-monsoon, appears to be felt in the Himalayas, and, descending in the North-West Provinces and Punjaub, brings their winter rains.

The rainfall on the southern and western coasts is the heaviest; but there are many variations and peculiarities due to local conditions,—elevated regions receiving almost a deluge, whilst some lower areas are very dry. All the conditions favourable to the condensation and fall of rain exist in certain localities, whilst the converse obtains in others.

A few words on the geography and physical characters of the vast rainfall area we are about to consider. British India, the great central and southern promontory of Asia, situated between the eighth and thirty-fourth parallels of north latitude, and the sixty-sixth and ninety-fifth meridians of east longitude, includes also a portion of Afghanistan in the north-west, and part of the country on the eastern side of the Bay of Bengal, extending from Chittagong to Tenasserim as far south as the tenth parallel of north latitude. It has a coast-line extending for more than 4,000 miles. It is about 1,900 miles in length from Peshawur to Cape Comorin; and about the same distance in breadth from Sudya,—a frontier post in Assam,—to Kurrachee at the mouth of the Indus; it is 900 miles from Bombay to Point Palmyra in Orissa. The superficial area is above 1,500,000 miles,—equal to the whole of Europe, excluding Russia; three-fifths being under British rule, are, therefore, with the exception of certain districts, under the observation of the Meteorological Department of Government. The geographical boundaries are well defined, on the north by the Himalayas, a chain of stupendous mountains (the highest in the world), 150 miles in average breadth, running north-west and south-east in a crescentic manner, in a double range, which is traversed by great rivers (Ganges, Sampu, Indus) running east and west for 600 miles; the valleys reaching to a depth that places their bases at not more than 6,000 to 10,000 feet, whilst its mean height is from 16,000 to 20,000 feet above the sea level, Mount Everest and Kinchinjunga, the loftiest peaks, being over 29,000 and 28,000 feet high. This barrier, which separates and isolates India from Turkistan and Tibet, is crossed by passes 17,000 feet above the sea, nearly on a level with the line of eternal snow. On the north-west it is bounded by the edge of the plateau of Afghanistan and Beloochistan, rising to the Suliman and Hala mountain

ranges, some of the peaks of the former reaching to a height of 11,000 feet; on the north-east, the heights of Assam, the Naga Hills, divide the drainage of the Brahmapootra from that of the Irawaddy. It is separated from Burmah and Siam by the Youmadong and other mountain chains, whilst its coasts have the Bay of Bengal on the east, and the Arabian Sea and Indian Ocean on the west and south, enclosing a table-land of from 1,500 to 3,000 feet above the sea level, between the Eastern and Western Ghâts; this table-land slopes gradually to the east, most of the rivers running to the Bay of Bengal. The mountains are separated into two distinct systems by a continuous low land extending from the Arabian Sea to the Bay of Bengal. This is washed by the streams of the Ganges and its tributaries on the east, by the Indus and its branches on the west. The western slope includes Scinde, the Punjaub, and part of Rajpootana; the eastern, which is divided from it by a water parting 900 feet above the sea level, contains the greater part of the North-west Provinces, Oude, and the lower provinces of Bengal. The north part of this lowland skirts the foot of the hills, and forms the damp region, called the Terai. The first or outer range of hills known as the Siwalik, and Salt Range, is about 2,000 feet high, whilst the valley separating these from the Himalayas is known as the Doon; the forest-clad base of the mountain range is known as the Bhabur. South of the lowlands of Hindostan is the triangular table-land of the Deccan, extending through 20° of latitude. The basins of the Indus and the Ganges are its base; its sides are the Eastern and Western Ghâts and the littorals of the Arabian Sea and Bay of Bengal, whilst the table-land seldom exceeds 2,000 to 3,000 feet high, and gradually slopes to the east. The Western Ghâts rise to 4,000 and 5,000 feet; Dodabetta, the southern peak in the Neilgherries, is 8,640 feet high. The Eastern Ghâts are not so high, and much less continuous than the Western. The whole of India forms two great watersheds; that of the Bay of Bengal on the east; that of the Arabian sea on the west. The former includes the whole of the peninsula east of the Aravulli Hills and Western Ghâts; the latter, the basin of the Indus, Nerbudda, Tapti, and the declivity of the Western Ghâts. The water, parting, runs nearly vertically from Cashmere to Cape Comorin. This vast country, which has nearly two hundred and fifty millions of inhabitants, of races more ethnically distinct, and more numerous than those of Europe, has, owing to the nature of its physical geography and the extent of its area, every kind of climate, from that of the Torrid to the

Arctic zone ; possessing lofty mountains, elevated table-lands, alluvial valleys, desert tracts, and plains ; noble rivers, extensive swamps, jungles, and magnificent forests ; it has characters that invest it with peculiar interest for the meteorologist ; for, as Mr. Blanford says, "it offers peculiar advantages for the study of meteorology, exhibiting at opposite seasons of the year an almost complete reversal of the wind system and of the meteorological conditions depending on it. Its almost complete isolation, in a meteorological point of view, from the rest of the Asiatic continent by the great mountain-chain along its northern border simplifies to a degree almost unknown elsewhere the conditions to be contrasted, by limiting them to those of the region itself and the seas around. India also presents in its different parts extreme modification of climate and geographical feature. In its hill stations it affords the means of gauging the condition of the atmosphere at permanent observatories up to a height of 8,000 feet. The periodical variations of temperature, vapour, tension, and pressure, both annual and diurnal, are strongly marked and regular ; and these changes proceed so gradually that the concurrence and inter-dependence of these several phases can be traced out with precision." As regards climate, India may be divided into :—1. Himalayan, including Bhotan, Nepal, Gurhwal, Cashmere, and Cabul. 2. Hindostan, which extends along the foot of the Himalayan range, and includes the alluvial plains of the great rivers Ganges and Indus, with their numerous tributaries, as far south as the Vindyah mountains. 3. Southern India, or the Deccan, which consists of elevated table-lands, littoral plains intersected by numerous rivers, mountain ranges, and isolated hills. The Aravulli and Chittore hills, the Vindyah chain, rising to over 2,000 feet, covered with forest vegetation, with its off-set the Satpooras, traverse the continent connecting the Eastern and the Western Ghâts."

The rainfall varies according to latitude, elevation, and physical characters of the country, Northern India being less influenced than the Deccan by the south-west monsoon. The climates also vary ; but in the plains of Hindoostan and the table-lands of the Deccan, the heat is intense, though often greatly modified by moisture. The effects of a dry or damp atmosphere at the same temperature, however, are very different. Dry air, in motion, at a temperature of 100°, is more tolerable than stagnant air loaded with moisture at 80°. The hot dry winds of Northern India are more endurable than the cooler but saturated atmosphere of Lower Bengal or parts of Southern India.

The *mean* temperature of a few well-known stations is as follows:—

Calcutta, 8 feet above sea level, is in May (hottest month) 89° ; in January, 70° ; but it ranges between 45° in the coldest and 92° in the hottest months.

Madras, sea level.—June (hottest), 88° ; January, 76° . Range, 72° to 92° .

Bombay, sea level.—May (hottest), 86° ; January, 74° . Range, moderate.

Peshawur, 1,056 feet above sea level.—June and July (hottest), 91° ; January, 52° . Range, great.

Punjab, 900 feet above sea level.—June (hottest), 89° ; January, 54° . Range, from frost to intense heat— 110° and more.

Bangalore, 3,000 feet above sea level.—May (hottest), 81° ; January, 69° . Range, moderate.

Poonah, 1,089 feet above sea level.—May (hottest), 85° ; January, 70° .

Belgaum, 2,200 feet above sea level.—April (hottest), 81° ; May, 78° ; June, 75° . December (coldest), 70° .

The coldest months are December and January; the hottest, April, May, and June.

There are fluctuations in temperature owing to hot, dry winds, sea and mountain breezes, great river basins, the presence of forests, tracts of jungle and vegetation, arid treeless rainless deserts, which give local peculiarities of climate; but it may be said, generally, that there are three distinct seasons in India—the hot, the rainy, and the cold,—which vary in duration and times of setting in; but approximately the cold season extends from November to March, the hot from March to June or July, and the rainy season from that to October or November, these seasons being greatly influenced by the monsoons. The south-west monsoon commences with storms of thunder and wind, which are soon followed by the bursting of the rain on the Malabar coast, in May, but reaches regions further north later in the year. Its force and influence, indeed, are well-nigh spent ere it passes the twenty-fifth parallel of north latitude. The Carnatic and Coromandel coasts, being sheltered by the Western Ghâts, are exempt, when the west coast is deluged with rain.

About Delhi and in the north-west the rains begin towards the end of June, and fall in diminished quantity. In the Punjab, near the hills, the rainfall again increases; but in the Southern Punjab, and in the Great Desert regions, there is very little rain,—in some parts none. There are belts or tracts of country commencing, in Sind and the north-west, almost

rainless, or with a rainfall as low as two inches; whilst the highest fall is at Cherra Poonjee, in the Khasia hills, on the north-east frontier, where 600 inches fall in the year. Next to this, the Western Ghauts have the greatest rainfall; at Mahabuleshwar 253 to 300 inches, and on the Tenasserim coast 180 inches fall yearly. The provinces in the North-east receive rain in rather a different manner; the wind which brings the rains to that part of the continent blows from the south-west, over the Bay of Bengal, till, meeting the mountains, it is deflected. The prevailing wind, therefore, in this region is south-easterly, and from this quarter Bengal and the Gangetic valley receive their rain; when it reaches the mountains in the north-west, it is compelled to part with more of its moisture.

Near the sea, where the land is low and the temperature high, very little rain falls; at Kurrachee it was, in 1879, 1·92 inch. In inland districts, as at Peshawur, in 1879, only 5·84 inches fell; whilst the rainfall in Calcutta averages 63; in Madras, 48·50; in Bombay, 74; in Delhi, 27·5; in Meerut, 27; in Lahore, 21; in Mooltan, 7; in Benares, 37; in Bellary, 18; in Bangalore, 35; in Poonah, 27; in Belgaum, 49; in Kamptee, 22; in Akyab, 198. The amount of humidity in the air also varies greatly. Flat hot plains, like Scinde, where there is little or no rain, have an atmosphere almost saturated, and on some of the lower mountain ranges, in Bengal, and in many districts near the coast in Southern India, the air is very damp. But the elevated table-lands of the Deccan and Central India, and the hot sandy plains of North-west India, have a dry air during the months of May and June, which blows like a furnace blast, heated and desiccated by the burning country over which it has passed!

The north-east monsoon commences gradually in October, and is attended with dry weather throughout the Peninsula generally, except on the Coromandel coast, where it brings rain from the Bay of Bengal, between October and December, after which it is dry until March, when it gives place to variable winds, which last till about June, when the heat is great and the tendency is then from the south. About the end of May the south-west monsoon again sets in, bringing a few showers, known as the lesser rains, before the regular rains set in. In the hill stations of Darjeeling, Mussoorie, Nainee-tal, Murree, Simla, and generally in the elevated provinces of the lower ranges of the Himalayas, also at Ootacamund, Conoor, Wellington, Mahabuleshwar, in the Neilgherries, and Ghauts—stations at elevations of 5,000 to 7,000 feet—the climate is genial, the rainfall moderate, it

is healthy in summer, and almost as bracing in winter as Europe. These are favourite health resorts, and may, perhaps, become the sites of future colonisation, for it seems probable that there the European will thrive and continue to reproduce his race, which it is said would cease to exist in the plains after the third generation.

The following extracts from Mr. J. Talbot Wheeler's "Rare and Curious Narratives of Old Travellers in India in the Sixteenth and Seventeenth Centuries," published in Calcutta in the year 1864, gives a quaint and graphic account of the Monsoons as observed in those days, by Purchas and Van Linschoten.

The former, who visited India somewhere about 267 years ago, says :—

"THE mightie Riuers of *Indus* and *Ganges*, paying their fine to the Lord of waters, the Ocean, almost vnder the very Tropick of *Cancer*, do (as it were) betwixt their watery armes, present into that their *Mother's* bosome, this large *Chersonesus* ; A Countrey full of Kingdomes, riches, people, and (our dewest taske) *superstitious costomes*. As Italy is diuided by the *Appennine*, and bounded by the Alps, so is this by the Hills which they call *Gate*,* which goe from East to West (but not directly) and quite thorow to the *Cape Comori*, which not only haue entred league with many In-lets of the Sea, to diuide the soyle into many Signiories and Kingdomes, but with the Ayre and Natures higher officers, to dispence with the ordinary orders, and established Statutes of Nature, at the same time, vnder the same eleuation of the Sun, diuiding to Summer and Winter, their seasons and possessions. For where as cold is banished out of these Countries (except on the tops of some Hills) and altogether prohibited to approach so neere the Court and presence of the Sun ; and therefore their Winter and Summer is not reckoned by heate and cold, but by the fairnesse and foulnesse of weather, which in those parts divided the yeere by equall proportions ; at the same time, when on the West part of this *Peninsula*, between that ridge of Mountaines and the Sea, it is after their appellation Summer, which is from September till April, in which time it is alwayes cleere skie, without once or very little raining ; on the other side the hills, which they call the coast of *Choromandell*, it is their Winter ; eury day and night yeelding abundance of raines, besides those terrible thunders which both begin and end their Winter. And from April till September in a contrary vicissitude ; on the Westerne parte is Winter, and on the Easterne, Summer ; insomuch that in little more than twentie leagues iourney in some place, as where they crosse the Hills to *Saint Thomas*, on the one side of the Hill you ascend with a faire Summer, on the other you descend attendant with a stormy Winter. The likes, saith *Linschoten*, hapneth at the *Cape Rosalgate*, in Arabia, and in many other places of the East.

* He alludes to the Western Ghauts.

“Their Winter also is more fierce then ours, every man providing against the same, as if he had a voyage of so many moneths to passe by Sea, their ships are brought into harbour, their houses can scarce harbour the Inhabitants against the violent stormes, which choake the Rivers with Sand, and make the Seas vnnaugible. I leaue the causes of these things to the further scanning of Philosophers; the effects and affects thereof are strange. The Sea roareth with a dreadfull noyse: the Windes blow with a certaine course from thence: the people haue a Melancholike season, which they passe away with play. In the Summer the Wind bloweth from the Land, beginning at Midnight, and continuing till Noone, neuer blowing about ten leagues into the Sea, and presently after one of the clock vntill midnight, the contrary winde bloweth, keeping their set-times, whereby they make the Land temperate, the heat otherwise would bee vnmeasurable.”

Van Linschoten, who visited Southern India in 1583 or thereabouts, says:—

“The Summer beginneth in September and continueth till the last of April, and is alwaies cleare skie and faire weather, without once or very little raining: Then all the ships are rigged and made ready to sayle for all places; as also the Kings Armie to keepe the Coast, and to convoy Merchants, and the East windes beginne to blowe from off the Land into the Seas, whereby they are called *Terreinhos*, that is to say, the *Land windes*. They blowe very pleasantly and cooly, although at the first, by hanging of the weather they are very dangerous, and cause many great diseases, which doe commonly fall in *India*, by the changing of the time. These winds blowe alwaies in Summer, beginning at midnight, and continue till noone, but they never blowe above ten miles into the Sea, from off the coast, and presently after one of clocke, until midnight the West winde bloweth, which commeth out of the Sea into the Land and is called *Virason*. These winds are so sure and certain at their times, as though men held them in their hands, where they make the Land very temperate, otherwise the heate would be unmeasurable.

“It is likewise a strange thing that when it is Winter upon the coast of *India*, that is from *Diu* to the Cape de *Comorin*, on the other side of the Cape de *Comorin*, on the coast called *Choramandel*, it is clean contrary, so that there it is Summer, and yet they lie all under one height or degrees, and there is but seventy miles by land betwene both coasts, and in some places but twenty miles, which is more, as men travel overland from *Cochin* to *Saint Thomas* (which lieth on the same coast of *Choramandel*), and comming by the Hill of *Ballagatte*, where men must pass over to go from the one coast to the other: on the one side of the Hill to the top thereof it is pleasant clear sunne shining weather, and going down on the other side there is raine, winde, thunder and lightning, as if the world should end and be consumed; which is to be understood, that it changeth from the one side to the other, as the time falleth out, so that on one side of the Hills it is Winter, and on the other side Summer; and it is not only so in that place and Countrie, but

also at Ormus, the coast of *Arabia Felix* by the Cape of *Rosatgatte*, where the ships lie, it is very still, cleare, and pleasant water, and faire Summer time ; and turning about the Cape on the other side, it is raine and wind with great stormes and tempests, which with the times of the yeere doe likewise change on the other side, and so it is many other places on the Orientall Countries."

Having given some account of the monsoons, which are the great rain-carriers, and of the physical characters of the country which so largely influence its distribution, I now proceed to describe some facts relating to the rainfall, and the effects thereby produced.

It is only within the last ten or twelve years that the comprehensive system of meteorological observation now carried on has been in operation, but it promises to yield valuable results ; and one can hardly over-estimate the importance of such researches towards a thorough comprehension of the laws that regulate atmospheric pressure, vapour tension, and the supply of rain, when we consider their bearings on the causes of scarcity and famines which from time to time affect large tracts of country, and sweep away millions of lives.

The annual meteorological reports of India abound in careful, comprehensive, and scientific work, and in information that must ultimately be productive of valuable results to the people of India.

A glance at a hyetographical map of India shows that there are areas of rainfall of various degrees of irregular form and extent, corresponding to the latitude, physical characters of country, and proximity to sea or hills. Let me briefly describe them.

In the north-west corner of India there are arid regions, which have a rainfall of less than 15 inches ; in many parts of it, indeed, it is much less ; whilst the desert tract of the Thur is to a great extent rainless. This area includes Sind, part of the Punjab, and Rajputana. Then there is a zone with an annual fall of between 15 and 30 inches, surrounding the arid region on the north and east in a belt of 100 to 200 miles wide, which includes Delhi and Agra. This is the northern dry zone. The upper parts of the valley of the Ganges, Central India, and the eastern coast of the Madras Presidency, have a fall of between 30 and 60 inches.

There is a southern dry zone, which extends from Nassick to Cape Comorin, at a distance between the two seas. The deltas of the Mahanuddi and Ganges, and the lower part of the Gangetic Valley, have a fall of between 60 and 75 inches. There are two belts of excessive rainfall,—one extending

along the Aracan coast, from the mouth of the Irawaddy up the valley of the Brahmapootra. The other, on the west coast of India, from Cape Comorin to the Tapti—from the seashore to the summit of the Ghauts! It is in these regions that the most remarkable falls occur, for the reason that they are placed in the direct course of the south-west monsoon, catching its first impact at heights where vapour is most readily condensed into rain. Mr. Bateman told us that at 2,000 feet the greatest condensation takes place in our islands; it is at a greater elevation in India, and the most striking illustration is found at Cherra Poonjee, in the Khasia hills, where, at 4,000 feet above the sea, 600 inches of rain fall in half the year. Here the locality is on the edge of an abrupt mountain ridge and plateau, situated about 200 miles from the Bay of Bengal, the intervening country being flat alluvium, covered with rivers and swamps. Over this the south-west monsoon blows, laden with moisture from the ocean, which is increased by absorption from the wet country over which it passes. On the plateau of Cherra Poonjee the first condensation takes place, and the fall is so great that in a few weeks the plains of the Sylhet district, lying at the foot of the hills, are converted into a sea; whilst a few miles inland, and at little greater elevation, the fall is reduced to less than one-half. I spent my first year in India at this station, and the 610 inches I registered on that occasion gave me an interest in rainfall that I have never lost.

At Mahabuleshwar, in the Western Ghauts, the conditions are somewhat similar, but there the fall is less, amounting only to about 300 inches. In these instances, we have all the conditions favourable to the production of rain in the highest degree, but these excessive rainfalls in certain elevated regions are quite local, and no more represent the average rainfall of all India than does the dryness of the desert tracts in the north-west; or the heavy fall on the hills on the west coast of Britain, in Cumberland or Scotland, the average rainfall of Great Britain. There is, however, an analogy between India and Britain in this respect, much as they differ otherwise in the nature of the distribution of rain, that the heavy falls at Cherra Poonjee and Mahabuleshwar are paralleled by the heavy falls on the slope of Ben Lomond, Glengyle, or the Cumberland hills; while the heavy rainfall on our western coasts—the result of the warm moist air coming from the Atlantic and Gulf Stream—resembles the south-west monsoon, which deposits its heavy rain on the Western Ghauts and on the coast of Aracan—proximity to the Equator and high temperature in the latter cases making the effects so much more striking.

The average annual rainfall in Equatorial regions is, I believe, about ninety-five inches; in the temperate regions thirty-five inches, that for the whole of Tropical India is considerably less; while for Hindostan it would be reduced to a lower figure, if we include in the average the almost rainless Thur desert; but, if the rainfalls of the Himalayan be included, the average would, no doubt, be considerably raised. The problems presented by the rainfall are of a comparatively simple character in Southern India and Bengal, where the influence of the monsoon is prominently felt; but in the northern regions of Hindostan, where the influence of mountains, river basins, and the desert come into operation, there must of necessity be perturbation of the direction of the air currents and of the amount of rain. Further observations will, no doubt, in time throw much light on these points.

For the purpose of estimating the general results of rainfall, Mr. Blanford divides India into rainfall provinces, each of which may be represented by a general average, without any disregard of the normal variation of distribution, and be taken as the average rainfall of all the stations included in it; except that when particular stations, such as Cherra Poonjee in Khasia, Mount Abu in Rajputana, Matheran, Mahabuleshwar, and Baura Fort on the Western Ghauts, &c., have a fall very greatly in excess of the majority of the stations, a fall which must be considered as purely local, only a half or third value is assigned in summing up in the general average.

The following table, taken from Blanford's Meteorological Report for 1879, gives the result of this estimate as regards certain localities. The areas of the several provinces have been measured on one of the Surveyor-General's maps:—

RAINFALL PROVINCES.		Area Square Miles.	Number of Stations.	Mean Rainfall, 1878.
				Inches.
1.	Punjaub Plains	118,000	29	21·66
2.	N.W. Provinces and Oudh...	82,000	42	37·35
3.	Rajputana.....	67,000	18	24·36
4.	Central India States	89,000	21	42·00
5.	Behar	30,000	8	42·31
6.	Western Bengal	38,000	6	51·24
7.	Lower Bengal	54,000	21	67·52
8.	Assam and Cachar	52,000	13	98·18
9.	Orissa and Northern Circars.	27,000	13	45·92
10.	South Central Provinces.....	61,000	14	49·22
11.	Berar and Kandesh	43,000	11	30·08
12.	Guzerat.....	54,500	9	35·98
13.	Sind and Cutch	66,500	10	9·24
14.	North Dakhan.....	48,000	14	28·68
15.	Konkhan and Ghauts	16,000	10	118·77
16.	Malabar and Ghauts	18,000	8	113·95
17.	Mysore and South Hyderabad	84,000	10	27·01
18.	Carnatic	72,000	29	33·34
19.	Arakan	11,000	4	171·05
20.	Pegu	32,500	6	74·91
21.	Tenasserim	10,500	4	170·73
Total.....		1,074,000		

Certain areas are yet imperfectly represented by rain-gauge stations, such as the Thur desert (about 65,000 square miles) in Northern Hyderabad, Jaipur, Singbhoom, and South Rewah, which, taken together, form about one-sixth of the whole. Omitting these from consideration, it appears that, on a rough approximation, there was, in 1878, a rainfall equal to 4·9 inches in excess of the average, over the whole of India and its dependencies, omitting seas and islands. This shows that, although the general character of the seasons is pretty constant, yet that there are annual fluctuations which perhaps recur in cycles and are more remarkable in some districts than in others; years of deficiency being conducive to imperfect irrigation of the land, which results in scarcity,—sometimes in famine.

In our own favoured land, where, with all its uncertainties of a variable climate, we have happily little or no experience of the desolation caused by a deficiency of rain, we can hardly understand what is implied by a failure of the rains in India. A charming and talented writer* in India has recently drawn

* P. Robinson.

a most graphic picture of it in the following words: "We in the West can hardly understand what it means that 'rain has fallen in India,' and it may seem, at first sight—so wide is the world, and so far apart the interests of races—a strange thing that a fall of rain should be magnified by such language as is often used. And yet in a year of threatened famine it is not easy to find in history a greater blessing than the sudden relief of a shower. Those who best know the land so sorely athirst,—who remember the dreary, leafless months, when, scathed by hot winds, the country side lies bare and brown under a sky of relentless blue, and who have had experience, too, of that first day of gathering clouds, when the face of Nature betokens a welcome to the coming rain; when almost in a single night the heat-cracked plains clothe themselves with grass, the fainting trees are lit up with the brightness of young leaves, and the world awakens on the morrow to a surprise of fertility,—these can best picture to themselves the true spectacle of the change that transfigures the face of India, when the clouds burst upon the empty fields. During the months of July, August, September, and October, which in other and more kindly seasons are rich with springing vegetation, and glad with the grace of standing corn, India lay, in 1877, wasting under a remorseless sun a great length of deadly days, while the ploughs stood idle under the old peepul tree in the centre of the village, and the men gathered gloomily about the headman's house; and sadly along the dusty highways went the tinkling feet of the women sent forth to the shrine by the river to supplicate the Goddess of Rain; day by day the peasant doled out for the present meal the precious store put by for sowing of his fields for the next year's harvest; day by day the women going to the well found their ropes yet another inch too short for the bucket to drop into the shrinking water. The cattle, long ago turned loose to find their food where they could, had given up the vain search in the fields, and lingered about the villages sniffing at the empty troughs, and lowing impatiently for the evening meal of bitter leaves which the lads were beating down from the trees in the jungle. And then there came over many a sad village a day when the bucket brought up no water from the well, when the grain-bag was empty and the cattle dead. Famine, stealthy and pitiless, prowled from village to village.

"Along the raised pathways between the empty fields the sad processions of mourners filed all day, bearing to the river-side the bodies of the dead. Yet the sun still flamed ruthlessly in the sky. The villages gradually emptied of men; some

had perished, while the rest had fled from their homes. To stay and hope was to die. At last came this rain. It did not bring food, but it brought the assurances of future harvests, and set the poor souls to work and to hope. Even food would grow cheaper, and be more freely obtained as those precious drops pattered; for the rain came at the right time. Just when further hope seemed useless; when, from the Indus, all along the Ganges valley to the Bay, from Oude, 'the garden of India,' and the principalities of the Rajput and Maharattah; from the wild fastnesses of Sind to the palm-fringed shores of the Eastern coast—the danger of a second year of drought was gathering force. Just when it seemed inevitable that half India must be involved in the disasters of Madras, the rain-clouds hurried up in a night, and the peninsula awoke from despair."

And after a most eloquent and touching account of the sufferings during July, August, and September, when the natural rain was withheld, he goes on to say:—

"So the days wore on to October. The sowing of seed for next year's food now seemed hopeless, and another year of famine inevitable; but the people did not repine. They waited patiently and pathetically, closing in round the famine-works and doing their day's labour for a day's food, enduring the 'evil times' without hope but without murmur. Indeed, hope looked like folly. The news came from every side that crops had failed. The horizon of disaster seemed expanding every day. Even the stout heart of the English official began to fail him, and he spoke dismally of the future. The sky was still unflecked with clouds, and a great multitude was dying at his gates. Then, suddenly at last, when it seemed almost too late, nature relented. A shadow of clouds had grown up on the horizon, the great rain-wind blew, driving a tempest of dust before it, whirling the dead leaves from the trees, and signalling that help was coming. The birds could be seen gathering in the sky, and the cattle turned their heads to the wind, for they could scent the approaching showers. There would be a strange gloom while the dust-storm was passing, and the people would throng, gazing at the clouds, or waiting for the rain that they knew was close behind. The streets would be filled with men and women, and all hands would be idle, and all tongues silent, and then, lo! the rain.

"First, great sullen drops, pattering one by one, and then, as if it could not come down fast enough or thick enough, the torrent descended. Not a mocking shower, but a glorious life-saving deluge, brimming the tanks to overflowing, and sending the dead weeds swirling down the nullahs. In

instant response the earth broke out into life. From forest and hill the familiar cries of Nature were again heard, the crane trumpeting to his mate as he stalks among the waving sedges, the cry of curlew and plover wheeling above the meres, the clamour of wild fowl settling upon the waters, the barking of the fox from the nullahs. The antelopes found out their old haunts, and from the villages the hyena and jackal skulked away to ravine and cave. Men and women came straggling back to their villages; ploughs were dragged afield; and, where a week ago was hopelessness and desolation, the only sounds of living things, the cries of beasts and birds over the corpses, there awoke a glad renewal of busy peasant life."

Something has been said and written on the influence of the solar spots on the cyclical changes that involve recurrence of dry seasons, and consequent scarcity or even famine, but no very definite conclusions have been reached in regard to their value as causal agencies. Mr. Blanford, however, says that he considers the evidence in favour of the general fact that the solar heat increases and decreases *pari passu* with the spots in the photosphere, is at least much stronger than any that has been brought forward in favour of the opposite view, but the numerical value of the variations has yet to be ascertained.

The relation of the sun spots to rainfall is yet a *questio vexata*.

The following are the Rainfalls of some of the principal Stations in India for 1879, compared with the average yearly falls :—

Stations.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total.	Average.
Calcutta .....	.....	0.28	.....	.....	3.07	7.52	12.21	12.54	6.22	2.41	.....	0.42	44.67	62.95
Dacca .....	.....	0.75	0.06	0.51	4.42	14.37	20.51	13.71	13.28	6.29	.....	0.90	74.80	73.29
Chittagong. .	0.36	.....	0.11	0.07	4.28	36.58	25.98	12.84	7.37	6.71	.....	1.01	95.31	103.36
Sibsagar	1.60	0.62	1.55	7.51	21.01	17.28	19.18	16.40	16.63	3.93	.....	0.38	106.14	94.45
Silchar .....	.....	0.51	5.48	4.73	16.26	32.49	17.75	22.82	10.22	2.83	.....	0.41	113.50	117.40
Cuttack .....	.....	0.07	1.15	.....	8.52	3.57	12.23	18.96	9.44	4.89	0.25	1.54	60.62	55.89
Hazaribagh .	.....	0.60	.....	.....	1.47	7.42	13.09	12.17	7.07	2.53	.....	.....	44.35	48.33
Patna .....	.....	1.37	.....	.....	0.02	5.23	9.78	12.87	8.93	6.53	.....	.....	44.73	40.26
Darjeeling ..	.....	0.47	.....	1.51	13.36	27.67	53.53	40.68	19.84	3.63	.....	0.23	160.92	120.17
Allahabad ...	.....	0.07	0.02	.....	.....	9.26	6.01	9.58	13.95	3.46	.....	.....	42.35	38.45
Lucknow	0.17	0.02	.....	.....	0.05	3.70	18.12	8.47	5.67	1.96	.....	0.16	38.32	39.52
Meerut	0.56	1.32	0.75	0.30	0.05	1.87	12.49	13.81	3.10	0.40	.....	0.92	35.57	27.44
Delhi .....	.....	0.21	1.03	0.05	.....	6.79	15.28	8.99	2.29	0.09	.....	1.22	35.95	27.49
Agra	0.66	0.11	0.15	0.03	.....	3.02	7.93	10.62	6.60	0.28	.....	0.20	29.60	25.77
Jhansi	0.40	.....	.....	.....	.....	2.90	16.76	17.10	9.17	0.91	.....	.....	47.24	35.08
Agmere .....	.....	0.89	0.27	0.02	0.13	6.56	0.38	16.71	2.03	0.10	.....	0.51	27.60	22.90
Saugor .....	.....	0.85	.....	.....	0.75	4.93	11.88	13.81	3.23	3.88	.....	.....	39.33	46.90
Jubbulpore .	.....	0.73	.....	.....	0.06	3.60	10.84	17.45	8.67	3.92	.....	.....	50.27	52.24
Mooltan .....	.....	.....	1.73	.....	.....	1.32	0.81	1.03	.....	.....	.....	.....	4.89	7.41
Lahore .....	.....	0.01	1.32	.....	0.01	5.48	1.13	7.49	3.12	0.17	.....	0.45	19.18	21.38
Peshawur ...	.....	0.46	2.73	0.24	0.14	0.05	0.47	0.97	0.16	.....	0.10	0.52	5.84	14.66
Ranikhet	0.23	1.55	3.32	0.53	0.20	9.65	21.78	13.30	2.01	2.40	.....	1.22	56.19	48.56
Chakrata ...	0.36	1.56	5.65	0.70	0.22	12.37	15.91	27.62	6.41	0.75	.....	0.81	72.36	61.07
Indore.....	.....	0.61	.....	.....	2.29	6.16	3.45	7.79	14.67	3.29	.....	.....	38.26	36.30
Deesa .....	.....	0.86	.....	.....	.....	5.42	9.42	15.12	1.59	0.01	.....	.....	32.42	24.13
Kurrachee ...	.....	.....	1.00	.....	.....	0.04	.....	0.87	0.01	.....	.....	.....	1.92	7.37
Bombay .....	.....	.....	0.03	.....	5.23	16.56	11.21	22.36	5.61	0.40	.....	.....	61.40	74.06
Belgaum .....	.....	0.05	.....	0.64	5.35	13.40	8.66	17.13	1.40	3.81	4.40	0.07	54.91	48.15
Nagpur .....	.....	0.63	.....	.....	5.92	13.46	8.48	13.50	6.54	3.65	.....	.....	52.18	43.71
Bellary* .....	.....	0.39	.....	0.59	3.03	1.50	7.34	2.98	3.54	3.03	0.86	0.02	23.28	17.57
Bangalore* ..	0.33	1.38	3.19	0.26	6.58	2.93	7.20	3.56	4.76	8.35	2.13	.....	40.67	35.46
Madras*	1.30	.....	1.50	.....	4.43	2.10	4.30	6.61	0.54	18.23	10.91	4.33	54.25	48.56
Rangoon.....	0.04	.....	.....	4.57	12.17	15.12	19.14	20.25	18.66	8.48	.....	.....	113.69	101.10
Akyab.....	.....	.....	.....	.....	10.82	54.02	60.10	58.83	24.29	16.02	.....	3.16	227.24	197.98

* The fall at these three Stations in September, October, November, and December, shows the effect of the north-east monsoon as a wet wind.

I have taken from the meteorological report for 1878 the rainfall in a number of stations in illustration of the influence of season and the monsoons in different regions of India; 1878 seems to have been an exceptional year, with peculiar variations from the ordinary conditions, for, whilst unusually dry in some, it was unusually wet in other districts. The general result was an average rainfall for the whole country registered, 4·9 inches in excess of previous years.

The following averages of a number of previous years are instructive. In Calcutta, for example, 65·80 inches fell, the greatest falls being in the months of,—June, 11·78; July, 12·77; Aug., 13·96; Sept., 10·15.

In Chittagong, the greatest falls were in,—June, 21·35; July, 21·93; Aug., 21·71; Sept., 14·05. The whole rainfall was 103·7.

In Bombay, the whole rainfall was 74·20. The greatest was in,—June, 20·95; July, 24·27; Aug., 15·21; Sept., 10·71.

In Kurrachee the fall was 7·61. The greatest being in,—July, 2·97; Aug., 2·10; Sept., 0·81; Dec., 0·22; Jan., 0·67; Feb., 0·26.

In Mangalore, on the west coast, in the full intensity of the south-west monsoon, the fall was 134 inches. The greatest falls were in:—June, 40·09; July, 37·68; Aug., 23·14; Sept., 11·70; Oct., 8·55.

In Madras, 48·15 fell. The greatest falls were in,—Oct., 10·73; Nov., 13·0; Dec., 4·99; Jan., 0·65, showing the influence of the wet north-east monsoon.

In Tinnevely, the fall was 28·16 in the whole year, greatest in,—Oct. 6·25; Nov., 9·86; Dec., 2·63; Jan., 1·55.

In Southern India at several stations, as, for example, Coimbatore, Bangalore, and others, both monsoons are felt, and a certain amount of rain is due to each.

Irrigation.

Though a great part of the continent of India is amply supplied with rain, there are extensive regions where the normal quantity is so small that it is insufficient to produce the crops that are necessary for the support of the population, and where, without the aid of artificial irrigation, the land would be sterile. This irrigation is effected by reservoirs, canals, and wells. In regions where the yearly rainfall is less than 15 inches irrigation is always necessary; such are the arid zone in the north-west, including most part of the Punjab, the great desert tracts of the north-west, and in that known

as the southern arid region, occupying the central portion of India from Nassick to Cape Comorin !

In regions having a rainfall of between 30 and 60 inches, such as the upper part of the valley of the Ganges and the eastern coast of the Madras Presidency, irrigation is often needed, and great distress has been caused by the want of it. Where the rainfall is between 60 and 75 inches, as in the deltas of the Mahanuddi and lower part of the Gangetic valley, irrigation is looked on as a luxury—often useful, but not necessary, except in exceptional years. There are two belts of excessive rainfall—the coast of Aracan, extending from the Irrawaddy to the valley of the Brahmapootra ; and the west coast of India ; where the need for irrigation never exists. In those wet belts, where a superabundance of rain falls, embankments are necessary to preserve the crops and villages from destructive floods ; whilst the maintenance of the river embankments in Lower Bengal is an important part of the duties of the Irrigation Department ; for the cultivation of the land is entirely dependent on their efficiency. This, however, is the result of the land lying below the flood level of the river rather than the excessive rainfall. There are upwards of 2,000 miles of such embankments in Bengal, under the charge of the Irrigation Department, kept up by the State. Mr. Bateman alluded to artificial irrigation in Ceylon and India, and to the great works that had been constructed in past ages for the purpose, many of which had fallen into disrepair and disuse ; and he mentioned the canals that have been constructed by the British Government with the view of irrigating those tracts where the natural rain supply is deficient during the whole year, or where it is so partial that it fails to supply the needs of cultivation, and he contrasted the condition of a country so situated with our own more favoured islands, where drought is infrequent.

The Government of India has given much attention, of late years, to artificial irrigation for those districts that are most in need of it, and many gigantic works have been completed, whilst others are in course of construction for this purpose ; some are altogether new, others are the reconstruction on former lines of old works of the Hindoo and Mahomedan periods, and the importance they must have attached to irrigation is manifested in the canals, anicuts or dams of rivers and reservoirs, many in ruins, left by them. It would be impossible for me now to give a detailed description of the irrigation works, ancient or modern, in use in India. I can merely give a general sketch of the great canal system actually in existence, supported and carried on by Government.

About sixty years ago the British Government seriously

took up the subject of irrigation by canals or other great works ; since then, the work has been steadily going on, and with it the names of Cautly, Cotton, Fife, Baker, and others, are honourably associated ; nearly the whole of the peninsula is now provided in those regions where water is needed, and a vast area of land, that would otherwise be sterile, is brought under cultivation. The works, consisting of canals of various sizes, dams or anicuts, lakes and tanks, extend from Himalaya to Comorin, and, to effect this, great rivers, such as the Ganges, Indus, Jumna, Sone, Sutlej, Ravi, Mahanuddi, Godavery, Kistna, Cavery, Colerun, Tunga-Badra, and Tapti, have been laid under contribution, with many other lesser streams, for the formation of artificial lakes and reservoirs ; whilst several others are in project. An idea of the magnitude of the work may be derived from the length in miles of the canals that form the canal system in India.

The total length in Bengal, Madras, and Bombay, amounts to 4,900 miles ; but this does not include the Tanjore system, which is 700, the inundation canals of the Punjab, 1,550, or the canals of Sind, 5,600 miles. Thus there are 12,750 miles of lesser or greater canals, whilst the total length of the distributing canals is unknown. In Northern India alone, however, it amounts to 8,300 miles. The area now irrigated amounts to 1,900,000 acres in Madras and Bombay, 300,000 in Behar and Orissa, 1,450,000 acres in N.W. Provinces, 1,350,000 in Punjab, and 1,250,000 in Sind ; in all, 6,310,000,—nearly six and a half millions of acres. The area irrigable by canals is yet considerably greater than even this large total, so that the system is capable of extension. The capital outlay by the State on this canal system may be set down at twenty and a quarter millions sterling, on which the net returns yield an interest of six per cent. Sir R. Temple says : *—“ Apart from the direct receipts from these canals, many indirect benefits accrue. These benefits are represented by the security afforded to agriculture, the assurance provided for the people against the extremities of drought and famine, the protection of the land revenue, the instruction of the husbandmen by the example of the superior husbandry established, and the introduction of superior products. The value of the canals during the recent famines has been inestimable. Without irrigation, these calamities, great as they are, would have been infinitely greater. The value of the produce which the canals saved in order to feed a famishing people, equalled the capital outlay on their construction.”

* “India in 1880.”

Another point of view from which meteorology is most important in its bearings on the material prosperity of India is the effect which it exercises over the sanitary condition of the people. There can be little doubt that public health is greatly affected by the rainfall, and that fluctuations or extraordinary departures from the normal state are attended by fluctuations in the standard of public health. The diffusion and activity of epidemics are probably influenced by it. It would be saying too much, perhaps, to assert that the fluctuations in the death-rate are altogether due to variations in the rainfall, but that they are to a great extent influenced by it seems to be proved by what obtains all over India.

The following* appears to have been ascertained in relation of climate to epidemics :—

1. If epidemic cholera be about, its intensity will be increased by continued dryness, evaporation, and high temperature. If cholera exists under this form, heavy rain will greatly diminish it, or wash it away.

2. Dryness, heat, and rapid evaporation reduce the intensity of fevers. Rain following, greatly increases their intensity. But the effect is not what can be called immediate. The rain must accumulate and the ground be soaked; as soon as drying up begins, fever augments until the evaporation reaches a certain intensity, when it declines. It is not so much the great amount of rain as the soaking and saturation that does the mischief. In some places fever declines very much when the country is completely flooded, but increases in intensity when the rain ceases, and drying up begins.

3. Small-pox in India does not appear to be related to rainfall. It augments with increase of heat, and so continues till colder weather arrives, irrespective of the amount of rain.

4. Rain with cold and high temperature range appears to augment the liability to bowel diseases, but not to a very great degree.

There is yet one point to which I would refer, though I can only do so very briefly; it is the influence of the rainfall on the growth of forests, and their effects on climate. There is reason for believing that some of the desert plains of India were at one time covered with trees, and that when they were so the climate was less rigorous in its extreme heat than it now is. When we think that the desert regions in the north-west were at one period the seat of early Hindoo civilization and population, it is obvious that the physical conditions of the country must have been very different to what they are now, and it seems probable that the change is due to destruc-

* Dr. Sutherland.

tion of trees. The cultivation of forests, therefore, is a matter of the greatest importance, for, not only do they temper the climate by the moisture they exhale, but they tend to cause rain where there would be none.

The subject of rainfall is one that involves so much, and that suggests or leads to so many collateral inquiries, that it is difficult in discussing it to draw the line where one would stop; but I feel that I must do so here, for I have exhausted the time at my disposal in giving what, after all, is but a mere sketch. I trust, however, that it may have conveyed some useful information on a subject that is fraught with interest to 250,000,000 of our fellow-subjects.

The CHAIRMAN.—I have to return our thanks to Sir Joseph Fayrer for his very interesting and useful paper. It is now open for any present to make remarks upon the subject.

Mr. J. F. BATEMAN, F.R.S.—I am happy to think that a paper of mine should have suggested so valuable and interesting a communication as that which we have just had from Sir Joseph Fayrer. There can be no question that the registration of meteorological facts all over the world is of great service; but the object of my paper was the particular one of confining the observations made on this subject to the British Islands, with a view to showing that it was necessary to take all the circumstances into consideration with the practical object of providing for the floods which occasionally deluge the country, and making a fair estimate of the quantity of rain which might be collected from a given area. I desired to show that it was not, as has been falsely assumed by many meteorologists, the mere elevation of the country which increased the quantity of rain, and I showed that the heads of all valleys and the first land (if the hills are only of a certain height where they are swept over by the south-west wind, which brings the largest quantity of aqueous vapour) received most rain, while as the south-west wind proceeds gradually to the east there is a lessening quantity of rainfall. I am happy to see that the observations of Sir Joseph Fayrer have corroborated this statement. But in the districts he has spoken of the difference in the rainfall is so large that little practical result can be obtained from the observations except that it is found that there is a very large rainfall in the mountains to the west, while in some of the districts beyond there is next to none, the difference being as between a rainfall of less than 2 inches and the enormous amount of 600 inches, so that about 300 times as much rain falls in one district as is registered in another upon the average of years, there being certain months during which no rain falls, while there are other months in which as much as 50 or 60 inches of rain are occasionally registered. In the tables which Sir Joseph Fayrer has given, which are exceedingly interesting, there are registers of rainfall, showing that in some places no rain whatever has fallen in the months of January, February, March, and

April, while in May, June, July, August, and September, the rainfall has amounted to 60 inches and upwards. The provision that has to be made under these circumstances is, therefore, of two kinds. They have first to provide for the construction of roads, railways, and other works, so as to pass the floods which arise from the prodigious quantity of rain which falls at certain seasons of the year, and they have also to provide works of irrigation in those parts where the rainfall of the wet season can be utilised for purposes of cultivation, or any other use to which it can be applied for the benefit of mankind ; and in these cases they have to base their calculations on the length of the drought which may be expected, and the period during which they must maintain a sufficient supply of water by artificial means. They must, of course, consider the capacity of the reservoirs they have to construct for the purpose of collecting and storing the rainfall which is obtained in such abundance during the rainy months. These are practical questions which can only be deduced from such observations as those which Sir Joseph Fayrer has brought before us. Therefore, quite apart from the interest the subject intrinsically possesses, they are of the greatest interest and importance to mankind in reference to their arrangements for works of improvement, or the mechanical operations by which man is able either to control the floods, or to impound the water falling in the wet seasons for use in the dry seasons. There are so many interesting points in connexion with the subject of meteorology, quite apart from those relating to the practical objects to which I have referred, that it is a matter in which I can well understand a great many people will feel an interest. Whether we shall ever find out and apply the laws which govern the fall of rain, so as to convert them into an exact science, I doubt ; but at all events a great number of observations, extending over a large area of the earth, must prove of the greatest possible benefit in enabling us to form opinions as to the quantity of rain which has produced, in flat districts, deltas like those in Egypt and Lower India. The difference in the fall of rain is so great, and the purposes to which the rainfall is applicable are so varied, that we cannot help thinking the distribution of water must necessarily call forth the intellect and the energies which God has bestowed upon us for the purpose of enabling us to make use of the great advantages which He has conferred upon us for applying the surplus rainfall of one district to counterbalance the deficiency of another. In this respect the observations of Sir Joseph Fayrer must be of the greatest advantage, quite apart from the practical results which it was the object of my paper to direct attention to. (Hear, hear.) I may mention one circumstance that has also been alluded to by Sir Joseph Fayrer, namely, that evaporation is constantly going on, and I have known as much as five inches of snow disappear during an east wind, although there was no thaw and the weather was freezing the whole time ; the effect of the dry east wind prevailing over the whole country being to produce this result. This fact shows that evaporation depends not so much on the temperature as it does on the dryness and capacity of the air to absorb moisture. Thus in the

tropics, through which I have passed, I have found that the atmosphere has been so saturated with moisture that at night, when the temperature has become reduced and condensation has taken place, the deck of the steam vessel would be absolutely wet, as if recently washed, owing to the deposition of dew or moisture upon the surface. (Applause.)

Dep.-Surgeon-General N. CHEVERS, C.I.E.—I was for a long time a near neighbour of Sir Joseph Fayrer's in India. I have been at Chittagong, where we had about 160 inches of rainfall in the year. It is pleasant to remember that, the very first, I believe, of the numerous illustrations of natural science in every part of India by which Sir Joseph Fayrer has enriched our literature, was a contribution to the meteorology of Burmah, in which he undertook the very difficult task of obtaining for a specified time, the hourly temperature, the rainfall, and the barometrical readings of that district. He and Mr. J. Bedford were the only men who were the actual pioneers in this work. Then followed what was certainly a violent measure on the part of the Government, and I am afraid that Sir Joseph Fayrer and Mr. Bedford are to be charged with bringing it down upon us. The Government sent us a most terrific paper, upon which already hard-worked men were expected to register the dry and wet bulb and barometrical readings, and the direction of the wind, six times a day, to observe also during the night what were the prevailing winds ; and, at the end of the 24 hours, to register the rainfall. I am now speaking of two and thirty years ago, and some of the results were very curious. For instance, some barometrical readings, which Mr. Bedford told me had been sent to him, were of a very wonderful and surprising character ; upon his inquiring whether they could possibly be true readings, the observer wrote back to him, saying, " You are employed in registering atmospheric phenomena ; this is an atmospheric *phenomenon*, and you must register it." There was one phenomenon for which I can vouch. A surgeon who was very much overworked, made the duty over to the sub-assistant surgeon, who, I am afraid, made it over to a native doctor, who observed that a certain wind blew " due east-west " for a whole week. (Laughter.) This was registered in one of the documents, and there may have been well nigh as little accuracy in some of the other conjectural registers. It was my duty, as secretary to the Medical Board, to make over the whole mass of these records to one of the brothers Slagenthweit, who afterwards died in India, who, I believe, was unable to publish them ; still, many of them were true and accurate documents, very carefully compiled by such men as Sir Joseph Fayrer and Mr. Bedford ; and, if they could be recovered now, they would give some very curious and interesting information. This was all before the time of Mr. Blanford. There was one point which interested me very much in Sir Joseph Fayrer's paper, and that was the allusion made to the effects of tree vegetation on the rainfall. I remember one or two spots which were wide wastes of sand swept bare by the mighty river the Brahmapootra, and which were left entirely without the appearance of vegetation for several months in the year ; but we

took certain pieces of this land, enclosed them, irrigated and cultivated them, and before five or six years were over, those sands were tolerably productive gardens. There has always been a great want of wood in India, and fire-wood is very expensive. There was a great sacrifice of wood caused by the introduction of railways. There was an extreme, almost a rabid, anxiety to get wood for sleepers, and large forests were cut down and carted away for the purpose. When I first went to India, thirty-three years ago, no person had any need to be what is called weatherwise. The seasons were then almost as regular in India as day and night are in England. You know perfectly well in Calcutta that on the 20th or 21st of June the rains would set in, and so on with regard to the rest of the climatic changes. Everything was fixed; but of late years, and especially since heavy cyclones have been frequent in southern India, there has been a difference: whether this is a mere coincidence or stands in the relation of cause and effect I am unable to say. At any rate, the climate of Calcutta is beginning, as to the rainy season, to be in some years most uncertain. In olden times, from the 20th of June until September, we had heavy rains every day, generally until about five or six o'clock in the afternoon, which was our driving time, and then we could get out and take a little exercise. The rainfall amounted to some 60 or 70 inches in the course of the year; but, of late years, you have sometimes almost a month in the rainy season without any rain whatever. The rainy season was a comparatively cool one, because the sun was kept off by the clouds. Now, that shelter is to a great extent withdrawn, and the sun comes down upon you with most intense heat. Coincidentally with this it is to be noticed that Calcutta, which is not a very ancient place, dating from about 1680, used to have in its vicinity beautiful forest trees, such as the tamarind, the peepul, and a great variety of others. It was, in old times, thought a great virtue to plant avenues of trees under which the troops and wayfarers could pass, and you see them still remaining on some of the old roads from Burhampoor, and between Calcutta and Barrackpore. It was the almost sacred duty of the Zemindar to have mango groves planted, which supplied the people with a food that is, perhaps, second only in value to rice in some of the districts, especially in Behar. Since the cyclones and the construction of the railways, the great trees of Calcutta have almost entirely disappeared; and I cannot help thinking there is more than a mere coincidence between the disappearance of these trees and the great irregularity of the seasons in the Calcutta district, so that now one must be exceedingly weatherwise to predict what sort of a day one is likely to have. The great thing for scientific men to do is to endeavour to equalise the fall of rain in some of those unhappy countries where it is so uncertainly distributed. I believe that trees are beginning to be more plentiful in Scinde than they were. The objects to aim at are, first of all irrigation, then of course growth of the crops, and then the planting of forest trees.

Mr. W. GRIFFITH, Barrister-at-Law.—The subject is one of so much interest that I am sure a paper upon it from any member of the Victoria

Institute must be worthy of attention, more especially one from a gentleman of such authority in the scientific and medical world as Sir Joseph Fayrer. Those who know the high position he has occupied in India, the great services he has rendered, and the opportunities of observation he has had, must admit that a more trustworthy and competent witness could not appear upon the scene. He has given us a great deal of very valuable information as to the effect of the rainfall not only on the famines of India, but also the health of the people,—on such diseases as cholera, fever, and other matters connected with Asia. I was glad to hear what he said with regard to the forests, which may in time to come be of so much importance in that country. He has told us that the rain is produced by the monsoons breaking on the mountain ranges during certain months in the year. I remember some years since reading in Alison a statement that during six months of the year the rainfall of India was designed by Providence to produce fertility in that country, while during the other six the melting snows swelled the rivers and produced a similar effect. I would, with all respect, ask Sir Joseph Fayrer whether this is a fact. Of course, I merely quote the statement on the authority of that eminent historian ; but the authority of a witness who has lived so long in India would be valuable, as tending to enlighten us upon that point, because some seem to think we can have no exact science on the question of rainfall. The interesting map exhibited illustrates with considerable accuracy, the results of Sir Joseph Fayrer's observations, showing that in Scinde the rainfall does not exceed 10 inches, while in various parts of the country it is over 100 inches. In a country with such an opportunity for the Government to exercise its powers to remedy the want of water, and to produce fertility among the arid districts, any postponement of irrigation works is to be deprecated. Of course, India is so extensive a theme that those only who have the best acquaintance with its history and its present condition can dilate upon these subjects to our satisfaction. It is very interesting to consider the history of the past military achievements of England in that part of the world, and the results of our statesmanship in consolidating that mighty empire, and to remember the great results achieved by a few British merchants. One cannot but contemplate with some satisfaction the benefits of our rule in that country ; there is no doubt that we have been the means of producing peace and improving the administration of justice, and it is satisfactory to find that we are doing much to promote the prosperity of the natives ; that we are considering the education of the people, and the means of averting any of the calamities that are likely to befall them, while we are promoting the productiveness of the soil by those great works of irrigation to which Sir Joseph Fayrer has referred. I was surprised to hear that those works had been extended to thousands of miles of canals. It is also to be remarked, and it is perhaps an argument why these works should be demanded of and carried out by us, that we are the landlords of the country, and that

whatever benefits we may produce must benefit ourselves by increasing the rent. This, of course, is a mere utilitarian argument. It is important that we should bind the natives to ourselves by anything that will tend to make them more satisfied. In times past they have had the opportunity of witnessing our military rule, and they may have had cause to admire our administration of justice; and I think we ought to consider it a hopeful sign that they are now to have the opportunity of finding that we are doing all we can in other ways to promote their welfare, and to increase their prosperity. I am glad we have had such men as Sir Joseph Fayer out there, and I trust there will be many more who will go and do as he has done, and produce the same amount of benefit to that important country.

Col. J. A. GRANT, C.B., C.S.I., F.R.S.—As the hour is getting late, I should have preferred to hear Sir Joseph Fayer's reply to saying anything myself; but I may allude to the equatorial region of Africa, in which I was with Captain Speke, where we had only 49 inches of rain. The altitude of the country is 4,000 to 5,000 feet, and as one goes northward to 5° north latitude and 2,000 feet altitude, the country is more of a desert, and resembles parts of Ceylon in there being a small rainfall. In the region of 3° south latitude, where the rains reach both the Congo and the Nile, the fall of rain may be 60 inches. But, as I have said, I only wish to hear my old friend Sir Joseph Fayer's reply; I have been delighted to hear such an admirable paper.

General MACLAGAN, R.E.—Sir Joseph Fayer has described the great inequalities of water distribution in India. India suffers sometimes from excess of rainfall, causing destructive floods, and sometimes from deficit, causing much distress from scarcity of water. And these two things may happen at the same time in different parts of the country,—a country not only of great magnitude, but of which the physical features and conditions vary as much as the different countries of Europe, and in some respects much more. A great problem in India, where it may be said there is ordinarily an abundant supply of water upon the whole, is how to make the most of this most valuable gift, and to prevent or diminish the injury it causes. Works have to be constructed in India for both objects, at one place for removal of excess water, or protection against it, at another for catching and economising every drop. Of the irrigation canals that have been referred to, some flow continuously throughout the year, the quantity of water admitted being to a certain extent under regulation. Others, more simple works, known as *inundation canals*, fill only when the rivers rise from the melting of the snows, and then from the periodical rains in the hills. Reference has been made to the effects of clearing forests in India. There has been, we know, extensive clearance in some parts, in past years, before the British occupation of the country. It is on record that wild animals used to be hunted in great forests, where now there is not a tree. And there can be little doubt that these clearances have affected the climate. But it can scarcely be said that the supply of the railway requirements in

our own time has helped to increase the injurious clearance of forests in India. The requirements are of two kinds, timber for sleepers and buildings, and small wood for fuel. The *deodar* timber, which in Northern India is the wood chiefly used for sleepers, as it is not liable to the attack of white ants (other woods have to be protected by creosoting, &c.), has been chiefly supplied from native hill states. It is true that under native management there was much wasteful and indiscriminate felling of the timber, the rulers looking only to immediate gain, regardless of the future. The British Government has taken a lease of some of the principal hill forests of *deodah* and other pines, and in the hands of the Forest Department the felling is under careful and systematic management, due care being taken for reproduction of timber trees and increase, in certain places, of forest area. The provision of fuel, and the management of the jungle tracts in the plains, from which fuel supplies are obtained, are likewise under careful regulation; and extensive fuel plantations in selected places provide for continuous supply and reproduction. The untrustworthiness of the meteorological registers, to which allusion has been made, was due to imperfect arrangements, imperfectly qualified agency, and imperfect means of compiling and examining the results. Matters are differently managed now, and a competent meteorological department has been organised. Many have heard the old story of the native official at a rural station (who, among other duties, had charge of the meteorological instruments), making things ready, on one occasion, for the expected visit of the Commissioner of the Division, who would be sure to ask to see the meteorological instruments. They could all be examined and read except the rain-gauge. The Commissioner might be disappointed if it had nothing to show, so a jug of water was poured in that he might find something to observe in the rain-gauge too! We may fully trust that, under Mr. Blandford, meteorological records will be obtained of great value and importance to India.

Surgeon-General GORDON, M.D., C.B.—I have been a good deal in India, and can endorse almost everything that has been stated by Sir Joseph Fayrer, especially with regard to the important bearing which meteorology has upon certain kinds of disease. Sir Joseph Fayrer has alluded to the prevalence of particular kinds of disease, according to the particular atmospheric conditions of the country. In so far as those atmospheric conditions at particular periods, or at the same period of the year, are very variable in different parts of the large continent of India, so do we find the phenomena of disease vary in a similar manner. That is to say, the disease which prevails in one part of India, and at one period of the year, differs in many respects in its phenomena from a similar disease prevailing in another part of India. I noticed that it was represented by Sir Joseph Fayrer that there are certain epidemics which have a natural relation to meteorological conditions, while there are others with regard to which similar conditions do not seem to be established,

With regard to those that are connected with meteorological conditions, such as cholera, we can almost trace the advance of cholera from one part of India—namely, from Lower Bengal upwards, according to the advance of the season—year by year, almost with unerring certainty. The cholera, beginning in Lower Bengal, especially in Calcutta, about the month of February, advances steadily upwards along the banks of the Ganges to Burhampoor, Dinapore, Benares, Cawnpore, Meerut, and so on to Peshawur, reaching the latter place about the latter part of autumn. It then frequently advances north and west, even in the winter season. But there is another respect in which the meteorological condition of India has a very important bearing, and that is with regard to the question of vegetation. We know that according to the peculiarities, climatic and otherwise, of particular localities, the vegetation varies, inasmuch as the influence of the climate of India upon vegetation, particularly upon plants, roots, bulbs, and other things imported from England, is very remarkably seen. When we see this, I think we must make allowance for the influence exerted by the climate of India on the health of Europeans who have gone to reside in that country. It is a very common saying in England, and especially amongst those whose personal knowledge of the conditions to which they refer is limited, that the mortality amongst our people is, in the majority of cases, attributable to faults on the part of the people themselves; it is due, they say, to too much eating or too much drinking. I am always glad when an opportunity occurs, such as the present, to try and show that such views are not correct. I have seen as much of European,—that is, British,—life in India as most people, and although, of course, there is a good deal of mortality and sickness due to excesses there, just as there is here in England, still, the great difference in the rates of sickness and mortality there over the rates prevailing in Britain is to be accounted for by something else than mere excess; and that something else is, I believe, to be found in those grave conditions, climatic and local, which we have not the means in the instruments at our disposal of identifying, and which affect vegetation in the way I have alluded to. (Hear, hear.) In order to make my meaning more clear, I may say that flowering plants—those, for instance, that have been introduced into India from England—completely change their characteristics; that is to say, many of them so completely deteriorate in a year, or a couple of years, as not to be recognisable. Plants that are exceedingly productive in England in regard to seed, fail in that respect in India. Flowers and plants flowering or budding in spring do not bud or flower very often in some parts of India until the autumn, while in other parts they flower twice a year. Some trees, as, for instance, the ornamental trees that have been introduced from England, completely change their appearance and become unrecognisable; and not only does this apply to trees taken from England, but also to those that have been introduced from Australia. I remember a gentleman from Australia going about with some of the officers in one part of India, and asking what a particular tree was. “Bless my heart,” he said, “surely you

know that that is the *Acacia dealbata*?" The reply was, "It is so completely different in appearance from what the tree is in its native country that I really do not know it." When I take these things into account, as well as other facts resulting from the climate in regard to vegetation, I think it puts us in a better position to understand how people from this country should be similarly affected by the climate in India. Therefore, I hope the few remarks I have made will have some effect in leading my hearers to the belief that when our soldiers and officers come home pallid and ill from India, their sickness has been brought about by something more than mere excess. As long as we are able to maintain India, which I hope will be for many generations, this is a point to which I think we ought to look. The more we consider the great influence which the climate has upon organic nature generally, and the more we apply the observations that are thereby presented to us to our own case, the better we shall be able to consider this subject in its more rational and scientific aspect.

Surgeon-Major PARK, R.A.—I should like to ask one question. I have not served in India myself, but I have seen a great deal of the British soldier, and his wife and children, and I should like to know whether there are any observations with regard to the effect of rainfall on the health and mortality of the soldier. From a personal experience of many parts of the world, excepting India, I feel strongly that he is a greatly belied man, and if such a Society as this can, by its publications, let the public have the views of such men as Dr. Gordon and Sir Joseph Fayrer as to the effects of the Indian climate on the soldier and his family, I think it will have a good effect. This may appear to be going somewhat wide of the subject of the paper, but I think the matter is one well worthy the attention of the English people. There is another point on which I should like to put a question to those who have served in India, and that is in reference to the common remark that three generations exhaust the vitality of the British residents in Lower Bengal. I wish to know whether there is any authentic record showing that this is the fact or the reverse?

Dr. CHEVERS.—That proposition has been considered by all the medical men in India, not merely as to Lower Bengal, but throughout the country, except, perhaps, Simla and the high lands and hill sanitarium, which are modern places of European residence, scarcely occupied as such for more than fifty or sixty years, so that in their case there has not been room for observation. But with regard to other places which have been in a great measure inhabited by soldiers and their descendants, and where the invalids used to be allowed to retire and make themselves comfortable, it has nowhere been discovered by any medical man that there have been any genuine descendants, of unmixed blood, of any European family of the fourth generation; that is, assuming there has been no return to Europe for education and improvement of health. If an instance could have been cited I am sure one or another of our active inquirers would have certainly brought it forward.

The CHAIRMAN.—In calling upon Sir Joseph Fayrer to make any comments upon what has been said, I would remark that the climatic conditions of life in India are interesting as affording us some means of judging what the condition of man might have been in past times in our own island. We may also learn therefrom facts which will enable us to draw valuable conclusions upon some geological questions. I will now call upon Sir Joseph Fayrer.

Sir JOSEPH FAYRER.—The first thing I have to say is that I thank those who have been good enough to speak so kindly of my paper. They have not raised any controversial question, so that really there is not much to reply to, and I need only refer to one or two observations that have been made. You, sir, have invited me to make some comments on what has been said, and first of all I would remind the meeting that this paper is essentially one on the rainfall of India. I included something about the climate, as it was necessary to do so: indeed I could hardly have avoided it in dealing with such a subject; but I did not include the whole scope of the science of meteorology. If I had attempted that—though the subject is one that is far beyond my powers—I should have occupied your attention, not for an hour only, but for many hours and many days. This will explain why I did not speak of the melting of the snows filling the rivers, and so on; and also why I did not go into such questions—about which I know very little—as the meteorology of Central Africa, though I should have liked to have heard more upon that subject from Colonel Grant. I will, however, notice one or two points that have been mentioned. Mr. Bateman spoke about the necessity for an equal distribution of water, and pointed out that heavy falls of rain take place in certain seasons and in certain localities, whilst it is dry in others. This, however, is not the case to such an extent in our own country as it is in India; and I endeavoured in my paper to point out the great efforts that have been made, not only in the present day, but in past times, by those who preceded us in India, who were as much alive as ourselves to the necessity of supplying the wants of the country by irrigation, by digging wells, and by constructing reservoirs and canals. Of course there were great difficulties even then. In a country like the Deccan, or Southern India, which is a high tableland, sloping gently to the east, with the rivers running from west to east across the continent, there is plenty of water, but it is not available because the rivers cut such deep channels that they are beyond reach. Consequently, it is necessary to make great reservoirs by damming the water, and to cut the communicating canals for its distribution, of which I have spoken. This is a subject, the engineering aspect of which I know little; it is one on which General Maclagan could thoroughly enlighten you. Dr. Chevers gave you an amusing statement of my early initiation into meteorology. I may say that I might well have my attention attracted to the subject, considering that I spent my first year in a station where 600 inches of rain fell in six months, sometimes 30 or 40 inches in a day, filling the rain gauge so fast

that one had to look at it frequently to see that it did not run over ; where the atmosphere was saturated with moisture and the heaviest thunder shower you have ever known in England, lasting only a few minutes, is there continued for days and nights without ceasing, sending down torrents of water that wash away every loose portion of earth on the plateau, and fall in great and magnificent cascades down to the plains below, which are very soon converted into a sea. Under such circumstances, it is not to be wondered at that one should have given some attention to the study of this subject. I was enthusiastic in those days. Going to Burmah, it seemed to me necessary that I should know something of meteorology. I therefore kept registers, and day by day for months I used to note the barometer, the thermometer, and the rainfall ; and once every hour of the 24, *on term days*, which was by no means an easy task, as one felt very sleepy towards two or three o'clock in the morning. I am afraid, however, that those observations did not lead to much, unless they contributed something in the shape of an inducement to others to undertake the same kind of duty. I am happy to think that at the present time there is no department in India the working of which is more thoroughly organised than that of the Meteorological Department, under my old friend Mr. Blanford. In reading my paper I omitted certain paragraphs, because I thought I should have wearied you had I read them all ; otherwise you would have noticed that I alluded to the value of Mr. Blanford's reports, which one can hardly extol too much, not only for the ability and science they display, as well as the perseverance and patience with which they have been worked out, but also for their prospective value, for I am quite satisfied they will yield excellent results in time to come ; so that, whatever may have been the case in the past, we may for the future look forward with great satisfaction towards the culture of that branch of science in India. Dr. Chevers spoke on the important subject of the destruction of the forests and the use of wood on the railways. I have no doubt whatever that at the inception of the railway system in India much damage was done in this way, and I am afraid that some is done even now. The wood—not the forest trees so much as the smaller trees and the brushwood—used to be cut down to supply fuel for the lines of railway ; but I believe that this is not the case now. As to railway sleepers, I do not think the forests we are concerned in are much indebted to them for their destruction, as the timber for this purpose comes chiefly from the great forests of that magnificent region where I have spent many happy months—the forest district at the foot of the Himalayas, where those magnificent trees, the *sāl* and the *sisso* grow. These are the valuable trees, especially the *sāl*, from which the sleepers I believe are made. Another speaker alluded to the importance of the effects produced by the melting of the snows upon the rivers. It is quite true that after the winter, when the great heat falls on the hill-sides and melts the snows, the rivers come down in floods, which no doubt help considerably towards the irrigation of the country, and even render a special arrangement of inunda-

tion canals necessary. Colonel Grant spoke of the comparative smallness of the rainfall in Central Africa at certain elevations, which would seem to involve the necessity of a large rainfall, because in the equatorial regions, as I have already said, we have the great distillery of rain. But if you go into the centre of India, in the tropical regions within 15 degrees of the line, over 12 you find it to be very dry. These are the arid regions. You have the damp, moist wind, the monsoon, blowing from the equatorial regions, the reversal of the north-east trade, that would be blowing the other way, but for the distribution of land and water which disturbs the atmospheric equilibrium. These monsoons, on their first impact on the ghâts which fringe the west coast of India, rising to a height of 3,000 or 4,000 feet—the height at which condensation most rapidly takes place,—have the water squeezed out, and it falls in the shape of rain; while in the centre of the peninsula you have a dry table-land almost under the shadow of the mountains that are squeezing out the rain. Old travellers noticed the phenomenon, but were unable to explain it. We understand how it is that those western ghâts condense the water out of the clouds and allow the air to pass dry over the other side. In that portion of the country south of Madras the atmosphere is comparatively dry, simply because the whole of the moisture has been squeezed out by the mountains it has passed over; one can readily understand how it may be that the portion of equatorial Africa referred to should be dry for similar reasons. I am not sufficiently acquainted with the physical geography of that part of the world to go beyond this; but imagine the explanation may be something like that which I have given. Colonel Grant's exploration of that part of the world has been so large that I feel sorry he did not give us more information on the subject. General Maclagan was very kind in his comments on my paper. Indeed, I felt some hesitation in reading it in his presence, for he knows more about the country than I do. He spoke of the distribution of rain. It is not that there is want of water, but difficulty in its distribution. We hear of terrible famines in India and the destruction of millions of lives, and we are led to suppose that this is occasioned by want of food. It is only a want of food in the famine districts. There is plenty of food produced in the country to supply the whole population if one could only distribute it. It is also important to remember that the country we are talking of, though it does not look very large on the map, is really equal in size to the whole of Europe, with the exception of Russia, and by this I mean the United Kingdom, France, Spain, Germany, Austria, Hungary, Italy, Sweden, Norway, Denmark, Greece, European Turkey, and more. Of course, the conditions are very varied in different portions of the country. As to the distribution of water, of which there is abundance at one season of the year and very little at another, while in some regions none at all, or scarcely any, it is made more or less available by irrigation; and it is owing to the particular department charged with this, of which General Maclagan is so distinguished a member, that the country is so well supplied with water, and will by-and-by be still

better supplied than now. It is the officers of his service that have done so much to bring about the supply he has advocated. Dr. Gordon spoke on a very important subject, and as he did so it seemed to me how extensive was the question I had introduced ; I had contemplated only the rainfall, but I see now how many other things it leads to. My old friend and brother officer, Dr. Park, has also introduced a question of great interest, though hardly germane to the subject of the paper—the health of Europeans and their families in India. I merely touched on it because I thought it right not to pass it over altogether, for how could one deal with so large a subject, or do more than just touch upon it in the brief space at my disposal ? The question of the continuance of the European race in India is a very important one, and as it has been discussed, I may say that my experience is the same as that of Dr. Chevers, and that I have never heard of an instance of the fourth generation of pure Europeans living in India. I have seen the third generation ; and I think, if anything were wanted to make one satisfied that the fourth could not thrive, it would be a sight of the third. I have nothing to add, except to thank you for the kind way in which you have listened to me.

The meeting was then adjourned.

ADDENDUM.

REMARKS ON RAINFALL AND FLOODS IN INDIA.

BY W. P. ANDREW, ESQ.

In India the rains commence about the middle of June, and continue with little intermission until the end of September.

The rainfall varies greatly in the North-West Provinces and Guzerat. It ranges from 15 to 30 inches, most of it falling in three months.

In the Khasia Hills, 600 inches of rain have been measured in the year. There is also the season of inundations from the melting of the snow in the mountains causing the rivers to overflow their banks.

The rivers of India vary much, according to the season of the year, at one time being small streams, at another resembling mighty seas : as, for instance, the Indus. In the summer months the melting of the winter snows swells the volume of its waters ; then the pent-up torrents, warmed into new life by an almost tropical sun, dash down from the everlasting glaciers of the Himalayas, and, mingling with their parent stream, roll in one turbid mass through the narrow gorges of its upper courses. Bursting

its bonds at Kalabag, the waters spread like a sea over the surrounding country, until at Dera Ismail Khan the eye can with difficulty discern the farther shore. In the winter all this is changed ; nowhere does the current exceed three miles an hour ; while the breadth, often less than a furlong, permits of pontoon bridges being thrown from bank to bank at more spots than one.

The Indus is the longest river of India, being 1,800 miles in length, and, after receiving the other rivers of the Punjab, debouches by many mouths into the Arabian Sea. The Ganges, the next in magnitude, is 1,500 miles in length, having its turbid volume swollen at Allahabad by the blue waters of the Jumna, and falls into the Bay of Bengal. The Ganges, like the Indus and the smaller rivers of India, is liable to enormous expansion during the season of inundation.

The Sutlej and other rivers of the Punjab are not only liable to overflow their banks, but are continually trying to change the channels in which they are flowing, either seeking their ancient beds or making new ones for their tortuous and impetuous floods.

Messrs. Brassey & Co., when building the Sutlej Bridge for the Delhi Railway in 1869, required to add some twenty additional spans of 102 feet each to provide for the alteration in the river's course, which appeared to be imminent.

The Muller Viaduct in Scinde was 1,800 feet long, in twenty-one spans of 80 feet each, built on stone piers, each pier consisting of two upright pillars, sufficient only for a single line. The foundations were of three kinds : the foundations of the two piers first built, Nos. 3 and 4, being in cofferdams, and sufficiently large for a pier to carry the double line ; Nos. 1, 2, 5, 6, 7, and 8 are built in brick wells, and the others were intended to be the same ; but, the foundations not being sufficiently good, piles were driven in the wells, and the interstices filled in with concrete, the piers being built on this.

Two rivers meet the Muller above the viaduct,—the Dumb about half a mile above, and the Sookham, quite close to the bridge. The sources of these streams are widely separated, and it would appear, on the morning when the viaduct was carried away, that the streams were discharging themselves at different levels, causing great turbulence in the water passing under the viaduct.

At daybreak, on the morning of the disaster, there was little or no water visible in the bed of the river, and at eight a.m. it had almost reached rail level. At nine a.m. the bridge was carried away. The water came down in a succession of bores,—the largest of which, bringing down with it the ruins of a village about a mile and a half up the river, came down with immense force, rising above the level of the rails, and carrying away eleven spans of girders, with their piers, as if they had been straws. Some of the girders were found within a few feet of the bridge ; but two of them were at least half a mile down the stream. Each span, with rails, &c., would weigh about 60 tons.

The Agent to the Oude and Rohilcund Railway Company pointed out that "in 1870 and 1871 the floods were so excessive and so entirely unforeseen, that the estimates submitted and the project prepared had to be reconsidered and altogether superseded ; the bank had to be raised, and the designs of bridges to be revised, increasing largely the waterway.

These floods fortunately occurred before the works were much advanced. This, however, has not been the case in other places. Disasters have accordingly occurred, and much damage has been inflicted on several railway bridges. Now that more is known, more will be done to avert mischief ; but, after taking every precaution, there will always be considerable difficulty where shifting streams have to be encountered, and where foundations have to be laid in the soil subject to a scour of 50 or 60 feet in depth.

ORDINARY MEETING, MARCH 7, 1881.

J. E. HOWARD, ESQ., F.R.S., VICE-PRESIDENT, IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced :—

MEMBER :—Rev. W. H. Jones, M.A., Hull.

ASSOCIATES :—R. F. Weymouth, Esq., M.A., D. Lit., Mill Hill ; G. Wise, Esq., London ; The Librarian, Cathedral Missionary Divinity College, Calcutta.

Also the presentation of the following Works for the Library :—

“Proceedings of the Royal Society.” *From the same.*

“Proceedings of the Geological Society.” *Ditto.*

Also pamphlets from W. H. Brown, Esq., R.N., and C. Hill, Esq.

The following paper was then read by the Author :—

LANGUAGE, AND THEORIES OF ITS ORIGIN.

By R. BROWN, Esq., F.S.A.

1. *Parallel and Connexion between Language and Religion.*

AMONG the multitude of animals existing upon the face of the earth, one only,—Man,—is possessed of the two remarkable endowments of language and religion ; and this circumstance alone might fairly give rise to the opinion that there is a somewhat intimate connexion between them. With men, language is universal, and religion is no less so* ; and in either case we have an almost infinite variety of manifestation, yet, as

NOTE.—R.Z., *The Religion of Zoroaster* (Paper read before the Victoria Institute, April 21, 1879). R.M.A., *The Religion and Mythology of the Aryans of Northern Europe* (Paper read before the Victoria Institute, April 19, 1880).—For the Synopsis, see page 355.

* *Vide* Appendix.

in Nature itself, capable of reduction into a vast unity; for, although both sounds, delineations, and ideas, like chessmen, present combinations practically innumerable, still, like chessmen, they are susceptible of classification, analysis, and coalescence in a single system. Again, language, in its totality, is not borrowed from without, but first welling up within the soul by virtue of a mysterious power inherent in the human individual, and then, assisted in its manifestation by the external world, it finally overflows the Ego, and produces an harmonious link between two or more beings; and, similarly, religion originates within to work outwardly, and, in its origin, is utterly independent of the material and the visible, however greatly these may assist or entangle its subsequent career. Language has become, in course of time, and with the increase and dispersion of population, almost infinitely varied, complicated, in many cases exhausted, degraded, and defiled; or, again, purified, elevated, vastly extended, made delicately accurate and harmonious; and, as its history continues, the possibility of its union or re-union in a single tongue becomes distinct: and religion has undergone an exactly corresponding destiny, and as no one ever urges the errors, degradations, or excesses which have arisen in connexion with language against its use, and its existence as a most practical, true, and important institution; so, equally, such arguments when advanced against religion, are not merely unjust but ridiculous, and if it be objected to this parallel that men cannot do without language, I have yet to learn that they can do without religion, although, of course, here and there an unreligious individual may be found, the deaf-and-blind-mute of a religious world. As even in our present civilisation the number of the ideas and of the words used by ordinary persons is extremely limited, so, it is evident that language in its earliest phases, owing to the simplicity of life, paucity of experience, and smallness of numbers of its employers, must have been also extremely simple, without almost the whole of those elaborations which, to later ages, become grammar with its alphabets and parts of speech. For the same reasons we might *à priori* suppose, and investigation confirms the fact, that religion in its earliest phases would exhibit a corresponding simplicity, a healthy infancy,—immature, indeed, when compared with subsequent attainment,—but yet, at the same time, free from those infirmities which beset age, unendowed with a formulated creed, canons, or articles, the grammar of belief, but based upon truth and giving light sufficient for the time. Again, language, like religion, is founded upon the unseen and immaterial, for it arises from the effort to telegraph thought to the consciousness of some

other sentient being; and as language is based upon limited and internal thought, so religion is based upon unlimited and external thought, *i.e.*, God. A safe superstructure can only rest upon a sure foundation; but language, the superstructure of thought, is in itself reliable, and is thus satisfactorily based; and human thought, therefore, is, when within the sphere of its involuntary operation, perfectly worthy of belief.* The fact, then, that religion is confessedly founded upon the immaterial, should offer no stumbling-block to our acceptance of it; or, if we regard the immaterial as a fallacious basis, then, to be consistent, we must also reject language and consider it an imposture. But, as language postulates human thought, which is obviously limited, so religion postulates superhuman thought,† and, as no limitation of this is mentally visible, it follows that (so far as we either are or can be concerned) it is unlimited; and as religion is to language, so is superhuman thought to human thought, *i.e.*, indefinitely superior. Again, the higher animals have simple cognitions, and, indeed, definite opinions: *e.g.*, a dog may regard A as an offensive person, to be always barked at and driven away; and such an opinion may, as in the case of a human being, continue for years and gain strength by time; but when a dog compels obedience, he does so by the exercise of force alone, without reference to the feeling, wish, or opinion of the creature with whom he deals; in the same way that a stone, striking a man, may compel him to fall to the earth; that is to say, no animal, except man, has any wish to promulgate his ideas or opinions by persuasion, or generally heeds whether others entertain them or not, whilst, on the other hand, man is essentially a propagandist of ideas, teacher, preacher, converter, perverter, and probably almost his keenest pleasure frequently consists in seeing his notions, good, bad, or indifferent, warmly accepted. The harmony of existence, therefore, necessitated the possession of language as a legitimate outlet for this passion; and, conversely, other animals have not, and never had, and never will have, any such power, because the economy of their nature does not demand it; and thus language upon the mind of a dog would be but an excrescence unsightly and inharmonious, and

* Vide *R.M.A.*, sec. 5.

† Mr. Tylor, for his purpose, gives "as a minimum definition of religion the belief in spiritual beings" (*Prim. Cult.* i. 383). Prof. Müller regards religion "as a subjective faculty for the apprehension of the Infinite" (*Hibbert Lects.*, 1878, p. 22). I do not feel it necessary to attempt an exact description here, because we may have a thorough practical knowledge of what is intended by a term, without necessarily crystallizing our conceptions into a perfectly satisfactory verbal definition.

it is probable that even the animal's bark is not natural but acquired from association with man. Now man, as we have noticed, is a religious animal, and although religion does not consist in the promulgation of individual ideas, yet this is a necessary feature in it; since we cannot imagine as religious any being who, whilst personally entertaining any of those ideas which we regard as religious, had a thorough dog-like indifference to an external and non-forcible communication of them (as, *e.g.*, in prayer to Divinity). A religious animal, therefore, must be a language-possessing animal; and, conversely, a non-language-possessing animal cannot be a religious animal. If this were not so, we should see a phenomenon similar to that which would be exhibited by a water-requiring creature whose constitution made it unable to obtain water; a frightful spectacle such as nature never presents. Language is thus the natural vehicle and servant of religion, and the closeness of the connexion is evidenced, amongst other circumstances, by the fact that even after the establishment of regular literary composition almost all literature continued to be either of an absolutely or of a semi-religious character. As the Vedic Indian of old saw in the ordinary panorama of nature the performance of a divine ritual, which he imitated by his earthly sacrifices and daily life; as we are commanded to pray without ceasing, and to be religious in the most trivial actions of our existence; so, in proportion as we advance towards the high standard of Christianity, and our life in its externals becomes more and more a not unworthy ritual, will language approximate towards a union with religion; for, were our thought holy, its product would not be inferior: and perfected beings combining in choric adoration, that is to say, employing at the same time melodious sound and vocal rhythmic harmony, which together form the noblest combination of utterance, would supremely illustrate the indissolubility of the two great gifts to man when with one mind (Religion) and with one mouth (Language) they glorified God. Such terms as *Logos* (= Lat. *rätio* + *oratio*) and *Fatum*, "the spoken-word," illustrate the close connexion between language and religion; and *Vach* (*i.e.*, *Vox*, *Voice*), personified as a goddess by the Vedic Indians, is said to rush onward like the wind and make him whom she loves a poet (*poëtés*, *i.e.*, a maker of word-clothed ideas) and a sage. As soon as the science of Comparative Philology was firmly established, the comparative study of religion followed as a matter of course; and in archaic times language is by far the most important, and frequently the only, factor in the explanation of religious ideas. We observe, then, that language and religion are inseparable, exhibit diversity in unity, are in origin

independent of, although stimulated by, the external world, are capable alike of advance and of degradation, indicate a future unity, possessed a pristine simplicity, are based upon the unseen and immaterial, postulate thought human and superhuman, are always associated with a spirit of propagandism more or less pronounced, necessitate each other, and approximate each other in proportion to the perfection of the individual existence. Lastly, language is a great fact, a mighty truth; and is it reasonable to say that religion is less? He who is the beginning and end of religion, has significantly declared that he is at once Alpha and Omega.

2. *Language, what.*

What is signified by the term "language" in its wide and true meaning? It is chiefly, no doubt, a way of expressing the unseen and immaterial by an articulation of air;* but the Archbishop of York has defined it with accurate generality as "a mode of expressing our thoughts by means of motions of the organs of the body."† This mode of thought-expression is addressed either to the sensation of feeling, to the eye, or to the ear of another. Mr. George Harris observes, "Taste and smell have not, as far as I am aware, ever been availed of for the purposes of mutual intercourse,"‡ among men. This, however, is far from certain, as *e.g.*, we find that "the Hill Tribes of Chittagong do not say 'Kiss me,' but 'Smell me.'"§ Language, as thus defined, addresses the sensation of feeling by touch, the eye by gesture and pictorial representation (which latter includes writing, the daughter of drawing), and the ear by sound, involuntary (simple ejaculations), articulate or musical. Hence, in considering any of the problems connected with language, we must start from as broad a basis as possible; and make, at least to some extent, a comparative study of the facts and principles of touch, gesture, delineation (drawing and writing), natural involuntary sound, articulate speech, and artificial harmony. Articulate speech divides into dialects and groups or families of languages; but articulate speech itself is only a division of the original subject. Thus we observe the vastness of the study of language, and the immense difficulty of the various questions and intricate problems connected with it; nor can we forbear

* Canon Farrar, *Chaps. on Lang.*, 92.

† *Outline of the Laws of Thought*, 27.

‡ *The Nature and Constitution of Man*, 1876, ii. 239.

§ Lewin, *Hill Tribes of Chittagong*, apud Sir John Lubbock, *Pre-historic Times*, 3rd edit., p. 563.

astonishment at the "light heart" with which numerous inquirers and theorists have essayed the subject, equipped with nothing much except a host of *à priori* fancies. The complicated character of language, as "the point of contact, where mind and matter, artificially, yet most intimately, blend, and reciprocate their respective properties,"* and as inexplicable in origin by any single science,† is also, I apprehend, at once apparent. Some have regarded language as being purely physical,‡ which is to confuse it with the mere process of phonetic; and it were as reasonable to attempt to penetrate its labyrinth by means of the physical aspect alone, as to endeavour to discover the soul by the aid of anatomy. Prof. Müller, indeed, says, "I always took it for granted that the science of language is one of the physical sciences";§ but at the same time he defines "physical science" as that which "deals with the works of God," and is not "historical"; and thus the psychological element in language is not excluded. Bearing its general and complex character in mind, we shall not be confused, but somewhat assisted, by more or less felicitous definitions and illustrations of language of a somewhat rhetorical, or of a symbolic or metaphorical character, as *e.g.*, that it is "the reflection of the soul," "the congealment of ideas," "the correlation of the understanding," "the gesture of the tongue," "imitative sound," "inexplicit things," and the like.

3. *Language a Natural Development.*

It may next be observed that language, like sculpture, for instance, is a natural art; with a beginning, progress, and development yet continuing. As in early Greece rude stones were revered instead of statues, and we read of an Artemis of unwrought wood, a Herê merely a tree-trunk or a plank, an Aphrodite in the shape of a conical stone, and the like,|| which forms at length expanded into the unsurpassed perfection of the Perikleian age; so, similarly, language, by means of the continued efforts of centuries, blooms from a lowly beginning into the Zeus-like Greek of Plato or the stately diction of Gibbon. I do not suppose that this position will now be seriously controverted,

* Isaac Taylor, *Physical Theory of Another Life*, cap. 8.

† *Vide* Prof. Sayce, *Introd. Sci. Lang.*, ii. 398.

‡ *Vide* Prof. Whitney's Essay on "Schliecher and the Physical Theory of Language." (*Oriental and Linguistic Studies*, First Series, 298, *et seq.*)

§ *Lects. Sci. Lang.*, i. 23.

|| On this subject, *vide* R. B., *The Great Dionysiak Myth*, i. 350, *et seq.*

but, at the same time, it may be well to supplement it by two or three general considerations:—

1. It is far more in harmony with the ordinary procedure of the Divinity to give man a power or faculty, and then to leave him to freely develop it, than to grant him at once the power to exercise an art in high perfection. Highly-developed language is and was no more an instantaneous natural endowment than are reading and writing.

2. There is not the least general evidence that the Divinity ever bestowed a perfect or perfected language upon man, but the whole study and history of language tends to show the exact contrary; so that you could no more induce an expert to support such an opinion than you could persuade him to believe that the whole history of the Pharaohs may be compressed into four or five centuries. We may remember with advantage the genial irony of Sokrates in the *Kratylos*, a treatise still worthy the most serious attention of every linguistic student, that if we are deprived of other theories, “we must have recourse to divine help, like the tragic poets, who in any perplexity have their gods waiting in the air.”

3. There is nothing in our Sacred Books which negatives the theory of the gradual natural development of language by man. We read that Yahveh Elohim brought the other animals to the Man to see what he would call them, and whatsoever he should call them that was to be the name thereof. Here the variety of nature stimulates the power of the language-possessing animal. He, not Yahveh, finds names for the other animals, appellations such as he deems to be appropriate for them. He sculptures names, if the expression may be permitted.

4. Language, like sculpture, poetry, and every other human production, is very imperfect; and this imperfection becomes glaringly apparent when linguistic forms are placed beneath the microscope of scientific investigation. Without referring to small special illustrations, almost every thinker knows how inadequate even the present elaborated condition of language is for the expression of numerous highly delicate imaginations and ideas; how translation into speech frequently disfigures their symmetry and obscures their drift, and how in some instances, as in the case of many dream-combinations, language is absolutely unable to reproduce them. Dr. Tylor forcibly remarks:—

“Take language all in all over the world, it is obvious that the processes by which words are made and adapted have far less to do with systematic arrangement and scientific classification, than with mere rough and ready ingenuity. Let any one whose vocation it is to realise philosophical and scientific conceptions, and

to express them in words, ask himself whether ordinary language is an instrument planned for such purposes. Of course, it is not. It is hard to say which is the more striking, the want of scientific system in the expression of thought by words, or the infinite cleverness of detail by which this imperfection is got over, so that he who has an idea does somehow make shift to get it clearly in words before his own and other minds.*

If it be objected that language is perfect, though man's use of it may be imperfect, I rejoin that we only know it in man's use of it; unlike religion, the principles of which and their harmonious expression in conduct, we see before us as a "flying perfect," a mark, goal, and standard to aim at, but which, unless terribly self-deceived,† we must be conscious that we do not attain. We may, therefore, well conclude with the Archbishop of York that "language is a divine gift; but the power, and not the results of its exercise, the germ, and not the tree, was imparted."‡ "Languages are not made, but grow." Their natural original is well illustrated by Canon Farrar,§ who truly observes, "On the human origin of language, the voice of the Bible coincides perfectly with the voice of reason and of science"; and who quotes the remark of St. Gregory of Nyssa that "the hypothesis of a revealed language" is "Jewish nonsense and folly."

4. *Primeval Language unknown.*

As language, whether slowly developed or instantaneously bestowed, had a beginning, there must have been at least one primeval form of speech. Inquiries respecting this have long been made, are naturally interesting, and lack nothing to command success except the requisite data. The hopelessness of this *ignis fatuus* pursuit is, in the present state of our knowledge, very apparent; but it may be desirable to illustrate the fact by one or two examples.

We have an account of the creation of man, written in Hebrew at a comparatively early period; but this circumstance affords not the least real ground, even in the abstract, and apart from any historical investigation, for supposing that Hebrew was the primeval language. We now know historically that it was a comparatively modern Semitic dialect; but we need not have

* *Prim. Cult.*, i. 216.

† "When the deceiver is always at home and always with you—that is indeed terrible." (Plato, *Kratylos*.)

‡ *Outline*, 47.

§ *Language and Languages*, cap. i.

waited for historical testimony on the subject. There is no pre-
 tence in *Genesis* to the use of *ipsissima verba* in the passages
 where speech is first mentioned. Dr. Colenso, in his carping
 criticism of the Bishop of Winchester's Commentary on *Genesis*,
 contends that the writer must be considered to have held that
 Hebrew was the language of Paradise, because there is a direct
 phonetic and etymological connexion between the words "Eve"
 ('Havâh, Chavvah, Khavvah, or Chawwâ) and "living." Suppose,
 then, we read,—“And the Man called his wife's name 'Life'
 (and rightly so), for she hath become the mother of all 'living,'”
 —may we urge that the writer of such a sentence necessarily held
 that English was the primeval language? It is obvious that a
 score of languages might keep up the connexion, and we are not
 a whit nearer the original *x*. Similarly the Man declares that his
 partner shall be called "Wo-man" (*i.e.* Wife-man, Heb. Isschâh),
 because she was taken out of "Man" (Heb. Isch.). Here, again,
 both languages with equal facility keep up a connexion between
 the pair of terms. Nor will antediluvian proper names give us
 any more assistance in the matter, even after making every
 possible allowance. Thus, *e.g.*, let it be granted that Moses wrote
 the name "Methusael," and that this name means "Man-of-God,"
 and represents a primeval name. How does it represent it,—by
 translation, as being an equivalent, or by transliteration? If
 by translation, then we can no more recover the original form
 than, if ignorant of Greek, we could obtain Astyanax from City-
 king; but, if by transliteration, through how many languages
 and dialects, Babylonian, Assyrian, Akkadian, plus *x*, may it not
 have passed? Again, of course it is by no means difficult to
 supply Hebrew derivations or explanations to non-Hebrew names.
 Thus, the Bishop of Winchester observes that Eve "called her
 firstborn Cain (*possession*), but this second Hebel (*breath*,
vapour, *vanity*, *nothingness*), because all human possession is
 but vanity."* Had Eve, then, at that early period, and thus
 made a happy mother, the feelings of the writer of *Ecclesiastes*?
 Even the Bishop himself seems to doubt his own explanation, for
 he immediately adds, "Yet it is not said that Abel was so named
 by Eve herself, as Cain had been. [It is not directly stated that
 Eve named Cain.] Hence it is possible that the name Abel was
 that by which he became known, after his life had passed away
 like a breath or a vapour." It is *possible*, but such possibilities
 are valueless. It is equally possible that, according to another
 suggestion, he "received a name indicative of his weakness and
 poverty, and, prophetically, of the pain and sorrow which were to

* *Holy Bible with Commentary*, i. 53.

be inflicted on him and his parents." * These are good examples of the facility with which reasons, more or less plausible, may be adduced in support of any etymology. Abel (Habel) is now generally regarded as a variant and derivative of the Chaldeo-Assyrian *ablu*, "son"; † but I am far from claiming any primeval character for this latter language, although we find in it some of the earliest known forms of antediluvian names, as, *e.g.*, *admu*, Heb. *adam* (dark-red), "man."

Leaving sacred books and their associations, let us suppose that we wish to know the primeval name given by man to his best, and probably first, friend,—the dog. In the abstract it is evident that the animal might not unnaturally have been called, in the first instance, Runner, Barker, Biter, etc. Will investigation assist us, and reveal what really took place? Take the the word *dog* itself. Prof. Skeat ‡ gives Middle Eng. "*dogge* (2 syllables). Not found in A. S., but an old low German word: Du. *dog*, a mastiff; Swed. *dogg*, a mastiff; Dan. *dogge*, a bulldog. Root unknown." Richardson § well observes, "Although the word in English is applied to every species, yet in the other dialects it is the large hunting-dog, *Canis grandis et venaticus*"; and we may well connect it with Fick || with the European formation, *dhav*; meaning, primarily, "to flow"; and the Sk. root, *dhav*, ¶ which has the same primary signification, and hence means to move quickly,—run, advance against, assault,—a line of idea most appropriate in connexion with the *canis venaticus*. The root *dhav* is, we find, connected with one or two other roots, as *dhanv*, and *dhan*, which latter has the general meaning of "to move" or "cause to move"; and the Gk. *theó* (θεός) "to run," is a connected form. Thus, *dog*, probably means "runner," but, as noticed, ** there was another and indeed a Proto-Aryan word for the animal, *i.e.*, *kwan* or *kvan*, Sk. *svan*, Zend *span*, Gk. *kuón*, Lat. *can-is*, Teutonic base, *hun* (*i.e.* *kwan*), Goth. *hunds*, Du. *hond*, Icel. *hundr*, Dan. Swed. and Germ. *hund*, Eng. *hound*, Lith. *szu* (=szan-s =szvan-s), Irish *cu*, Gael. *cu*, Welsh *ci*. Here is a word whose use is almost conterminous with the Aryan race, and one which probably is older than the most archaic form of the word

* Kitto, *Cyclop. of Bib. Lit.*, in voc. *Abel*.

† *Vide* Lenormant, *Les Origines*, 12.

‡ *An Etymological Dict. of the Eng. Lang., arranged on an Historical Basis*, 1879. In voc.

§ *New Dict. of the Eng. Language*, 1836. In voc.

|| *Ver. Wört. der Ind. Spr.*, i. 635.

¶ Prof. Monier Williams, *Sk.-Eng. Dict.* In voc.

** *R.M.A.*, 49.

dog. Professor Skeat says, "Root uncertain." The Sk. *svan* is connected with a root *svi*, "to swell," and similarly the Proto-Aryan *kvan* or *kvan* is probably connected with the primary Aryan root *kva*,* meaning "to swell" and "to burn," heat and expansion being connected; and hence to be hollow, be strong, promote, hollowness and strength being connected with increase of size and strength with heat; whilst that which is strong of course promotes. A dog may thus have been regarded as the hot,† warm-tempered, strong creature who promotes man's wishes, or according to some similar line of thought. Canon Farrar sees in *svan*, a direct *onomatopœia*, but this I am unable to discern: he derives it from the Sk. root *kvan*, "to sound," a view which, though tempting, is, I think, decidedly incorrect; for *kvan*, "to sound" (Cf. Lat. *can-o*, Goth. *han-a*, "cock," i.e. "sing-er," Ang.-Sax. *hæn*, i.e., female cock, the alteration of gender being shown by vowel-change), is from the Proto-Aryan *kan*, "to sound," a form contemporaneous but unconnected with the form *kvan*, *kvan*, or *kuan*, "dog." But let it be granted that the form *kvan* is older than any variant form of *dog*, and also that it is the first word ever used by Aryan man to express the animal, how do we know that it is older than the form which we find in Assyrian as *kalbu*, Heb. *keleb*, "barker," another very natural name to apply to the animal, or than the Kamic (Egyptian) *tesem*, or the Akkadian *lik*? This latter name Canon Farrar would probably connect with "the universal root *lk*, an imitation of *licking* the lips" (Cf. Sk. root *lak*, "to taste"). In this case *lik* would signify "the greedy," "the swallower," and the cuneiform ideograph of the word is, in the opinion of the Rev. Wm. Houghton,‡ "a rough picture of some animal couchant," and the name is used somewhat generally, being also applied to a lion, perhaps regarded as a big dog, as it has elsewhere been styled "the great and mischievous cat." A wolf, too, the most rapacious of brutes (Cf. "Benjamin shall ravin as a wolf"), is called *lik-bi-ku*, "dog-other-eating," i.e. greedy-dog. Thus, without entering into the vastly difficult question whether inflectional languages have passed through previous stages of

* *Vide* List of Primary Roots of Proto-Aryan (*R.M.A.*, Appendix B.).

† As to the connexion in idea between fire and an animal, *vide* the remark of Herodotus that "The Egyptians believe fire to be a live animal, which eats whatever it can seize, and then, glutted with the food, dies with the matter which it feeds upon" (*Herod.*, iii. 16, Rawlinson's translation). Plutarch similarly observes, "There is nothing that so resembles a live animal as fire, which moves and nourishes itself" (*Sympos.*, vii.).

‡ *The Picture Origin of the Characters of the Assyrian Syllabary*, 30.

isolation and agglutination, without indeed complicating the matter by any grammatical or linguistic doubts or inquiries, we see at a glance that if mankind have sprung from a single pair of ancestors, these progenitors may, with equal propriety, have called the dog *kwan*, *kalb*, *tsm*, *lik*, or *x*; and that if, for instance, white, black, red, and yellow men had an ancestry originally distinct, any primeval ancestor might have employed any one of these sounds for his purpose.

So we circle round to the *à priori* truth that the first man might have called his dog Barker or Biter, Runner or Watcher, or Swallower. As many appropriate ideas, so many appropriate names. Again, even if we knew that any particular dog-word, *e.g.*, *lik*, was the representative of the original term, we might be still far from the knowledge of what that term was; since, as Sokrates observes in the *Kratylos*, "names have been so twisted in all manner of ways, that I should not be surprised if the old language were to appear to us now to be quite like a barbarous tongue. Remember that we often put in and pull out letters in words," in accordance with the Laws of Least and Most Effort. Lastly, the primeval language may be extinct, not merely in the sense of being unused in conversation and literature, but as having none of its not directly onomatopoeic forms, or even very near approximations to them preserved in any manner. The number of extinct dialects must be immense, and curious accidents at times preserve them more or less; thus "Humboldt saw in South America a parrot which was the sole living creature that could speak a word of the language of a lost tribe."* So Dante's Adam declares:—

"The language, which I spoke, was quite worn out
Before unto the work impossible
The race of Nimrod had their labour turn'd." †

Prof. Sayce considers Akkadian to have been a decaying speech as early as B.C. 3000.‡ But the fact that we are ignorant what were the earliest vocal combinations employed verbally, is no absolute bar to the discovery of the origin of language; for this, when made, would show, to a great extent, how any possible prehistoric presentive § word acquired its special meaning.

* Darwin, *The Descent of Man*, 2nd edit., p. 181.

† *Paradiso*, Pollock's translation.

‡ *Introd. Sci. Lang.*, ii. 368.

§ *I.e.*, a word used for a thing or an idea, as opposed to a "symbolic" word, or one which by itself presents no meaning to the mind.

5. *Errors of the Conventional (Anomalistic) and Connexional (Analogistic) Theories of Language.*

The foregoing line of thought will serve to clear the mind from any traces of the errors of the conventional and connexional theories of language. In the *Kratylos* Hermogenes, on the one hand, contends that "There is no name given to anything by nature; all is convention and habit of the users. The name of anything is that which any one affirms to be the name. Hellenes differ from Barbarians in their use of names, and the several Hellenic tribes from one another." Aristotle is of this opinion, though how people could make agreements and conventions without language he does not explain. This crude *à priori* view which, as Prof. Jowett excellently remarks, "is one of those principles which explains everything and nothing," when applied to the canine terms we have been considering, asserts that different men arbitrarily chose the names *kwan*, *kalb*, *tesem*, and *lik*, as appellations for the dog. But if *kalb* mean "barker," and *dog* "runner," then it is obvious that these names were not chosen arbitrarily; and we are aware that all onomatopoeic names, and local * names, and very many personal names were given for reasons more or less obvious, and hence are not arbitrary. We should thus be at once driven to say that some words only were originally arbitrary; and, in affirming this unprovable proposition, we should be aware that we were doing no more than stating our ignorance of the particular principles which obtained in the formation of them. Sokrates, however, knowing no language but his own, and being etymologically ignorant of the meanings of words (about which, however, either in earnest or jest, he can, of course, guess to any extent), is compelled to disprove the absurd position of Hermogenes by an abstract argument which comes to this:—

Things have their distinct natures, and are independent of our notions about them.

Actions also have distinct natures.

There is a natural way of cutting or burning: any other way will fail.

This is true of all actions.

But speaking is a kind of action, and naming a kind of speaking.

We name, then, according to a natural process.†

Therefore, names are not given by artificial convention.

* "Local names are never mere arbitrary sounds" (Rev. Isaac Taylor, *Words and Places*, 1).

† *Vide* Jowett, *The Dialogues of Plato*, ii. 174.

Hermogenes agrees, but would fain know what is "the natural fitness of names." Why does *dog* mean "runner"? But this is the actual mystery of language, and Sokrates cannot help him except by a few ingenious general suggestions.

Kratylos, in the opposite extreme, not only holds that names "are natural and not conventional," and that "there is a truth or correctness in them," which I do not doubt; but also that one name is no better than another, that all names are rightly imposed, that if a man addresses you by a name not your own "the motion of his lips would be an unmeaning sound, like the noise of hammering at a brazen pot," and "that he who knows names, knows also the things that are expressed by them"; for, "as is the name so is also the thing"; and on being pressed with the argument that "if things are only to be known through names how can we suppose that the givers of names had knowledge before there were names at all," takes refuge in the supposition that "a power more than human gave things their first names, and that the names which are thus given are necessarily their true names." This latter position we have already found reason to reject on its own merits; and the view that "a word is either the perfect expression of a thing, or a mere inarticulate sound," is, as Prof. Jowett observes, "a fallacy which is still prevalent among theorizers about the origin of language." So far from a name being perfect, it is obviously imperfect; inasmuch as it gives an incomplete view, which itself naturally corresponds with an experience only partial and a defective apprehension. "Runner" is a good name for a dog, so far as it goes; but evidently not an absolutely good name. But there being thus an element of imperfection in names, there are therefore degrees of imperfection, so that one name is better or worse than another; and therefore all names have not an equal degree of truth or appropriateness. It is, then, absurd to regard names as god-bestowed.

Again, we do not, by knowing names, know the things that are expressed by them. Thus *tesem* raises no idea of the dog in our minds. Yet we are willing to admit with Kratylos that he who bestowed this name had a reason for so doing. But if all names are equally valuable, and indeed divine, so that *kwan*, *kalb*, *tesem*, *lik*, and *x* are perfect names for dog (if, indeed, there can be more than one perfect name, as, says the adage, "Mortals have many tongues, immortals one"), then the result is precisely the same as if these terms were merely valueless in themselves, *i. e.*, had only a conventional value. In either case we could understand nothing about them, except that we had them. Thus these two opposite systems, starting from the same point in different directions, traverse the world and meet

again, having in their course described two semicircles, which combined give us—nothing.

6. *The Platonic View of Language.*

Between Hermogenes and Kratylos stands the Sokrates of the dialogue, who freely communicates his "view," or perhaps "views," rather than any definite theory. Language has undoubtedly a natural element; names are appropriate and not arbitrary. But there is also a conventional element; thus, *e.g.*, *shall* (Old Eng. *sceal*, "belongs to") is now generally employed merely as a tense-symbol. There is, moreover, the element of accident, the element of the effect of time, the element of the desire of euphony, and (as regards Hellenic considered alone) the foreign element. Granting that language is the imitation of something; imitation, like convention or any other human effect or arrangement, is comparatively feeble and imperfect. And here it may be further observed that human imitation is second-hand, *i.e.*, we reproduce the impression which the particular circumstance has made upon us. This line of idea is most true, and excellent so far as it goes; but having nothing except *à priori* brilliance to support him, Sokrates starts the singular theory that "the work of the legislator is to give names, and the dialectician must be his director if the names are to be rightly given"; so that "this giving of names can be no such light matter." We who know that all languages are more or less related, and that simple primitive man was the great maker-of-terms (*poiētēs*), are, of course, aware that the appellation *kwan* was not the product of the joint reflective wisdom of dialectician and legislator; unless, indeed, the simplest thinker be dignified with the former name, and the simplest ruler with the latter. But Plato sees with luminous clearness the real *crux* in language, *i.e.*, "What is the natural fitness of names?" "Names rightly given are [in some way or other] the likenesses and images of the things which they name." We see, of course, how direct onomatopoeitic ("bow-wow") names answer this description. We do not, however, call a hound *bow-wow*, but *dog*; granting that *dog* means "runner," we see how this name answers the description, but why does the root *dhav* mean "to flow"? If language is "imitative sound," and if this fact be "the greatest and deepest truth of philology,"* what and how does *dhav* (allowing it for argument's sake to have been once used as a word) imitate? Names could never "resemble any actually existing thing, unless the original

* Jowett, *The Dialogues of Plato*, ii. 192.

elements of which they are compounded bore a resemblance [in some way or other] to the objects of which the names are the imitation." Very true; but, be it remembered, this "resemblance" may have been merely in the mind of the name-giver. "And the original elements are letters," or, rather, sounds. The alphabet is comparatively modern, and Sokrates is only thinking of the Hellenic alphabet. A practical age grouped these "original elements" in an alphabetic combination.

How, then, do letters imitate? Various ideas are imitated by various sounds. Sokrates modestly observes that his "notions of original names are truly wild and ridiculous"; but, as Prof. Jowett observes, "Plato's analysis of the letters of the alphabet shows a wonderful insight into the nature of language."* The "notions" of Sokrates on some letter-meanings are as follows:—

a expressed size, because a "great letter." How "great" I am not clear, whether as most important, † as the head of the alphabet, as being often written larger, or otherwise. Professor Jowett observes that "in the use of the letter *a* to express size, the imitation is symbolical." How the sound *a* was supposed to express size I know not; but Plato's obscure reason points more to the letter itself than to its sound. Cf. his explanation of *o*.

γ, a heavy sound.

γλ, "the notion of a glutinous, clammy nature." Vide *γ* and *λ*.

δ, *τ*, expressive of binding and rest, on account of the closing and pressure of the tongue.

ζ, *σ*, *φ*, *ψ*, are used to imitate what is windy, their pronunciation being accompanied by great expenditure of breath.

η, length; because a "long" letter (double *ε*). A "great letter." Vide *a*.

ι expresses "the subtle elements which pass through all things."

It is "imitative of motion, *ίέναι*, *ίεσθαι*." This imitation consists in the quickness and comparative noiselessness of its pronunciation, which Plato contrasts with the agitation of the tongue in *ρ*. This is the most interesting of these comparisons, because it is not palpably obvious; and yet Plato's view seems to have been that adopted by Aryan man. Thus, we find the Proto-Aryan root *i* (*ja*, *ya*), "to go," Sk. *i*, Gk. *ίί*-mi, Lat. *e*-o, *i*-mus, Lith. *ei*-mi, Slav. *i*-du, etc. So *i* in

* Jowett, *The Dialogues of Plato*, ii. 191.

† Vide the Alpha-speech (*R.M.A.*, Appendix B.).

Akkadian signifies "clear," "sunrise," the subtle element of light which passes quickly and noiselessly.

λ expresses smoothness, as the tongue slips in its liquid movement.

υ, being sounded from within, has a notion of inwardness, e.g., ἔνδον.

ο was the sign (not sound) of roundness.

ρ appears to be the general instrument of expressing motion, because the tongue is most agitated in its pronunciation.

These are his specimen letters, and he profoundly observes:—"I believe that if we could always, or almost always, use likenesses which are perfectly appropriate, that would be the most perfect state of language, as the opposite of this is the most imperfect." These are very valuable hints, and, in leaving Plato, we must also remember that the *Kratylos* does not pretend to be a formal treatise on language, but a semi-humorous argumentative conversation *about* language. Plato, being "necessarily more ignorant than any schoolboy of Greek grammar," could not make bricks without straw; but his profound and penetrating genius,—by which term I mean the power of appreciating and disclosing to an unusual extent the latent potencies of truth and beauty, and the capabilities of things,—did almost all that was possible in the way of useful *à priori* speculation.

7. The Divisions of Language.

Reverting to the definition of language and its divisions,* we observe that it naturally divides into:—

I. *Touch-language*.—A good instance of this is afforded by the special books for the use of the blind, but pressing the hand is equally a word in it. I do not propose to refer further to it.

II. *Eye-language*.—This consists of:—

1. *Gesture*. Which is,—

(1.) *Directly imitative*.

(2.) *Occultly imitative*.

2. *Delineation*. Which is,—

(1.) *Directly imitative*. *I.e.*, ordinary drawing.

(2.) *Occultly imitative*. *I.e.*,—

(a.) *Symbolic drawing*.

(b.) *Writing*. Originally purely pictorial or ideographic.

* *Sup. Sec. 2.*

III. *Ear-Language*.—This consists of:—

1. *Ejaculations*. *I.e.*, natural involuntary cries, which to a very great extent are identical, or only slightly variant, amongst different nations. They intensify by junction and reduplication,* *e.g.*, Gk. *a*, *aa*, *alalai*, *alala*, which becomes a sub., “the battle-cry,” and next a personification, the “genius-of-the fray,” and so gives rise to a verb, *alalazô*, “to cry *alala*.” Cf. Zulu *halala*, Tibetan *alala*, Heb. *hallelujah*. As an instance of reduplication, we find,—*ototoi*, *otototototoi*. So from the Old Eng. *ea* (ah) and *la* (lo) comes *eala* (halloo). Cf. *wa* (woe), *wala*, *walawa* (well-a-way, well-a-day).
2. *Ordinary articulate speech*. Which is,—
 - (1.) *Directly imitative*. — The Onomatopoeic Proper, *e.g.*, names simply and obviously expressive of sounds.
 - (2.) *Occultly imitative*.—Here the connexion between sound and sense is not immediately apparent. There must, as Plato remarks, have been some resemblance between the name and the thing; and intentional resemblance is produced by imitation. If we deny any resemblance, we are driven back on the conventional theory of language, which we have already seen cause to reject.†
3. *Music*. Which is,—
 - (1.) *Directly imitative*.—At times highly ingenious, but, as a rule, essentially clap-trap.
 - (2.) *Occultly imitative*.—*I.e.*, subtly suggestive; so that we speak of “the sound-reveries of Tone Poets.”

It will thus be observed that language, like the moon, has a bright and intelligible side (direct imitation), and a dark and hidden side (occult imitation); but the latter did not spring from the former. The two combined form the mysterious satellite that attends and illumines the intelligence of man, very possibly borrowing its own light from man’s sun religion.‡

* Vide *R.M.A.*, Sec. 19. The Law of Reduplication.

† “That the selection of words to express ideas was ever purely arbitrary is a supposition opposed to such knowledge as we have of the formation of language” (Tylor, *Early Hist. of Mankind*, 3rd edit. p. 56). “We cannot suppose the development of language possible without some connexion between sounds and objects” (Farrar, *Language and Languages*, 20).

‡ Vide *sup.*, Sec. 1.

I do not support "the Interjectional, or Pooh-pooh theory," *i.e.*, that speech is founded upon man's natural cries and ejaculations. "Our answer to this theory," says Professor Müller, "is the same as to the former"* [the Bow-wow theory], *i.e.*, that interjections constitute but a very small portion of the dictionary. I do not regard articulate speech as based upon ejaculations, nor is it possible to regard ejaculations as based upon articulate speech; both are necessary parts of ear-language.

It will next be observed that all language, whether working by touch, sight, or sound, is directly addressed to the apprehension of another; and is, therefore, inseparably connected with the desire to communicate our thoughts and ideas. Hence it is the special social force of the highest gregarious animal.

Occult gesture is probably as much simpler than occultly imitative speech, as the latter is than occultly imitative musical harmony.

In studying occultly imitative speech, the other divisions of language should be considered comparatively.

8. *The Divisions of Articulate Speech.*

Languages, according to the terminology of the time, are:—

- I. *Isolating*.†—This class shows no formal distinction between a root and a word, and has practically no grammar, but syntax only. It includes,—
 1. *The Tibeto-Burman Group.*
 2. *Chinese.*
 3. *Various Mexican Dialects.*
- II. *Agglutinative*.—The terminational class, in which two or more roots unite to form a word, but retain their original character in different degrees. The additions may be prefixes or affixes. The class includes:—
 1. *Akkadian*.—The language of the early non-Semitic inhabitants of the Euphrates Valley, inventors of the cuneiform writing, and from whom the Semites borrowed a considerable part of their religion and general civilisation.
 2. *The Ugro-Altaic Group* (Turanian); including Turkish-Tatar, Mongol, Tungusian, etc.
 3. *Etruscan*.‡

* *Lects. Sci. Lang.*, 6th edit., i. 409.

† Vide *R.M.A.* 5.

‡ Vide *R.M.A.* Appendix D. *The Etruscans.*

4. *Nubian*.
5. *Dravidian* (South-Indian Family).
6. *Malayo-Polynesian*.
7. *Papuan*.
8. *Australian*.

III. *Inflectional*.—The amalgamating class, in which the roots equally coalesce, and are therefore equally subject to phonetic corruption. It includes:—

1. *Hamitic*, which is:—

- (1.) *Kamic* (Archaic Egyptian).
- (2.) *Coptic*.
- (3.) *Libyan*.
- (4.) *Ethiopian*.

2. *Semitic*, which includes:—

- (1.) *Assyro-Babylonian*.
- (2.) *Phœnician*.
- (3.) *Hebrew*.
- (4.) *Aramaic*.
- (5.) *Arabic*.
- (6.) *Himyaritic* (Sabean).

3. *Aryan* (Indo-European), which includes:—

- (1.) *Proto-Aryan*.
- (2.) *Sanskrit*.
- (3.) *Hindustani*, and modern dialects allied.
- (4.) *Iranian*, including Archaic Persian, Archaic Baktrian (generally called Zend*), Pahlavi (Ancient Persian), and Parsi.
- (5.) *Keltic*, including Gaulish, Scotch, Irish, Welsh, and Cornish.
- (6.) *Teutonic*, including Gothic, Old English (Anglo-Saxon), Old Norse, German, Dutch, Swedish, Norwegian, Danish, and English.
- (7.) *Italian*, including Latin, Umbrian, Oscan, French, Spanish, and Modern Italian.
- (8.) *Hellenic*, including Ancient Greek, Modern Greek, and Phrygian.
- (9.) *Albanian*.
- (10.) *Letto-Slavonic*, including Old Slavonic, Old Prussian, Lithuanian, Polish, Russian, and Bulgarian.

4. *Lycian*.

5. *Alarodian*, including Vannic, Georgian, etc.

* Vide R.Z., Sect. 5. Iranian Sacred Literature.

The foregoing list, which includes the most celebrated dead languages, is, of course, not intended to be exhaustive, but merely indicative; and in addition to the above-mentioned three great divisions, some comparative philologists of the highest merit add a fourth, namely:—

IV. *Polysynthetic*.—The class where the sentence is fused into a word, and the words thus fused are reduced to their simplest elements.* *E.g.*, the Eskimo *sialugsiokhpok*, “he-is-outside-in-the-rain.” It includes:—

1. *Mexican*.
2. *Peruvian*.
3. *Many other dialects of North and South America*.
4. *Eskimo*.
5. *Basque*.

As regards the polysynthetic languages, Prof. Müller has remarked that,—

“As long as in these sesquipedalian compounds the significative root remains distinct, they belong to the agglutinative stage; as soon as it is absorbed by the terminations, they belong to the inflectional stage.” † Others see in polysynthesis a survival of the universal early state of language. The majority of the Old World dialects are agglutinative, and the inflectional branch, although exceptionally prominent, is by no means essentially superior. Thus, one of the strongest points about English, is the immense extent to which it has abandoned inflection, and the great advantages which it has gained thereby.

“That language,” observes Prof. Sayce, “has most chance of superseding [old dialects] which, like our own, has discarded the cumbrous machinery of inflectional grammar. The great Grimm once advised his countrymen to give up their own language in favour of English, and a time may yet come when they will follow the advice of the founder of scientific German philology.” ‡

It may be incidentally remarked, that if the principle of Fixity of Type obtains in languages, and, according to many of the highest authorities, it undoubtedly does; so that, *e.g.* an inflectional language will have always been inflectional, and has never passed through prior stages of isolation and agglutination or either of them, then we may find in this permanence of character a powerful argument against the doctrine of Evolution.

9. *The Transition from Drawing to Writing.*

The earliest inscribed language, whether Chinese, Akkadian,

* *Vide* Prof. Sayce, *Introd. Sci. Lang.*, ii. 216.





† *Lects. Sci. Lang.*, i. 371.

‡ *Introd. Sci. Lang.*, ii. 350.

or Kamic, was originally purely pictorial and unalphabetic; but, as direct and simple pictorial representation was obviously the most natural course, so equally, under the force of the Law of Least Effort, did the pictorial glide into the conventional, which latter at times became alphabetic, and drawing passed into writing. Thus, in Kamic we find:—

- I. *The (so-called) Hieroglyphic.*—Here, although direct ideographs are exceedingly prominent, yet we have also certain phonetic or alphabetic signs representing *a, i, u, b, p, f, m, n, r, k, q, h, ch, s, sh, t, and th.* There is, moreover, the very important class of indirect ideographs, which convey the idea by metonymy or otherwise, *e.g.* by putting cause for effect; hence a whip = to rule.
- II. *The Hieratic.*—This, which is of extreme antiquity, is merely the archaic contraction of the monumental (hieroglyphic) for ordinary use.
- III. *The Demotic or Enchorial.*—A still further abbreviated and common form of the country. These three forms completely illustrate the transition from drawing to writing,* and are referred to by the Greek authors.†

In the case of the cuneiform, we find similarly:—

- I. *The Ideographic.*—In Akkad, as everywhere, this is the first principle. As Clement of Alexandria says of the Egyptians, “Wishing to express ‘sun’ in writing, they make a circle; and ‘moon,’ a figure like the moon, in its proper shape.”‡ Here, too, of course, ideographs are direct and indirect.
- II. *The Archaic.*—This is the first phase of transition from picture-writing pure and simple. Thus  and  = the solar circle.
- III. *The (so-called) Hieratic.*—A succeeding avatar which, with variations, was used by the Babylonians down to the latest days of their monarchy. Here  = sun.
- IV. *The Ordinary Assyrian type.*—Here  = sun, the two perpendicular strokes of the last form having joined, and the two horizontal strokes having been shortened and made semi-perpendicular.

The Chinese characters present a similar example. Thus the

* *Vide Specimen of the Rosetta Stone, in Bunsen's Egypt's Place, vol. i., 2nd edit., p. 625.*

† Herod., ii. 36; Diod. Sic. i. 81.

‡ *Stromata, v. 4.*

archaic form for "a hare" shows the animal sitting upright. The form for rhinoceros shows the animal's horn used as a drinking-cup, on the principle of a part for the whole, just as our letter A is, in origin, a bull's horns. The form for "man" now shows only a man's legs, the rest of the figure having, like letters in words innumerable, dropped off in the march of time. The oldest characters, called *siang-hing* ("images"), are said to have been about 200 in number. The sun was represented by a circle with a dot in the centre, the moon is a crescent, and rude but plain ideographs show figures of a dog, a fish, etc. There is no difficulty in expressing more complicated ideas; thus "tear," both in the Chinese character and in the cuneiform, = eye + water.

It is very desirable that the various forms used by different nations should be studied comparatively, and it is almost certain that some connecting links between them will be discovered. Thus, according to M. Terrien de la Couperie, the Chinese ideograph, which represents the setting sun, is similar to the Akkadian ideograph, and, like it, has the phonetic value *mi*; and his recent researches actually tend to show the common origin of the Chinese and Akkadian writing. But the deduction which naturally arises from this examination of delineatory eye-language is, that, just as in the great majority of instances it would be utterly impossible to show *à priori* any connexion between the original ideograph and its ultimate conventional form, and yet that connexion is a most real and regulating one; so, similarly in ear-language, although it may be utterly impossible to show directly the connexion between the sound and meaning of the majority of words, yet such a connexion not only may, but by analogy in all probability must, exist. As is the transition from drawing to writing, so is the transition from the idea (mental picture) to its vocal expression (tongue-writing).

10. *The Principle of Limitation of Choice in Original Names.*

If, as we have seen, one name is not as good as another, or, at all events, that there is some cause, reason, or principle in the selection of a particular name, let us next inquire if it be possible to indicate, or even partially to determine, the limitation which obtains in this selection. That there is a practical limitation is obvious, inasmuch as not every name has been applied to the dog, but the animal has received only a certain limited number of appellations; and, again, the same name is not used

for "dog" and "cat" interchangeably. Thus the ancient Egyptians called, and the Chinese call, the cat *miau*, a name which obviously would never have been applied to a dog. When the Akkadai called the horse "the-animal-from-the-East," the wolf "the-animal-from-Elam," or the camel "the-animal-from-the-Sea" (*i.e.* as having come from Arabia across the Persian Gulf), or when the Vedic Indians called the horse "the-rapid-animal,"* and the cat "the-animal-that-cleans-itself," they had reason for the appellations; and the reason in each case was definite and limited, and not merely of a vague and general character.

But, in illustration of the Anomalistic position, it has been remarked that in Kamic *kek*, *u*, *ua*, *ta*, and some two-and-twenty other sounds, all mean "ship." There was a ship: A called it a *kek*, B called it *ua*, C called it *ta*, and so on through the alphabet. Let us translate this into English. There was a ship: A called it *ark*, B called it *bark*, C called it *cutter*, etc. Are all these chance names, of similar meaning, and one as good as another? The hieroglyphic forms (not to refer to anything else) show distinctions between the Kamic words; and we may naturally expect to find in the infancy of language, as now in many savage dialects, vast numbers of special, and few, or, at times, absolutely no general terms. A dialect may possess quantities of names for trees, the parts of trees, relation with trees, but yet no word meaning "tree." Again, a highly-developed life and language will and must produce this number of names *in addition to* appropriate abstract terms. Ancient Egyptian also offers instances of the converse example, *i.e.* some words have a great variety of meanings, some of which are apparently or even really unconnected; but this phenomenon, too, we can parallel without going beyond our own language, *e.g.* *bark*—of a tree, of a dog, of the ocean. Prof. Sayce, who to vast learning and ability adds the genial element of great personal kindness to inquirers, speaking on the question of the connexion between word and idea, observes: †—

"The arbitrary element in gesture-language is very small compared with what it is in spoken language.‡ Here beyond a few interjections, or possibly [Why 'possibly'? It is an absolute fact] a few onomatopœic sounds, the whole body of symbols is [Yes; *is now*—to us] purely conventional. The same combination of sounds may [to some extent] be used to denote very

* *Vide* Prof. Müller, *Lects. Sci. Lang.*, ii. 68 Other meanings have also been suggested.

† *Introd. Sci. Lang.*, cap. ii.

‡ *Vide* the Canon, *sup.*, Sec. 7.

different ideas. There is no necessary connexion between an idea and the word that represents it. It is as arbitrary as our making the sign I symbolize the idea of unity, or the sign = the idea of equivalence."

Here the question turns upon the meaning of "necessary connexion"; there is a connexion of some kind between that-which-is-representative and that-which-it-represents, for a word is a sign, and a sign, as M. Taine has acutely observed, is "a present experience, which suggests to us the idea of a possible experience." If by "necessary" is meant "abstract," it may be admitted that in the abstract one name is equally as destitute of, or as replete with, meaning as another. We are not, however, dealing with the abstract but with actual concrete circumstance, and Prof. Sayce's illustrations throw still greater doubt upon his meaning. For he says that the connexion is *as arbitrary as, e.g.,* making the sign = represent the idea of equivalence. But what degree of arbitrariness is there in so doing? Surely, two short and equal straight lines represent this idea very naturally. On the other hand, we might fairly call it arbitrary to represent equivalence by two unequal lines. There is evidently a certain degree of arbitrariness in the matter, *e.g.,* perpendicular lines might have been employed; and, therefore, by corollary, a certain degree of connexion.

Prof. Sayce continues,—“There is no reason in the nature of things [the abstract?] why the word *book* should represent what we mean when we look at the present volume; it might just as well be denoted by *biblion* or *liber*.”

Let us, forgetting the connexion between *book* (Old English *boc*, “a beech-tree”) and beechen tablets, between *liber* and the inner bark of trees, between *biblion* and the inner coats of the papyrus (a book being named from its material stuff), admit that they are equally good names; that the Aryan *kwan*, the Semitic *kalb*, the Hamitic *tesem*, and the Turanian *lik*, are equally suitable names for the dog. From such an admission, the deduction is frequently, but most incorrectly, drawn that *any* sound-name would have been, or be, equally suitable. Yet, as we have seen, *miau* would have been intrinsically inappropriate. Prof. Sayce observes that:—

“The origin of language is to be sought in *gestures*, *onomatopœia*, and, to a limited extent, *interjectional cries*.” If it comes from these three sources, the words “to a limited extent” apply equally to each source; and he then notices that interjectional cries are universally practically the same, like play of feature, that the same gestures are for the most part understood by different races in the same way, and that language can be traced back to a few and simple elements. As to interjec-

tional cries (of which more anon), they may or may not be words, but how much of the dictionary comes from them? Have they not, as far as we know, been almost always stationary in number? Theirs must at most be a minimum of influence; and this fact Prof. Sayce fully admits, since, as he says, they represent emotions, not ideas. But if the other two and the chief elements in the formation of language be gesture and onomatopœia, how can it be said of words generally, at all events in their origin, that there is no necessary connexion between an idea and the word that represents it? Noticing that natural sounds strike different ears very differently, he excellently remarks :—

“Of course, it is not necessary that the imitation of natural sounds should be an exact one; indeed, that it never can be all that is wanted is, that the imitation should be recognisable by those addressed. Many of our modern interjections, like *alas!* [= *a* (ah!) + *las* (wretched, Lat. *lassus*)], *lo*, are words that once possessed a full conceptual meaning, but have lost their original signification, and been degraded to the level of mere emotional cries. *So hard is it for language to admit anything which was not from the first significant in thought.*”*

Therefore, the mind, we notice, positively demands significance in word-making; but significance excludes the arbitrary element; and if men formed $\frac{9.9}{100}$ of language on gesture and onomatopœia, we again find that the means practically employed negatives mere arbitrariness. Thus from any and every point of view we arrive at the conclusion that language in origin is not arbitrary and conventional. But although these arguments may be fully admitted in the abstract, yet we falter when confronted with the crowd of utterly variant words (*e.g.*, *kwan*, etc.). The fact that people attempting to imitate the notes of the nightingale, produced forms as various as *bulbul*, *jugjug*, *whitwhit*, *tiuu-tiuu*, etc., † shows at least that there are cases in which highly different results may attend the attempt to express verbally the same thing; but I make no suggestion that the four dog-names are variant phases of a prior and original name, in the same way as numerous Aryan dog-names are variant phases of *kwan*.

As our method is strictly comparative, let us in the attempt

* The italics are mine.

† The cock is referred to in the *Avesta* as “the bird named Parodarsh, which evil-speaking men call by the name *Kahrkatās* (*Vendidad*, xviii.). Cf. our *cock-a-doodle-doo*, the Tahitian *aaoa*, the Yoruban *koklo*, the Zulu *kuku*, the Finnish *kukko*, the Sanscrit *kukkuta*, the Spanish *quiquiriqui*, the Chinese *kiao-kiao*, the Mantchu *dchor-dchor*, etc.

to discover the apparently occult, and yet, I think, really simple principle in the limitation of original names, call in to our aid the sister branch of language—drawing. If we wish to draw, e.g., Death, might we not depict a skeleton, a skull and cross bones, a winged skull, a black figure with a dart, a prostrate human body,* any usual means of putting to death, as an axe, guillotine, etc., or otherwise express the idea in fifty variant ways, which, however different from each other, would yet all agree in being aspects and phases of the general concept. And how many such pictures could we draw? Obviously as many as our distinct ideas of the original, and no more; given fifty independent ideas, and fifty different pictures can be produced. Here, then, we touch the principle of limitation of choice in original names. A man could give the dog as many of such names as he had distinct ideas concerning the animal, and no more. Thus, to instance some names which Ovid gives to dogs of the pack of Aktaiôn, he could call a dog Blackfoot, Tracer, Glutton, Quick-sight, Ranger, Hunter, Swiftfoot, Spot, Smut, Snap, Runner (*Dromas*, i.e., “Dog”),† Barker (Kanakê-Kalbu), etc. But he could not call a dog Tree, Root, Onehorn, Tenlegs, etc., because naming was a powerful exercise of rational judgment, and not an aberration of judgment; and such names as the latter would have been, to quote the simile of Kratylos, “unmeaning sound, like the noise of hammering at a brazen pot.” But could not we call a dog Tenlegs? Certainly, although any one who did so would be thought very foolish, or at all events decidedly eccentric, which is almost the same thing. But we possess a power of abstract and arbitrary and sportive thought, which primitive man, the slave of truth and reality in nature immediately around, had no idea of.

Gifted with a supreme power of apprehension in the matter of simple natural facts, it was as impossible for him to contradict the vivid impression of his every-day ideas, as it would be now for a sane man to take a madman’s stand-point. Thus every archaic animal-name is based upon an excellent reason; and it was nothing short of an illumination of genius, the quintessence of correct observation, which made the mighty animal call himself *man*, he-who-means,—“the Thinker,” not “the Speaker,” observe; for speech is based on thought, not thought on speech. Thus we may conclude that *Original names do not exceed in number the number of distinct ideas entertained by the namer.*

* The Kamic ideograph for “to kill.”

† Vide *sup.*, Sec. 4.

11. *Children and the Origin of Language.*

The acquisition of speech by the "Speechless one" (*Infans*, *Nēpios*) has long been considered a phenomenon of great importance in the study of the origin of language; and various celebrated experiments have illustrated the universality of the imitative element in children, who learn one dialect as easily as another. Thus, according to the famous story in Herodotos, the Egyptian king, Psamethik (Psametichos), "made an attempt to discover who were actually the primitive race," and "finding it impossible to make out by dint of inquiry what men were the most ancient," he had two children brought up with goats by a herdsman, "charging him to let no one utter a word in their presence. His object was to know, after the indistinct babblings of infancy were over, what word they would first articulate"; it being apparently a very general, but most illogical, assumption that any such word would belong to the most ancient of languages. After two years "the children distinctly said '*Bekos*,'" and the king finds on inquiry that this is "the Phrygian name for bread," on which the Egyptians admit "the greater antiquity of the Phrygians."* Into the question of the historical truth of the story we need not enter, and despite various learned conjectures respecting *bekos* (*i. e.* *bek*, with a Greek termination), we may, I think, undoubtedly agree with Larcher, Canon Farrar, and Dr. Tylor,† that the children were imitating a goat's bleat.

This is confirmed by the result of the experiment attributed to Akbar, whose ruling passion was "desire of knowledge," and who "had heard that Hebrew was the natural language of those who had been taught no other." Here, again, we encounter the view that people, if uninfluenced, would speak the primeval language, and also the ancient and possibly not yet extinct opinion that such language was Hebrew. "To settle the question, he had twelve children at the breast shut up in a castle and brought up by twelve dumb nurses." At twelve years of age the children are brought before him and a great assembly of linguists. "Every one was astonished to find that they did not speak any language at all. They had learnt from their nurses to do without any, and they merely expressed their thoughts by gestures, which answered the purpose of words."

* *Herod.*, ii. 2. Canon Rawlinson's translation.

† "*Bek bek* is a good imitative word for bleating, as in *βληχάομαι*" (*Early Hist. of Mankind*, 79).

It was with some trouble that their tongues were loosened.* Thus, as we all know without any experiment, children imitate their companions; but it further appears that the influence of the latter may be strong enough even to set aside the ordinary course of nature.

Believing that language was primarily used by the man, not by the child, I do not think that very much is to be learnt from children in the matter, because we miss the comparatively thoughtful and mature intelligence that was first employed upon the formation of words. Yet that occasional hints and illustrations of great value may be obtained from observation of the earliest linguistic operations of children is undoubted, as the following instance will show. A little boy "showed, in early infancy, a peculiar tendency to form new words." It will be observed that such a tendency is decidedly uncommon. "He established in the nursery the word *nim* for everything fit to eat. First, he expressed his satisfaction at seeing his meal, by the natural humming sound *hm*. Gradually it changed into the more articulate *um* and *im*. Finally, an *n* was placed before it. But soon the growing mind began to generalize, and *nim* came to signify everything edible; so that the boy would add the words *good* or *bad*, which he had learned in the mean time. He would now say *good nim*, *bad nim*. On one occasion he said *fie nim*, for *bad*, *repulsive to eat*. There is no doubt but that a verb *to nim*, for to eat, would have developed itself, had not the ripening mind adopted the vernacular language, which was offered to it ready-made."† So, again, amongst the Papuans "eating was called *nam-nam*, from the noise produced by the process";‡ and in Akkadian the greedy wolf is called *nim* or *num*. In the above case of *nim* we have a rare and admirable instance, showing how the rational mind deliberately strengthens a sound into a word. Prof. Sayce quotes a dictum of Proklos that "men create speech, not, however, deliberately and with intention, but instinctively through the impulse of their nature." The error here lies in the "but"; there is no real antithesis. Men create speech instinctively and naturally, and yet also deliberately and purposely. Here we have a case of occult imitation; of course the lips may be opened and closed silently, yet it will probably be admitted that it is very natural to accompany this movement with the sound *em*, *um*, *mem*, in fact, an *m* sound. Cf. and Sanskrit root *mu*, "to tie,

* The Jesuit Father Catrou ap. Tylor, *Early Hist. of Mankind*, 80, 81.

† Lieber, ap. Taine, *On Intelligence* (Eng. Trans.), 402-3.

‡ Comrie, ap. Sayce, *Introd. Sci. Lang.*, i. 108.

make fast," *muka*, "dumb," *i.e.*, where the string of the tongue is tied; Greek *mu*, an imitation of the sound made by *murmuring* with closed lips, *muβ*, "to be shut," especially of the lips, *muβ*, "to initiate into the mysteries," because in saying *mu* the mouth is both opened and shut. Cf. also English *mum*, *mumble*, *munch*, *mutter*, *mute*; the *mumu*, "dumb," of the Vei negroes of West Africa, the Tahitian *mamu*, "to be silent," etc.

It is said that the little boy in question placed an *n* before *im*, "*nim* being much easier to pronounce than *im*, when the mouth has been closed." But this I do not follow. As the child's organs strengthened he evidently placed more emphasis upon the *im*,* and imitated the action more thoroughly; and, as we see, his *nim-nim* almost exactly agrees with the Papuan *nam-nam*, the Surinam *nyam-nyam*, the Swedish *nam-nam*, and the Chinese child-word *nam*. Such a case as this, where every step of the process can be traced, shows how the principle of occult imitation doubtless obtains in numbers of cases where at present we are unable to trace it. The whole operation has not the slightest connexion with the emotional cries of other animals. Mr. Darwin, also, mentions the case of a little boy who invented the word *mum* for food, and called sugar *shu-mum*; and we see how naturally the same sound, *e.g.*, *mum*, may be connected with two apparently absolutely distinct and even opposite ideas; *i.e.*, with food as that which goes into the mouth, and with silence or words-not-coming-out.

12. *The Simious Theory of Language.*

We may next notice what has been styled the "Simious" theory of language, *i.e.*, that speech has arisen through the natural instinctive cries of quasi-human apes. The epicurean Horace has told us how at some time animals crawled forth from the earth, formed, probably, somehow by the mixture of heat and moisture; and how "the mute and dirty herd" fought for nuts, and at length in some way found out words and names "by which to mark articulate sounds and to express their feelings."† Manilius‡ speaks similarly, and Diodoros, apparently repeating the common opinion of his day, observes that at first the tones of the human voice were indistinct and confused, but that after a little they distinctly articulated their

* As to emphasis, vide *R.M.A.*, 45. I apprehend that originally emphasis was frequently expressed by a prefix.

† *Sat.* I., iii. 99, *et seq.*

‡ *Astronomica*, i. 85.

speech and used signs, so that they became able to understand each other.* Plutarch, too, records an Egyptian tradition that until the god Teti (Thoth) taught men language, they used mere cries, like other animals.

But what the ancients were ignorant of is the great principle of the gradual transformations, avatars, descent, or rather (as Prof. Goldwin Smith well observes) 'ascent' of man. Though at present I see no reason to accept the evolutionary view (which I regard as being what lawyers would call a "bare possibility," and to be rejected, amongst other reasons, by virtue of the principle of fixity of type), I do not wish to ridicule it. Prof. Sayce expresses the theory in no unfriendly spirit:—

"Between the ape and man the evolutionist has inserted his *homo alalus*, 'speechless man,' whose relics may yet [or may not] be discovered in Central Africa, or in the submerged continent of the Indian Ocean. Wherever the conditions were favourable, *homo alalus* developed into *homo primigenius*, whose first records are the unworked flints of countless ages ago. Where the conditions were unfavourable, there was retrogression instead of progress, and *homo alalus* became the progenitor of the gorilla, the chimpanzee, the gibbon, and the orang-otang. Such is the theory which post-tertiary geology can alone verify or confute."†

The theory, then, is "not proven," and we must wait and see what geology will do for us in the matter; again, it cannot be absolutely refuted, because we cannot demonstrate an absolute negative on the point. We should be fully justified in letting this theory stand aside for the present, but it is perhaps more satisfactory to give it a brief examination with the aid of the evidence available. There is plenty of decided *opinion* on the matter; thus Mr. Darwin remarks:—

"I cannot doubt that language owes its origin to the imitation and modification of various natural sounds, the voices of other animals, and man's own instinctive cries, aided by signs and gestures."‡

Here the elements of language are said to be Imitation, which of course produces modification, Ejaculations, and Gesture. This latter is undoubtedly a most valuable adjunct. Prof. Sayce, too, as we have seen,§ founds language on Gesture, Ono-

* Diod. Sik., i. 8.

† *Introd. Sci. Lang.* ii. 310. All students of the question should carefully consider Dr. Elam's acute and caustic criticisms (*Winds of Doctrine, and The Gospel of Evolution*, in the *Contemporary Review*, May, 1880).

‡ *Descent of Man*, i., 87.

§ *Sup.*, Sec. 10.

matopœia, and Interjectional Cries. The Imitation of Mr. Darwin is probably identical with the Onomatopœia of Prof. Sayce, although not exactly with onomatopœia in the sense in which I understand the term.* Before calling in the assistance of Dr. Bleek† to show us how imitation practically operated, we may notice from one or two names the way in which man has regarded the family of the Simiadæ.

1. *Ape*. Proto-Aryan root *kap*, "to vibrate," Sk. *kamp*, "to move rapidly," *kapi*, Heb. *koph* (an instance of Semitic borrowing), Ang.-Sax. *apa*, middle Eng. *ape*. The creature constantly in motion, "mopping and mowing." As to the loss of an initial *k*, cf. Proto-Aryan *kam*, "to love," Lat. *am-o*.

2. *Monkey*. According to Prof. Skeat from Ital. *monna* (a corruption of *madonna*) a woman's familiar or nickname (*i. e.* *eke-name*, extra-name), dim. *monicchio* (little *monna*), Eng. *munkie*. "The order of ideas is: mistress, dame, old woman, monkey, by that degradation of meaning so common in all languages." In this case *monkey* means "little old woman," funny little hag, instead of *manikin*, a Dutch word with double dim. suffix (cf. *Donkey*, *i. e.*, *don-ek-ey*, double dims., "little dun," *i. e.*, little horse, *dun* being a familiar name for a horse; cf. old Eng. proverbs, "Dun in the mire," "The devil on Dun's back," etc., as a colour, dull-brown or dark). With *monkey* as meaning little man or woman, cf. the Assyrian *udumu*, "monkey," which is connected with *admu*, *ádám*, "man," *i. e.*, a kind of little man.

3. *Pithékos* ("ape.") Probably mimic, from *peithó*.

4. *Simia*. Probably "flat" or "snub-nosed" (*simus*, *simos*), as Herodotus describes a tribe of Skythians;‡ but some would connect it with *similis*, *i. e.* "mimic." *Simos* is occasionally represented on Greek vases as a Seilenos,§ *i. e.*, one of the Dionysiak personages connected with the flow of water, and hence with the force and flow of life.|| Thus we get the general idea of ape or monkey as a little, old, snub-nosed, restless, imitating, human variant. The orang-oötan is "the man of the jungle."

According to Dr. Bleek the "earliest quasi-human beings" (1) uttered instinctively certain sounds which expressed certain feelings; (2) heard their fellows also utter sounds; (3) imitated them; (4) were then reminded of their feelings when they first uttered the sounds; and thus (5) saw distinctly and separately

* Vide *sup.*, Sec. 7.

† On the *Origin of Language* (Eng. trans. by Davidson).

‡ Herod., iv. 23.

§ Vide *Brit. Mus. Vase Cat.*, No. 1,318.

|| Vide R.E., *The Great Dionysiak Myth*, i. 155.

the sound and the idea, so that (6) the sound became the word for the idea or feeling.

This theory assumes that language is founded on ejaculations, but they do not form a hundredth part of it; and have always remained much as they are, comparatively infertile. Again, as Prof. Whitney observes, with his rough common sense:—

“Involuntary utterances did not need to be repeated by imitation before they could be associated with an idea of the feeling that led to them. Would not the most rudimentary man *in posse*, if he heard his fellow laugh or cry, understand what it meant, without having first himself to *haw-haw* or *boo-hoo*? Do not even the animals thus? When a gun goes off, all the shy birds near take to flight without waiting to say ‘bang’ to themselves. The imitative factor is an intrusion and may be left out of the account altogether.”* But, alas, if you take away this, what remains?

Again, this quasi-human being had some power unknown to parrot and monkey, or otherwise either he would have remained at their level, or they would have ascended. This occult x was a power of judgment and comparison, a power of reflection and introspection; but such a power is not excited by the mere act of imitation, otherwise parrots would acquire it. “Observe,” says M. Taine, “the profound difference separating this acquisition [*i.e.*, of speech by a child], and the parallel acquisition which a parrot might make. The infant invents and discovers incessantly. The names suggested to him are but starting-points for his innumerable efforts. A parrot does not apply the name which is taught him; in a bird’s brain it remains isolated.”† Dr. Tylor gives the following illustrative instance from the Brazilian traveller, Eschwege:—

“I was occupied . . . in making philosophical observations on a deaf-and-dumb idiot negro boy about thirteen years old, with water on the brain, and upon whom nothing made any impression except the crowing of a cock, whose voice he could imitate to the life. He lay most part of the day stark naked on the ground, and crowed as if for a wager against the cock.”‡

Mere animal imitation gets no further than this, and as the quasi-human being in question possessed this x -power, which was thus not dependent upon imitation, he must have possessed it prior to and independently of his imitation. But if he had this power prior to and independently of his imitative power,

* *Oriental and Linguistic Studies*, 296.

† *On Intelligence*, 402.

‡ *Early Hist. of Mankind*, 73.

then, although he might imitate as a child does, yet the rise of his definite ideas would not be the result of his imitations, and these would be nothing more than one of the forms of activity which his mind-power would set in motion. We are, therefore, compelled to set aside the ape-mimic when he would pose as an interpreter of the riddle of language, and we may add with Prof. Whitney:—

“When the process of language-making began, man was man *in esse* as well as *in posse*, ready to have his powers drawn out and educated—just as is every human being nowadays at the commencement of its existence. And the specific moving power to the working-out of speech was not the monkeyish tendency to imitate, but the human tendency to sociality.”*

Man is, as Prof. Noiré well observes, “the not merely *gregarious* but *co-operative* animal.”† Mr. Darwin remarks, —“The strong tendency in our nearest allies, the monkeys, in microcephalous idiots, and in the barbarous races of mankind, to imitate whatever they hear, deserves notice, as bearing on the subject of [the rise of language by means of] imitation.”‡ It certainly deserves very careful notice, and the result of such notice will be to bring into prominence the bridgeless gulf which separates the infant and the barbarian from the monkey and the idiot.

13. *The Co-operative Theory of Language.*

The writer who is supposed to have approached the nearest to the solution of the enigma of the origin of speech is Prof. Noiré,§ who has carefully considered the efforts and views of his predecessors in the field, and who observes of one of the latest and most prominent of them, “It was not reserved for Geiger to reach the final goal, as he hoped, and indeed, as appears from some indications, believed himself to have done.” The reader will perhaps conclude that we may re-read this passage by substituting the name of Noiré for that of Geiger, although I am quite willing to admit its truth, so far as Geiger himself is concerned. In his latest work, from which the following quotations are taken, Noiré sums up with deep admiration the views of Prof. Max Müller on the origin of language. Scientific investigation has revealed certain “roots”

* *Oriental and Linguistic Studies*, 296.

† *Max Müller and the Philosophy of Language*, 83.

‡ *The Descent of Man*, 87.

§ *Der Ursprung der Sprache*, 1877; *Max Müller and the Philosophy of Language*, 1879.

lying *apparently* at the basis of speech ; they differ in different languages. Primary Aryan roots are, or, at all events, are generally, monosyllabic ; Semitic roots dissyllabic, or, if the vowels are sounded, trisyllabic. Old Egyptian roots may be either. Semitic roots show the principle of triconsonantism ; Aryan roots do not.*

And here let me observe that nothing is more dangerous than to build a universal theory on the phenomena afforded by a single family of languages, *e. g.*, the Aryan dialects. If any one is inclined to be alarmed at the amount of knowledge which may be supposed to be requisite for linguistic inquiries, let me reassure him by the dictum of a master ;—

“ I must protest, at the very outset of these lectures, against the supposition that the student of language must necessarily be a great linguist.” †

But whilst this is a most consoling fact, yet be it remembered that the student of language should have a clear grasp of a subject upon which most people have but very shadowy notions—the principles of evidence. Suppose, *e. g.*, that Aryan man started with the verb, in the abstract it is evidently possible that Semitic man may have started with the noun. Yet we find persons arguing or even asserting, with the utmost confidence, that what has occurred in some families of speech must be the rule in all. What is at fault, their knowledge, according to the saying “ a little knowledge is a dangerous thing ? ” No, their knowledge is very valuable ; it is their imperfect logic,—their ignorance of the laws of evidence, which overthrows their efforts.

We have, then, these mysterious roots, and arrived at this point, Prof. Müller observed :—

“ The science of language, I felt, had done its work when it had reduced the vague problem of the origin of language to a more definite form, *viz.*, What is the origin of roots ? Beyond that point, however, where the student of language is able to lay the primary elements of language at the feet of philosophers, the science of language *alone*, apart from the science of thought, will not carry us.” ‡ Psychology, then, must be summoned to assist. The problem, to use the words of Prof. Müller, is “ How do mere cries become phonetic types ? ” This most difficult question Noiré claims to have solved, and Prof. Müller appears

* *Vide* List of Primary Roots of Proto-Aryan (*R. M. A.* Appendix B.).

† *Lects. Sci. Lang.*, i. 25.

‡ *Contemporary Review*, Feb., 1878, p. 466.

to be quite satisfied with his solution.* Prof. Sayce also speaks with high approbation of Noiré's main theory, but adds:—

“ Like Geiger, Noiré is a philosopher rather than a philologist, and his explanation of Aryan roots and their connexion with one another, frequently contravenes the laws of scientific etymology. Nor can his identification of roots and words be admitted, or the actual existence at any time of the hypothetical roots of the Aryan tongues. But his theory doubtless explains the origin of much that is in speech, though it does not explain everything.”†

It may be observed that the investigations of any able man on such a subject are almost sure to be valuable as being suggestive, even although his conclusions may be highly doubtful, or even actually erroneous. The reader will further notice the absolute opposition of opinion on the important question, Did “ roots ” ever actually exist, and as words?

Rejecting the “ Pooh-pooh ” and “ Bow-wow ” Theories, and also the Imitation Theory, and noticing that a rigid analysis would doubtless diminish the comparatively small number of original roots, and that Geiger even referred all vocal sounds to “ a single sound, excited by a single definite idea,” we press up to the question, How (to take a particular instance) did *da* come to mean giving? Before unlocking the gate Noiré turns round to gibe at the impotent crowd of sages who are hopelessly outside, and exclaims;—

“ Now is the time to prove your mettle! A philosophy that can solve such a problem as the present has given a pledge of substantial value, and established an unassailable claim to universal respect.” Certainly; so let us listen to the hierophant:—

I. “ Language is a product of association, and of the community of feeling which is developed, intensified, and finally carried to perfection by community of life.”

This is merely the preliminary basis, for, of course, the above-named factors are not sufficient to produce language; were it otherwise, many gregarious animals would possess it.

II. “ Language is a product of an active process; it is the child of will. In the place of sensations, the mere sense-impressions . . . we must set the active will, or spontaneous activity, . . . which the Monistic philosophy affirms to be at the root of all phenomena.”

This further stimulating cause now presents itself; it is the

* Vide *Lects. on the Origin and Growth of Religion*, 183 et seq.

† *Introd. Sci. Lang.*, i. 83.

active (human) will, which appears to be also described as "spontaneous activity." When the Monistic philosopher affirms that active will is at the root of all phenomena, he will doubtless find the religious philosopher happy to agree with him. When he affirms that spontaneous activity occupies this position, the materialistic sage will probably assent to the dogma. The doctrine of spontaneous activity may be expressed in the statement;—Activity exists, and I don't understand it. But without entangling ourselves in "the Monistic philosophy," we see so far that the factors which are stated to produce language, are association + the community of feeling arising therefrom + will. This last is undoubtedly an essential. As a corollary from the previous "two points" we find that:—

III. "There is not only a sympathy of joy and sorrow expressing themselves in . . . laughter and tears, as well as in the impulses towards common movements, out of which dancing, singing, and music develop themselves later; but there is also a sympathy of the will, of activity directed outwards, which only becomes *phenomenally apparent in its effects.*"

Professor Noiré underlines these last words, though what their special significance is, it is difficult to say. Doubtless there is a sympathy of will; it is equally clear that this involves "activity directed outwards," and it is if possible even more certain that this activity "only becomes phenomenally apparent in its effects." It certainly has no other chance of attracting notice. But probably Noiré merely desires to call attention to this obvious fact in order to prepare us for his next proposition.

IV. "This common sympathetic activity was originally accompanied by sounds, which, as in games and dances, broke out from the violent stress or excitement of the common action, *and as they recurred with every repetition of the particular form of activity,* they became so intimately associated with it as to acquire the power of *recalling the memory* of the action. This is the origin of human thought, for it is the origin of phonetic types (roots)."

There are various other considerations referred to by Professor Noiré in connexion with his theory, but this is the all-important clause by which it must stand or fall, and so consequently demands the closest scrutiny. Man showed a sympathetic activity, and this was originally accompanied by sounds. Doubtless. According to the theory, these sounds were accidental, unpremeditated, and involuntary; "they broke out from excitement,"—the excitement of the moment,—"*as in games and dances.*" Young people, playing or dancing, utter similar cries, the natural outcome of the action and of the surroundings of the situation. True. But their chance excla-

mations, except indeed so far as they are purely interjectional (and language Noiré admits is not founded on interjections), are not remembered and repeated, or repeated without being remembered on subsequent occasions. A boy in an excited state may exclaim "Row-de-dow-de-dow," but on a subsequent similar occasion the probabilities are enormously against his repeating this particular sound; it has an extremely poor chance of passing into a "phonetic type." Thus, so far as the evidence afforded by what now takes place in games and dances is concerned, we find no confirmation of the principle laid down by Noiré, and this implies that these incidents illustrate a contrary principle. But, leaving this illustration, let us simply take the vital point of the theory. This common activity was accompanied by sounds, "and AS they recurred with every repetition of the particular form of activity," etc. But *did they so recur?* Man sat down in company to rub two stones; he exclaimed, casually and by chance, *mar*. He sat down again next day for this purpose, and again exclaimed, as of course, *mar*. Having once said *mar* by accident, he subsequently always said it again either by accident or otherwise. After a few more times, the sound *mar* became associated in his mind with the idea of rubbing. Then *mar* became a phonetic type, a word, subsequently a root, lastly, the parent of a tribe of words all connected with the one idea of rubbing. About this last point there is no question; *mar* is an absolute fact. It was the sire of the god Mars, of Ares, and of the blustering Vedic storm-winds, the Maruts.

Professor Noiré thus holds that man pitched upon his particular sound, *e.g.*, *mar*, in the first instance, and then adhered to it ever after. Of course, his view is merely a theory; it is what *may* have been, and therefore the only standard by which we can try it is that of probability. Now let x = the number of sounds, evidently a large number, which man might or could have used on the original occasion; then the probabilities are x to 1 against his selecting *mar*. But when he had once used it as a mere sound on a particular occasion, are the probabilities that he would use it on a subsequent occasion increased? Certainly not. Nature usually exhibits a repetition with variations, not an exact repetition. He might have said *kar* or *tar*, etc. Looking at the question from this standpoint, Professor Müller, naturally enough, sees no reason to believe that man pitched upon *mar* in the first instance. He observes:—"Every possible combination of consonants, with final *r* or *b*, was suggested; *kr*, *tr*, *chr*, *glr*, all would have answered the purpose, and may have been used, for all we know, previous to the first beginning of articulate speech. But, as soon as *mar* had got

the upper hand, all other combinations were discarded; *mar* had conquered.* How and why? It *happened* to conquer. But if any one of these various combinations "would have answered the purpose," how was it that man, either sooner or later, so resolutely discarded all the rest in favour of one? It *chanced* that he did so. But if I can get to Rome with equal facility by all roads, is it probable that I shall invariably use one only? Scarcely. Thus Noiré's explanation of this mysterious fact of language is (to illustrate it by a particular instance):—

That man *happened* to select the sound *mar*.

And that he subsequently *happened* to continue to use this sound to the exclusion of others. The rest is simple enough; *mar* from association became connected with the idea of rubbing. Hence, language. We know that man has selected and continued to use the root *mar*, but we would fain know *why*. It was an accident of circumstance; "as it fell upon a day." But this bare possibility, the odds against which are 100, or perhaps 1,000, to 1, cannot surely be considered as an *explanation* of the occult fact of language and of the origin of phonetic types. According to Noiré, the only link between the sound and the action is one of time; they were contemporaneous. "Stress or excitement" is no special element in the case. These states might make a man exclaim *mar*, *bar*, *kar*, or anything else. I fear that, after all, the real difficulty has eluded us, and that with Waitz, Geiger, and others, we are still outside the gate of the temple that enshrines the mystery. The questions—

Why did man first select the sound *mar*? and,

How is that he has continued to employ it in a particular connexion to the exclusion of other sounds?—

remain practically unanswered by Noiré's theory. To say that this or that matter happened to take such and such a turn, is practically only saying that things are as they are.

14. *Further examination of Professor Noiré's views.*

Professor Noiré adds, "It is only by means of this visible effect [*i.e.*, the effect of "the individual activity"] that the sounds acquire their meaning." That is to say, when a man said *da*, he gave his fellow something. No doubt the element of gesture and demeanour is an exceedingly important one; but it is here tacked on to an unsupported theory. And why is Noiré compelled to hold that man *accidentally* said *da*?

* *Lects. Sci. Lang.*, ii. 348.

Because he stretches Professor Müller's celebrated dogma, "No speech without reason. No reason without speech," to the extent of holding that there is no reasoned thought before verbal utterance. Thus "the illuminated space of rational thought," = "the store-house of linguistic expression." Having given Lange's definition of a "thing," *i.e.*, "a group of phenomena, which, making abstraction of remoter relations and internal changes, we grasp and conceive as one;" he asserts that "there are things for men," because they can name them; and, conversely, that "it follows undoubtedly from this definition, that things have no existence for animals." What! Cannot one dog grasp as one the group of phenomena which compose another dog? Does he regard that other dog as more than one, or as merely part and parcel of surrounding appearance? Or are the "remoter relations and internal changes" everlastingly present to his mind, so that he cannot abstract them from the concept? I trow not. And when this previously thoughtless quasi-human creature, uncognisant of "things," in his excitement had involuntarily ejaculated *da* or *mar*, what was there in so doing, what occult philosophy did this potent utterance possess, which at once brought his bestial intelligence within "the illuminated space of rational thought?" I doubt not but that just as *man* is he who *means*, not he who *speaks*, so man had his meaning all along; he had his rational thought prior to its expression, as the child exists before its birth; and the circumstance that his choice of a sound was not haphazard, but more or less deliberate,—for mere ejaculations are not speech,—was not the only, but one of the chief reasons, why any sound hardened into a phonetic type.

I have elsewhere quoted an unproved assertion of Professor Noiré, that there was a time when man's thought knew "no I nor thou, no here nor there," etc., and we find in illustration of his general position the statement that "the earliest meanings of verbal roots referred to human action. An impartial glance at any dictionary of roots will serve to verify this assertion. We do not find there Sun and Moon, Thou and I, nor yet anything about shining, flashing or burning. No thoughtful etymologist, even if he found them, would allow them to pass as primitive intuitions; such is the power of truth! What we do find are words signifying to dig," etc., *i.e.*, other strictly human activities. Of course, in the nature of things, most verbal forms indicate actions such as might be performed by human beings; but when we pass this truism we find:—

1. The assumption that men spoke in dictionary roots, which may or may not be true; but which many high authorities, *e.g.*, Professor Sayce, regard as absurd.

2. That we find nothing about shining or burning, whereas in these Proto-Aryan roots of which Professor Noiré is so fond, and to which he seems almost exclusively to have directed his attention, as if they had supplied a pattern to the world, we find *ar*, "to shine," and *ka*, "to burn;" an eloquent commentary on his preposterous statement that "primitive man was dumb in the face of light."

3. That verb-forms are older than noun-forms. On this point let us, waiving argument for once, appeal to authority. Professor Sayce observes:—

"From an analysis of Aryan it has been inferred that all roots were originally verbal. This is certainly the case in the Indo-European, so far as our facts allow us to see. . . . Hence it might be supposed [and it evidently is supposed by Noiré] that the verbal nature of radicals was a fact which held good not only of Aryan, but of all other human languages. Not so, however. In this case we cannot appeal to Turanian; for though Accadian seems to have nominal as well as verbal roots, our data do not carry us back to their original content and meaning, and they may have been a combination of nominal and verbal elements. [Most probably.] But, like the idioms of Polynesia, the Semitic languages refer us to nominal roots as decidedly as the Aryan do to verbal ones. The Semitic verb presupposes a noun, just as much as the converse is the case in Aryan. Here, then, the conception of the *object* lay at the bottom of the language; subjective action being left out of sight."*

Chavée, again, to quote another view, places at the base of Aryan speech pronoun-adverbs and verb-nouns.† Here we have a "combination of nominal and verbal elements," such as Prof. Sayce thinks Akkadian very probably presented.

Canon Farrar, the thorough-going supporter of onomatopœia, advances various arguments to show that the naming of animals was the first effort of speech,‡ in which case nominal forms, of course, preceded verbal forms; he believes with Garnett § that "all language is reducible to roots, which are either the basis of abstract nouns, or are pronouns denoting relations of place." He even thinks it "inconceivable" that men should have used a word meaning "to shine" before they named the sun.

Take, again, the case of an isolating language. "In Chinese

* *Principles of Comparative Philology*, 79, 80.

† *Idéologie*, 33.

‡ *Language and Languages*, 1878, cap. iii.

§ *Essay on the Nature and Analysis of the Verb*.

ly means to plough, a plough, and an ox, *i.e.*, a plougher. Whether a word is intended as a noun, or a verb, or a particle, depends chiefly on the position which it occupies in a sentence.*

What evidence does this state of things supply respecting the priority in time of noun or verb? What now becomes of Noiré's confident dogmatism respecting primitive man, and his list of roots confined to verbal ideas and human activities? As surely as primitive man dug for roots, so surely had he a name for "root" as well as for "to dig."

15. *Present position of the Onomatopoeic Theory of Language.*

"Plato," says Prof. Jowett, "is a supporter of the Onomatopoeic theory of language; that is to say, he supposes words to be formed by the imitation of ideas in sounds." In this view he has been followed by a whole host of sages, one of the most remarkable of whom is De Brosses, who published his *Traité de la Formation Mécanique des Langues* in 1765. We "may read there," says Prof. Noiré, ridiculing the work which he, of course, imagines his own theory has effectually overthrown, "how the *littera canina, r*, betokens what is disagreeable; how the tone of pain is deep, *oh, heu, hélas*; that of surprise higher, *oh, ah*; of joy short and recurring, *ha, ha, ha! he, he, he*; of displeasure and contempt labial, *fi, vae, puh, pfui*; that of doubt and negation nasal, *hum, non*, etc.; and that all the most necessary words are derived from these sources." The fact that supporters of a theory misapply it in particular instances, or unduly extend it, is, of course, not fatal to it; although frequently unfairly pressed against it. Those who wish to study the strength of the onomatopoeic position, should make themselves familiar with Mr. Hensleigh Wedgwood's *Origin of Language* and *Dictionary of English Etymology*, and Canon Farrar's *Chapters on Language* and *Language and Languages*. But besides these champions of the cause, as we have seen, Mr. Darwin and Prof. Sayce regard Onomatopœia and Interjectional Cries as the source of language; and even Prof. Max Müller can no longer be considered as an opponent, for he explains that when he spoke of "the Bow-wow and the Pooh-pooh theories," he was thinking "of Epicurus rather than of living writers;" and in the Preface to the 5th edit. of his *Lectures on the Science of Language*, he says:—

* Prof. Max Müller, *Lects. Sci. Lang.*, ii. 89.

“I value as much as any one the labours of Mr. Wedgwood and the Rev. F. W. Farrar in their endeavours to trace the origin of roots back to interjections, imitations, or so-called vocal gestures. I believe that both have thrown much light on a very difficult problem, and as long as such researches are confined to the genesis of roots, without trenching on etymology in the ordinary sense of that term, I mean on the formation and the history of words, Mr. Farrar is quite right in counting me not as an opponent, but as a neutral, if not an ally.” That is to say, we must not run haphazard into the matter, guided only by an arbitrary fancy, and careless whether or not we respect the historical principles of language, such, *e. g.*, as Grimm’s Law. But, provided we pay due regard to the ascertained laws of verbal development, we may assail, on onomatopoeic principles, that ultimate residuum of speech which is properly outside the sphere of the science of language when unassisted by kindred sciences. Nothing could be fairer, as every reasonable supporter of onomatopœia will doubtless admit.

Dr. Tylor, with his customary cautious sagacity, takes up a somewhat neutral position, but observes,—

“It may be shown within the limits of the most strict and sober argument, that the theory of the origin of language in natural and directly expressive sounds, does account for a considerable portion of the existing *copia verborum*, while it raises a presumption that, could we trace the history of words more fully, it would account for far more.”*

He urges the comparison of words in independent languages. If in this case an agreement is found, “then we may reasonably suppose that we are not deluding ourselves in thinking such words highly appropriate for their purpose. They are words which answer the conditions of original language, conforming as they do to the saying of Thomas Aquinas, ‘*Nomina debent naturis rerum congruere.*’”

Leibniz, Herder, and Wilhelm von Humboldt all saw the infinite importance of sound-imitation in connexion with the question of the origin of speech; and we may accept it as a fact, by a consensus of opinion, that imitation, in some form or other, and of something or other, lies at the basis of nineteen-twentieths of original language; but the imitation was that of a man, not of a brute. No other theory of language has ever yet succeeded in explaining a single root-word. To originate is to be a god; to imitate is the mark of a creature.

* *Primitive Culture*, i. 146-7.

16. *Occult Imitation.*

Of direct imitation, *i.e.*, the obvious reproduction of sounds in their totality, *e.g.*, the Kamic *aua* (ox), *ba* (ram), *miau* (cat), nothing more need be said: but the psychological linguistic of the future will be concerned with the unfolding of the principles of occult imitation. A *mimic* (*mimmick*, Shakspeare; Greek, *mimos*, a reduplicated form, the doubling in the form of the word illustrating the doubling involved in the action; Proto-Aryan root, *ma*, "to measure"), is one who "measures," *i.e.*, "compares" himself with another; and it is to be observed that this comparison or imitation is not of the thing itself, but of our concept or apperception of it. A dog barks; the circumstance produces some effect upon our consciousness, and if we attempt to imitate the original incident we give an expression of that effect. Our imitation being thus second-hand, we see how easily it may, nay must, differ, and that probably very considerably from the original; and, further, how widely imitations of the same thing or circumstance, made by different persons, must differ from each other, their differences being the ratio of the powers and opportunities of the several imitators. Now the circumstance that that which is imitated is, as it were, passed through our consciousness prior to our imitation of it, shows how sound may be imitated by silence, or silence by sound. For if anyone says *st!* we may place a finger on the lips to express this; or, conversely, if we place a finger on our lips, some one may imitate the action by exclaiming *st!* And the reason of this is that the human consciousness, unlike, *e.g.*, the parrot consciousness, takes not merely one only but many analogies or corresponding measurements of things, and, indeed, grasps, although with extreme faintness, the principle of the Unity of the All; so that when a blind man compares red to a trumpet-note, or a deaf-mute compares a trumpet-note to red, we feel that this measurement is at once true and appropriate.

Another point which may be incidentally remarked is, that the principles of imitation suggest that many primeval words were not monosyllabic, just as many natural sounds are prolonged, reduplicated and varied. Phonetic Decay, or the Law of Least Effort, is constantly working in favour of monosyllabism. Thus *periwig* dwindles to *wig*, *omnibus* to *bus*, *withhold* to *wôh*, and *withstay* to *way!* "Bohtlingk notes that many Tibetan words at present monosyllabic were formerly polysyllabic, and the polysyllabism of the roots of the Bâ-ntu

family [the Kafir languages] is well known.* The Akkadian language which, according to Prof. Sayce, ceased to be spoken prior to the seventeenth century B.C. has been greatly affected by phonetic decay. Thus *ma*, "land," which by the addition of the individualising affix *da*, becomes *mada* (Media, *i.e.* "the Land"), appears next as *mad*, which, adopted by the Semitic Assyrian, goes through the avatars *mad-atu*, *mad-tu*, *mat-tu*, *ma-tu*. *Timmena*, "foundation-stone," becomes successively *timmen*, *timme*, *tim*, *tem*, *te*; † just as the Aryan *ayus*, (eternity) dwindled at one portion of its career to *aé*; ‡ and we find the forms *eal-swa*, *also*, *alse*, *als*, *as*.

The obscure question of the special part played by various letters and sounds in the formation of the great mass of words must be approached in two ways; (1) by an immense classification of known forms, and (2) by the aid of psychology, which, as regards archaic man, finds one of her chief helpers in scientific etymology. Given the knowledge how primitive man regarded ideas and things in general, and given a vast number of sounds and forms, at least closely akin to those which he must have used, and the combination will show us the principles employed, and which obtained in his "natural selection." And the recent vast advance in our information on these matters may make us reasonably take a most hopeful view of the probabilities of the future. We must not expect to find in natural processes that uniformity which has been well styled "the perfection of small geniuses." We shall meet with no archaic Bishop Wilkins, with his *da*, "god," *ida*, "devil," *dad*, "heaven," *odad*, "hell;" no Dr. Murray with his nine primeval roots, *ag*, *bag*, *lag*, etc. We must not expect to hear, with Dr. Wienburg, "the sylphlike waving and whispering of the letter-spirits."§ The path of laborious induction possesses no such assistants; but, listening to nature, we shall find, with Emerson, that she hums her old tunes with innumerable variations; and further, that languages reflect the characters of nationalities, even as he declares that "Strasburg Cathedral is a material counterpart of the soul of Erwin of Steinbach." The powerful and penetrating mind of Iamblichos the Neo-Platonist, called by succeeding members of the fraternity, "the Divine," and of whom the Emperor Julian in enthusiastic admiration declared that "he was second to Plato, but in time only, not in genius," seems to have grasped various true principles of language, a circumstance which his

* *Introd. Sci. Lang.*, ii. 13.

† Prof. Sayce, *Assyrian Lectures*, 144-5.

‡ Vide *R.M.A.*, p. 47.

§ Apud Canon Farrar, *Language and Languages*, 225, Note 3.

familiarity with foreign tongues assists in explaining; and he speaks with much insight of "the physical similitudes of language to things which exist in nature."*

There are a number of highly interesting and important questions connected with the study of language which, of course, I have not been able even to refer to here. One of them is the determination of the character of primitive religion by linguistic means; but I can only say, with Kratylos in the Dialogue, "You do not suppose that I can explain any subject of importance all in a moment; at any rate, not such a subject as language, which is, perhaps, the greatest of all." Suffice it if I succeed in indicating what language is, and how to be studied, and what are the errors in some of the theories of its origin. I conclude with a suggestion of the process by which any particular sound became a phonetic type, that is to say, an ordinary word:—

I. Man is an imitative being; and, having reason, his imitations are not purposeless but connected with design.

II. The circumstances of his first utterances are not to be regarded as if he had been a vocal statue, *i.e.*, as if sound had been the sole aspect and constituted the whole of the phenomenon.

III. When circumstance stimulated him to the exercise of his latent power of speech, he uttered a sound which he regarded as appropriate to the occasion; † and accompanied the utterance by certain special movements, not accidental but designed, as being, in his opinion, suitable and characteristic of the idea he was endeavouring to express. Thus, not relying wholly on sound, the use of which as language was necessarily strange to him, he partly worked out his meaning pictorially by pantomimic action.

IV. The sound and the action were contemporaneous, and mutually suggestive or provocative; the action suggesting the particular sound, the sound the particular action.

V. A sound having been once used by man in a definite connexion, and that not merely accidentally but because it had approved itself for the purpose to his judgment, ‡ its re-user generally followed in the same connexion as of course; as such re-user was also supported or provoked by the recurrence of the

* *Peri Mysteriôn*, vii. 4.

† Vide *sup.* as to how to ascertain the principles which determined his choice.

‡ This "judgment" would, in a great number of cases, be almost entirely instinctive: that is to say, man would not be conscious of deliberation in the matter. It does not take a good cricketer more than a second to decide how to play a swift round-hand ball.

appropriate pantomimic action, which was itself recalled by the return of the particular circumstance or idea.

Thus, not at random, but designedly, in the first instance, may we suppose that man used sound linguistically and strengthened it by gesture; and, as he had a reason for his first step, so had he a still stronger reason for his second; and his first sound in any particular line of idea being thus definitely determined, his second, in the same line, was naturally, in the great majority of instances, a repetition of the former.

LANGUAGE, AND THEORIES OF ITS ORIGIN.

Synopsis.

1. Parallel and connexion between Language and Religion.
 2. Language, what.
 3. Language a natural development.
 4. Primeval Language unknown.
 5. Errors of the Conventional (Anomalistic) and Connexional (Analogistic) Theories of Language.
 6. The Platonic view of Language.
 7. The Divisions of Language.
 8. The Divisions of Articulate Speech.
 9. The Transition from Drawing to Writing.
 10. The Principle of Limitation of Choice in Original Names.
 11. Children and the Origin of Language.
 12. The "Simious" Theory of Language.
 13. The "Co-operative" Theory of Language.
 14. Further Examination of Prof. Noiré's Views.
 15. Present position of the Onomatopoetic Theory of Language.
 16. Occult Imitation.
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APPENDIX.

THE UNIVERSALITY OF RELIGION.

As the statement in the text respecting the Universality of Religion is almost certain to be hastily denied, I subjoin the following dicta by the highest authorities :—

“ We may safely say that, in spite of all researches, no human beings have been found anywhere who do not possess something which to them is religion.”—(Prof. Max Müller, *Hibbert Lectures*, 1878, p. 79).

“ The statement that there are nations or tribes which possess no religion rests either on inaccurate observation or on a confusion of ideas. No tribe or nation has yet been met with destitute of belief in any higher beings ; and travellers who asserted their existence have been afterwards refuted by the facts. It is legitimate, therefore, to call religion in its most general sense a *universal phenomenon of humanity*.”—(Prof. Tiele, *Outlines*, 6 ; cf. *R.M.A.*, 16.)

Dr. Tylor, after showing that absence of religion has been incorrectly attributed in the most positive manner to the aborigines of Australia, the Payaguas and Guanas of South America, the natives of Madagascar, the Dinkas of the White Nile, and various other tribes, observes :—“ Thus the assertion that rude non-religious tribes have been known in actual existence, though in theory possible, does not at present rest on that sufficient proof which, for an exceptional state of things, we are entitled to demand.”—(*Primitive Culture*, i. 378.)

The CHAIRMAN, Mr. J. E. HOWARD, F.R.S.—I am sure that I may present your thanks to Mr. Robert Brown for this interesting paper, in which he has thrown before us what are certainly subjects for manifold discussion. For myself, I scarce agree with all he has said in regard to the origin of language I think he has been more successful in pulling to pieces the bow-wow and pooh-pooh theories. The question can scarcely be fully considered without inquiring what was man antecedent to the foundation of his language? There are at least two theories on the subject, and it is necessary to proceed on one or the other of these two lines. Scripture teaches that man was created perfect from the hands of his Maker endowed with a spiritual as well as animal part,—let us say, endowed with the *πνεῦμα* as well as the *ψυχή* (endowed with the spirit as well as with the soul), and from the first in communion with his Maker,—

so that He who endowed him with the $\psi\chi\eta$, and also with a spirit of untold and unknown power, could also continually educate the creature He had made, and sustain him in the use of his powers. Therefore, while I quite agree that language was welling forth, as has been described, from the internal resources of the man,—the $\pi\nu\epsilon\delta\mu\alpha$, I take it, may reasonably be supposed to have been not only endowed with power, but guided in its efforts by Divine intelligence. At least, I cannot myself understand how else the remarkably abstract difficulties of language could be conquered by man. I confess it perplexes me to see how this could have been without some Divine supervision and guidance. The other theory is, of course, as all know, that man is only an improved ape; and that, by some means or other, he has managed to pick up a mode of communicating with the other apes. I confess that I do not feel myself to belong to this community, and consequently decline to discuss the corresponding theory; perhaps I could have wished that Mr. Brown could have as summarily dismissed it as I have; because some of his conclusions seem to me rather to take for granted that man did pick up his language in this kind of simial style. Possibly I am mistaken, but in the passage beginning, "The circumstances of his first utterances," the description belongs to the simial period as far as I can understand it—that is, according to the evolutionist theory; but in the Scriptural account I find man, in his first utterances, giving expression in good and correct language to the most abstract and difficult thoughts. If you look at the third chapter of Genesis you find the Almighty conversing with man, and man replying, and this upon the most difficult subjects. Sin and shame and punishment, and the things that are there discoursed about, are the most difficult abstract subjects, requiring the greatest perfection of language. My attention was drawn to this exact point once when, at the wish of one of my scientific friends, when I was young, I took down some portions of the language of the Krumen on the west coast of Africa. In translating the parable of the prodigal son, I found that a very intelligent Kruman, who had been under Christian instruction, hesitated as to the translation of the words, "I have sinned against Heaven." He could not get hold of a version of that sentence at all, until he at last put it into the Scriptural phrase,—"I have sinned in the presence of God." "I have sinned against Heaven," I should have thought a simple idea; but it was too abstract for him. Well, all these abstract conceptions you find in the conversations with man immediately, as far as I understand it, after his creation, and as soon as he is driven out of Paradise, and this may be considered not to have been a long period. Therefore, it follows that he must have been endowed with language from the beginning. How to explain this I do not know. I do not attempt to explain it any more than I can explain how the nightingale is endowed with its musical powers. That which applies to language applies to the nightingale. I think, therefore, there must have been a primitive language, because only two persons spoke it. That that language was the

Hebrew I do not assert ; but that it was something like the Hebrew I think we may fairly deduce, because of the permanence of the words Adam (Admu in the Assyrian), and perhaps, Eve ; and still more particularly from the permanence of the words, Shem, Ham, and Japheth, which, of course, have only their meaning in Hebrew, and these meanings are very definitely associated with the destinies of these great divisions of the human race.

The HON. SECRETARY.—Before the discussion commences I have to read the following communication from the Rev. Isaac Taylor, D.D. :—

“I much regret not having been able to be present at the reading of Mr. Brown’s very able paper on ‘Language.’ I very sincerely congratulate you on having succeeded in obtaining such competent treatment of a most difficult subject. If I had been present I should gladly have expressed a general agreement with Mr. Brown’s positions, though I think, on the whole, assigning rather more importance to the theories of Geiger and Noiré than he has done.”

Mr. R. Cust says that the true theory of language is in its infancy, and alludes to the many hundred languages of Africa having “extraordinary resemblances” and “inexplicable differences,” and agreeing with each other in nothing ; some elaborate, others showing no power of development, some dying out. He adds, that a preparatory step to inquiry into the origin of human speech should be to frame a language-map, showing the habitat of the speakers of the languages and a genuine vocabulary of the language spoken.*

Admiral E. G. FISHBOURNE, C.B., R.N.—We are all much indebted to the author of this valuable paper ; but I must confess that, in my opinion, if he had followed out the premises to their legitimate conclusions, he would have come to the result that I now venture to put before you, and which has already been alluded to by Mr. Howard. Adam was created, and he was among other things, declared to be very good ; therefore, we must assume that we have God’s authority for saying he was perfect in his organism and faculties. He was called upon by God to name the animals, and, according to the paper we have just heard, there is no arbitrary naming, but Adam recognised the specific qualities of the particular animals, and gave them names accordingly. Then we pass on to the confusion of language. You will here observe that the people were at first of one language and of one speech. I do not think the two words were indifferent ; I believe they meant two different ideas of language and speech. Language implies the grammatical form of the language, whereas speech was a

* Professor Ludwig Noiré writing to the author from Mayence, says :—
“Your interesting *brochure* has given me great pleasure. Complete understanding of the weightiness of the problem, and earnest endeavour after truth is expressed in it.”

Professor Sayce, of Oxford, adds, “I have been delighted with what you have written ; I know of no other publication in which the present state of the question in regard to the origin of speech is presented with as much learning, clearness, and compactness.”

loose mode of expression current in the place amongst the people. Mr. Brown has alluded to superhuman thoughts arising out of true religion, and all true religion involving superhuman thought ; therefore, as a consequence, superhuman language is required to set forth superhuman thought. Let us take an illustration from the difficulties our missionaries have to deal with. I refer to the difficulty experienced in translating the Chinese language by the Roman Catholic missionaries, the English Protestant missionaries, and the American Protestant missionaries. They all had to obtain a word to represent the Supreme Being, and they all took different words, one taking Tien tu, another Shangti, and another Shin, until they came among the rebels, when they found they used the word Shangti. It is easy to understand how every language may be thus influenced, so that after the fall of man and the degradation of his intellect, while he does not lose sight of the Supreme Being,—and I, for one, do not believe there has ever been any one in the world who did not believe in a Supreme Being,—it may be in a superstitious way,—but in some Supreme Being and a hereafter,—a religious effect is exercised on the conscience, and man is thus kept within bounds. As the nations fell into barbarism their language would be degraded and changed, and then the process of improvement alluded to by the lecturer would have found a place in any nation that advanced, and as it advanced, more particularly as it received new ideas and powers from revelation. I think it immensely important that we should keep before our minds that the statements of Scripture represent facts and realities.

MR. W. GRIFFITH.—I am sure we are all greatly indebted to Mr. Brown for the pains he has taken in presenting us with so laborious a view of the theories entertained on this interesting subject. Of course, one of the first questions arising upon it is, What is language? I have had the pleasure of listening very often to the eloquence of the Archbishop of York. He is a man of undoubted ability, but I must take exception to the accuracy of his definition that language is “a mode of expressing our thoughts by means of motions of the organs of the body.” Language is the process of expressing the operations of the mind, but it does more than express those highly-developed mental operations called thoughts. It is perfectly correct, as Mr. Brown has told us, that the mind not only reasons and thinks, but there are certain innate ideas of right and wrong, of righteousness and sin, contained in the mind. Locke’s theory is that there are certain innate ideas employed in the mind from the first, and if the Archbishop of York had said language was an expression of our ideas rather than of our thoughts, he would have been nearer the truth ; but even then he would have been hardly correct, because language expresses feelings as well as ideas and thoughts. Passing to the more general question of what is the origin of language,—was it divinely given to man at the Creation, or has it been evolved in the process of time,—we come to a much more difficult subject. I must say that the reasons advanced by Mr. Howard for the conclusions he arrives at do not quite

convince me. He says the Almighty is represented as speaking to Adam. Of course, I take this as an historically true and credible narrative; but it does not follow that the conversations took place in audible tones. The human being does contain such a principle as conscience,—an innate spiritual sense,—and we know that inspiration has spoken to people by dreams and other means which we cannot understand; therefore, when we find it stated that the Almighty conversed with Adam, we cannot at once conclude that it was in audible speech. Then comes the further statement that man gave names to particular animals. Well, this, to my mind, rather contravenes the argument of the last speaker that language is a divine gift; for if the beast of the field and the fowl of the air were brought to Adam to see what he would call them (Gen. ii. 19), Adam invented the names, they must have originated in Adam's mind, and were not directly given to him. Of course, I admit that the faculties were given to him; but the question is, whether the language was a divine gift? I do not think the evidence establishes that. If we consider the further idea started by the Archbishop of York, we find he tells us that language was "a divine gift; but the power and not the results of its exercise, the germ and not the tree, was imparted." You have the faculty, and not the words themselves. Language is said to be not only a mode of communicating our thoughts but also our feelings and ideas, and some persons have started the theory that even other animals than man do possess a certain language which we do not understand. I think that as far as we can apply the Baconian theory of philosophy to this experimental question we must admit they do. For instance, we hear the hen calling her chickens, and the chickens understand, and obey the call. Of course, the language these and other animals possess is of a very low description, and primarily appertains to the appetites. It does not prove the existence of any intellect, or mind, or conscience, but it corroborates the theory to which I incline, that language is evolved, and not to be traced to the Creation, although it may have existed at the Creation. Another reason for saying this is that the Almighty in His miracles seldom goes beyond the actual necessity of the case. When Lazarus was raised from the dead, those who stood around him were told to take off the clothes. When man was in a primeval state, having no society, he did not greatly want language, as when woman was created he was sure to do. We all know the expressive power of the countenance, and how quickly ideas are communicated by a pleasing glance or an angry look,—by a smooth brow and a pleasant smile. These things doubtless amounted to all that was necessary in a primitive state of society for some time; but of course it is easier to demolish than to create. Mr. Brown adduced many arguments against some of the theories he quoted; but it seems to me that, on such a subject, we can only reason from very slight grounds. Having said so much as to the main question involved,—the existence of language, as a divine gift, in the first instance, or its being developed according to the necessities of the case, I would remark that the doctrine

of the evolution of language does not in any way support the theory that the human creature is evolved from the lower animals. Man is distinguished by his intellect and conscience, and by those ideas he possesses, which cannot be traced in lower animals. An interesting comparison between the incidents of religion and language was elaborated in the first head of the lecture, and an inference drawn therefrom that they are inseparable, exhibiting diversity in unity. From this tenet I dissent. Religion and language, inasmuch as they are properties of a particular being, may, when that being is compared with others, exhibit much in common. But, as properties, they are essentially distinct. Natural religion binds man to his Maker; language may connect him with his fellow. In the former the conscience dimly apprehends the Infinite, and manifests its truth and honesty by actions. In the latter a different subjective faculty, intellect, or reason, and not faith or spirit, predominates, and may end in talk. The most silent men may be the most genuinely pious, while the infidel may carry off the prize in logomachy. Again, the literature of the religions of Mahomet, Buddha, and Brahma—Confucius is by some called a philosopher, and not a religionist—may be highly intellectual, while their practices and ritual are most degrading. Or, supposing true religion is essentially connected, false religion, on account of its falsity, cannot be. But not wishing to play with words instead of sentiments, I prefer, to pursuing the last argument, to thank the lecturer for the pains he has taken, and for the large amount of information he has laid before us in so pleasant a form. As to which was the primeval language, I do not think we can decide that, although some have ventured to do so; some advocates for Hebrew basing their theory on the fact that Eber lived at the dispersion.

Mr. D. HOWARD, F.C.S.—There is so much in the paper we have just heard that it is difficult to know where to begin and where to leave off. I think that the point which the last speaker has handled so ably is a curious and interesting one, and one which I hope Mr. Brown will endeavour to work out and give us the benefit of, namely,—What necessary connexion is there between religion and the moral sense and language? There is, I think, a very subtle connexion between thought and language. Undoubtedly western thought and language have acted and interacted one on the other, and it is a very curious historical question, as well as a mental question of the present day,—How far are our modes of thought governed by our modes of speech? If you trace through the various families of the human race, you find the same great differences in the modes of thought caused by differences in the modes of speech; while there are great differences in the modes of speech caused by differences in the modes of thought. If we trace this peculiarity back, it will probably throw a vast amount of light on the history of mankind, and I should be far from thinking lightly of the hint the lecturer has given us, namely, as to how far the modes of religious thought—I do not mean in the sense of natural as against revealed religion—are caused by modes of religious expression. There may be two ways of

apprehending a true thing. Just as it has been said that every man has been born either a Platonist or an Aristotelean, so am I convinced that there is a wide difference in the modes of apprehending spiritual conceptions depending on the constitution of the mind. All these are points that deserve a vast amount of attention ; but there are other points in connexion with the subject of the paper that are especially interesting. One that has been touched upon is—How far we should conceive the creation of man as an absolutely perfect being in actuality, and how far perfect in possibility ? I cannot help thinking of a perfection which may be like imperfection. The Greek language was perfect before Plato, and gave the possibilities of Plato's thoughts, but until Plato's thoughts came the possibilities of the Greek language were not developed ; and then, again, until Paul came, they were not fully developed. How far the first speaking man—for I confess that the *homo alalus* is one of the most curious myths we can find—was gifted with the possibility and how far with the actuality of language, is a curious and interesting problem. You cannot imagine the first man a baboon ; you see in the baboon no possibility without the actuality. And so with regard to the first man : there may have been a certain amount of imperfection, but that existed along with perfect possibilities, and this may explain a great many of the questions raised this evening. It seems to be a pregnant idea in the mind of the lecturer that roots may never have been used. If one may judge from the inventions of science, it will be found that, to speak analogically, the root is not used. In mechanics, the best invention is at first a very complicated one, and it is only by what is done afterwards that it is worked into a simple form. Watt's first steam-engine was infinitely more complicated than the modern steam-engine. If you look at one practical point, the arrangement of the valves to regulate the steam, which afford the key to the whole matter, you will find that in Watt's engine these things are exceedingly complicated, and the slide valves, which now do all the real work, were not invented till long after. And I cannot help thinking that there may, in the same way, have been a good deal of complexity in the earlier forms of speech, and that in reality the root was not developed until later, though it sounds very much like a bull to say so. The curious experience of our missionaries among savage tribes with regard to the different forms and roots of the native languages, and the manner in which they are obtained is interesting. I remember it being said that, in one of the Polynesian islands, they describe a horse as a "man-running-pig"; but in order to describe a cow they perform a more curious process of philology, for they take the words "bull" and "cow," and put them together, and add vahina, *i.e.*, lady, with the result that a cow is called "ebullemacowvahina."

Mr. R. BROWN, F.S.A.—I had on a former occasion to commence my reply by explaining the stand-point from which my paper was written, and I must do so again, and the explanation simply is, that it is a paper for any one and every one, and not for those only who hold distinctly Christian opinions in the same way that we do. (Hear, hear.) This, I think, is an

absolutely essential stand-point in a philosophical society, and, as on a former occasion I ventured to adopt the conduct of St. Paul at Athens, when he took the Athenians on their own ground, so I shall remind you to-night of a still higher example, when the great Founder of Christianity met the sceptics of His day, who rejected nearly the whole of the Old Testament, and took them strictly on their own ground, *i.e.*, on the Pentateuch, which they accepted themselves. That is the reason, and the only reason, why this paper is, as may be seen, so remarkable for the absence of Scriptural quotations, and while there are no allusions to this, that, or the other positions which may involve circumstances about which there are as many opinions as men. Suppose, for instance, you were arguing with a Brahmin, in defence of your faith, and he were to say, "I am perfectly willing to discuss the matter with you, but you must assume that my books are divine works, and that I only know how to interpret them." You would, of course, say at once, "I do not admit anything of the sort;" but I am afraid that when we are dealing with the world at large, we shall have to take people on their own ground, and meet them from a stand-point on which all can agree. I have, therefore, in this paper endeavoured to take such common ground, and to show the evolutionists and others of our scientific friends that, taken on their own basis, the evidence they adduce does not give the results they suppose, but the contrary. And here I would make just one or two remarks, after first thanking you for the kind patience with which you have listened to my paper. Our Chairman has spoken of the supervision of Divine goodness. I have never denied it; but I think we may suppose the Archbishop of York to be a fair Christian authority on these matters, and he says that language is a divine gift; but that the power, and not the result was imparted. The Chairman has also said that I have denied a primeval language. I have done nothing of the sort. Of course there must have been a primeval language,—a primeval language that is now unknown. If you will refer to page 317 of the paper, which I did not read, in order that I might save time, you will find the question of original names there dealt with, and the bearing they have on the question whether there was a primeval language. As to which was the primitive language it cannot be inferred that, because some of our remote progenitors bore the same names as others, living hundreds of years after, they therefore spoke the same language. Of course the modern Italian differs from the ancient dialect that may have been spoken in an archaic age. The Hebrew language, as known to us in its most archaic documents, could only have come into existence when there was a Hebrew nation, and hundreds of years must then have passed since Abraham came out of another country where the Assyrian, the Chaldean, and the Babylonian languages, and languages of the same stock, or family, were spoken, though of a much older and distinctly different form,—languages which have a better claim to antiquity, in the same way as, I believe, that Admu was an older form than Adam. Exception has been taken to the introductory heading of my

lecture. I do not press that very far ; but it does seem to me that there is a wide and historical connexion between language and religion, and that the inquiry of the future will tend in a great measure to the investigation of this particular question. I do not think there is anything else that calls for observation, except that I desire to say, emphatically, there is nothing in my premises or conclusions in favour of the evolutionist theory. Of course, the fact that man had the capability or power of making a language, and then worked it out, would not support the doctrine of evolution ; the development of language is merely one of the ordinary effects of the progress of human genius, which is always working up towards noble results, and I think that on this point we may hope to aspire still higher. I have not introduced the Tower of Babel into my paper ; there was not only the confusion that we read of there, but I think there has been some since on that point. I have been speaking of the *origin* of language, and there can be no doubt that it must have existed for a long period before that unfortunate event, to whatever extent that event may have influenced the world. I have only to add that I am much obliged to you for the patience with which you have heard me.

The meeting then adjourned.

THE "GUNNING NATURAL SCIENCE SCHOLARSHIPS AND FELLOWSHIP FOR THEOLOGICAL STUDENTS."*

1. Dr. Gunning proposes to assign two hundred pounds annually for encouragement of the study of the Natural Sciences amongst students of Theology.
2. The competition to be open to students of the Established Church and the Free Church of Scotland.
3. The scholarships to be three in number, of the respective annual values of twenty, thirty, and fifty pounds.
4. Each scholarship to be held for three years.
5. The three scholarships shall be decided for the first time in May, 1880.
6. The candidates to be examined in natural history, botany, and geology

* This statement is inserted, as it will be read with interest by many Members and friends. The Founder has acted upon his own responsibility, and quite independently of the Institute. The scheme is for the purpose of promoting an object in the same direction as that which the Institute was founded to carry out (it is not often that the value of a society's main object is so emphatically recognised).

The fellowship and scholarships can now be competed for by theological students of the Scottish universities "holding to our National Confession of Faith." The Founder writes as follows in regard to the scheme:—"It is now launched. If the idea is good, would not some with more money than this life needs establish similar prizes in connection with the Church of England, the Wesleyan and other Nonconformist denominations in England? With different platforms, but only one Faith, we could then combine to qualify the rising race of religious teachers with enough of scientific knowledge duly to appreciate and rebut the pretentious sophisms of those to whom the gospel of wisdom, peace, and salvation is hated foolishness.

"My scheme is tentative at present, but after experience of its working will be made permanent. I now see that the scholarships should be competed for annually (and not held for three years), so as to prevent the gainer resting on his oars during the two succeeding years, and also to give unsuccessful men hopes of gaining at the second or third trials. In other words, scholarships should be annual trials as *certamina* for the fellowship, the final prize which implies six years' study of geology, botany, and natural history. By having these degrees of scholarships, more students will be induced to compete, as some despairing of being first may hope to be second or third. Of course, with sufficient means more of each could be established.

"By this means students for the university who have a knowledge of the three sciences named will be centres of influence against false science in the districts in which they may labour." The Founder (now resident in South America) concludes by referring to the value of the Institute's "Transactions" to ministers of the Gospel in their respective districts.

by the professors and extra-academical examiners of the University of Edinburgh ; also, in some department of Natural Theology or Christian Apologetics having special reference to the connection between religion and science, by the examiners to be appointed by the Faculty of Theology in the University of Edinburgh, it being left to the Faculty to choose one of the examiners outside its own body.

7. Each candidate to produce evidence of his having attended a three years' course of study in the Faculty of Arts of one or other of the Scotch universities, and also a declaration that he is on the point of commencing the theological studies enjoined by the Church to which he belongs.

8. If it shall appear to the examiners that there are not candidates whose examination comes up to a due standard of excellence, the scholarship or scholarships shall not be assigned, and the competition shall be renewed between them and other candidates six months subsequently.

9. There shall be a fellowship of the value of one hundred pounds annually, to be held for three years, the first to be competed for in May, 1883.

10. The competitions to be open to students of the Established and Free Churches of Scotland who have completed a three years' course of theological study.

11. The fellowship to be awarded after a senior examination in natural history, botany, and geology, and in their theological studies by the examiners mentioned above in section 6, and on due certification of proficiency as theological students.

12. The fellowship not to be assigned if no competitor be found duly qualified ; and the competition, in that case, to be renewed in six months.

13. Each holder of a fellowship at the close of his three years' occupancy, either to produce a dissertation or to deliver a few lectures on some subject related to the connection between the Scriptures and the natural sciences ; the Faculty of Divinity, and the three professors of the natural sciences in the University of Edinburgh to decide whether the dissertation is worthy of publication or the lectures of being publicly delivered.

14. The Senatus Academicus of the University of Edinburgh at any time after six years subsequent to the awarding of the first fellowship in 1883, to have the power of altering the above conditions, but only in such manner as may seem to them more conducive to the study of the natural sciences by theological students in Scotland.

P.S.—Dr. Gunning offers these scholarships and the fellowships for a period of nine years. But if they answer the purpose designed of fully encouraging the study of the natural sciences by theological students, it is his wish and present intention to found them permanently.