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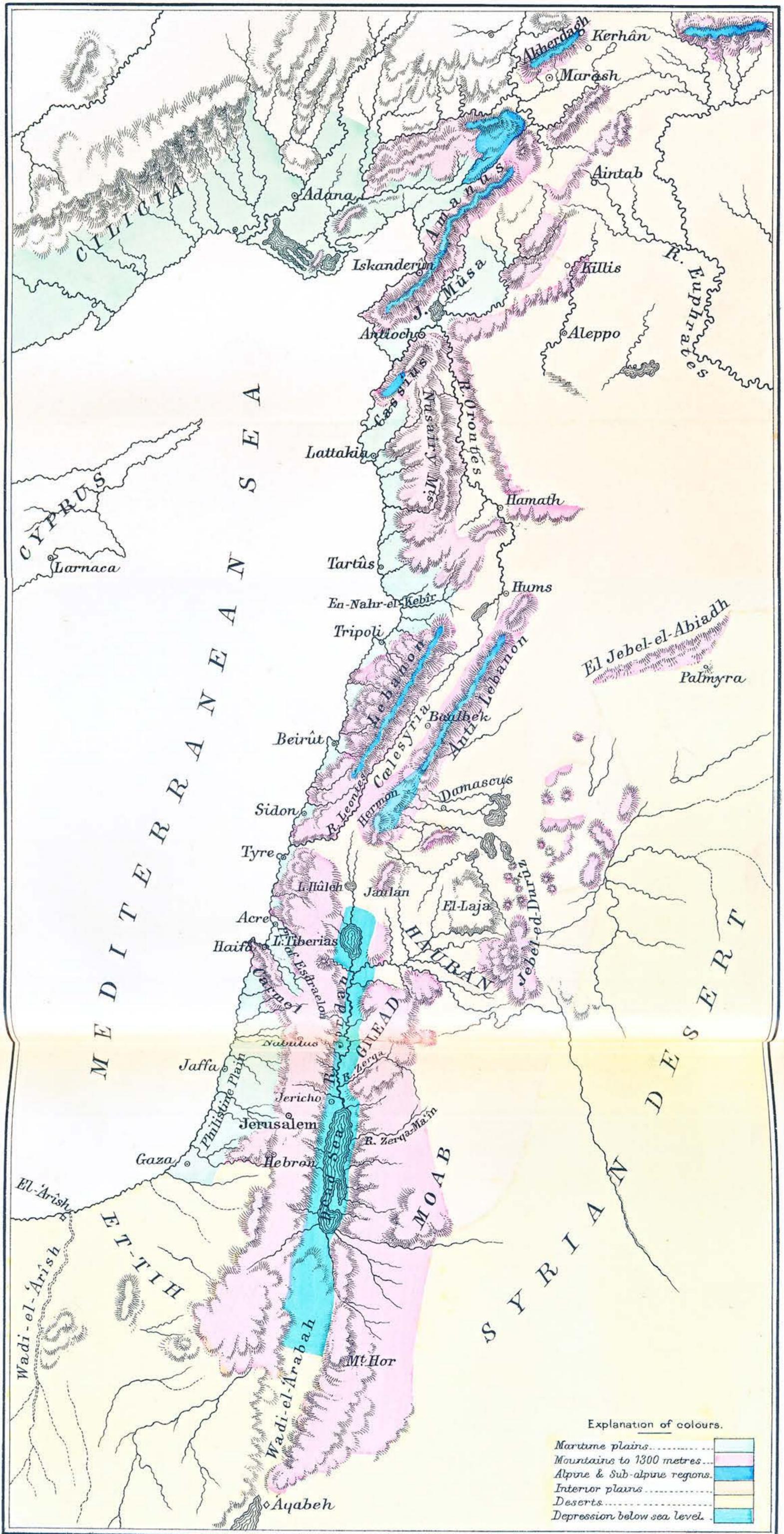
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TO ACCOMPANY A PAPER PREPARED BY DR POST FOR THE VICTORIA INSTITUTE.

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

EDITED BY THE HONORARY SECRETARY,
CAPTAIN FRANCIS W. H. PETRIE, F.G.S., &c.

VOL. XXII.



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CONTENTS.

PREFACE	ix
MAP TO ACCOMPANY PROFESSOR POST'S PAPER	<i>Frontispiece</i>
ANNUAL MEETING—THE REPORT	Page 1
SPEECHES BY SIR HENRY BARKLY, K.C.B., K.C.M.G., F.R.S., SIR J. RISDON BENNETT, F.R.S., &c.	9
*ANNUAL ADDRESS, BY PROFESSOR G. G. STOKES, P.R.S., THE PRESIDENT	11
SPEECHES BY SIR F. LEOPOLD M'CLINTOCK, R.N., F.R.S., MR. HORMUZZ RASSAM, &c.	18
NOTE	22
ORDINARY MEETING	23
*ON TIME AND SPACE. BY THE REV. W. ARTHUR	23
DISCUSSION	44
ORDINARY MEETING, MAY 7, 1888	50
*ON THE NAMES OF THE LISTS OF THOTHMES III. WHICH MAY BE ASSIGNED TO JUDEA. BY M. MASPERO—FRENCH	53
MAP ACCOMPANYING M. MASPERO'S PAPER	53
ENGLISH TRANSLATION. BY REV. H. G. TOMKINS	76
DISCUSSION	98
COMMUNICATIONS FROM SIR CHARLES WILSON, K.C.B., F.R.S., THE REV. CANON LIDDON, D.D., MAJOR CONDER, R.E., AND MR. LE PAGE RENOUF	101
REMARKS BY PROFESSOR SAYCE	111
MEET G, JAN. 2, 1888	113

	<i>Page</i>
*ON THE THEORY OF NATURAL SELECTION AND THE THEORY OF DESIGN. BY PROFESSOR DUNS, D.D., F.R.S.E....	113
REMARKS, &c., BY LORD GRIMTHORPE, CANON SAUMAREZ SMITH, B.D., AND OTHERS	126
THE AUTHOR'S REPLY	138
NOTE: THE NECTARINE ONLY A FORM OR VARIETY OF THE PEACH. BY MR. T. F. RIVERS (<i>vide Preface</i>)	141
THE LATE PROFESSOR ASA GRAY, F.R.S.	142
MEETING, FEBRUARY 6, 1888	143
MEETING, FEBRUARY 20, 1888	144
REMARKS ON EXPLORATION IN BABYLONIA	144
MEETING, APRIL 9, 1888	145
*ON ANCIENT HUMAN FOOTPRINTS IN NICARAGUA. PAPER BY DR. D. G. BRINTON. ILLUSTRATED BY A PHOTOGRAPH	147
MEETING, JAN. 16, 1888	155
*ON THE ABORIGINES OF AUSTRALIA, THEIR ETHNIC POSITION AND RELATIONS. BY JOHN FRASER, B.A., LL.D., F.R.S. (N.S.W.)	155
DISCUSSION	177
COMMUNICATIONS FROM THE REV. MYRON EELLS AND MR. H. C. DENT, C.E., F.L.S....	181
REPLY BY THE AUTHOR	187
NOTE, PROFESSOR MAX MÜLLER'S VIEW	190
MEETING, MARCH 5, 1888	191
*ON ORIENTAL ENTOMOLOGY. BY THE REV. F. A. WALKER, D.D., F.L.S.	191
DISCUSSION	209
COMMUNICATIONS FROM E. B. POULTON, ESQ., M.A., F.R.S., F.L.S. (ON "MIMICRY"), AND OTHERS	221
ORDINARY MEETING, APRIL 16, 1888	226
*ON A PHYSICAL THEORY OF MORAL FREEDOM. BY MR. JOSEPH JOHN MURPHY	226
DISCUSSION	241

CONTENTS OF VOL. XXII.

vii

	<i>Page</i>
THE AUTHOR'S REPLY	249
ORDINARY MEETING, JUNE 18, 1888	252
*ON THE BOTANICAL GEOGRAPHY OF SYRIA AND PALESTINE.	
BY REV. PROFESSOR G. E. POST, M.D. WITH MAP.	
<i>Frontispiece</i>	253
DISCUSSION	299
NOTES BY THE REV. F. A. WALKER, D.D., F.L.S.	308
APPENDICES—	
A. ON FLINT ARROW HEADS OF DELICATE STRUCTURE. BY	
THE RIGHT HON. SIR C. MURRAY, K.C.B.	313
B. ON ANCIENT HUMAN FOOTPRINTS IN NICARAGUA.	
DR. EARL FLINT'S REPLY, &c.	315
C. CAVE DEPOSITS	318
LIST OF MEMBERS, &c.	321
RULES	i.

* OBJECTS AND CONTENTS OF ALL THE VOLUMES OF THE JOURNAL.

*** The Institute's object being to investigate, it must not be held
endorse the various views expressed at its Meetings.*

P R E F A C E.

THE Twenty-second Volume of *the Journal of the Transactions* of the VICTORIA INSTITUTE is now issued. It contains papers by the following authors:—The Rev. WILLIAM ARTHUR, on “Time and Space.” Professor DUNS, D.D., F.R.S.E., on “The Theory of Natural Selection and the Theory of Design,” which is followed by remarks thereon by the Rt. Hon. Lord GRIMTHORPE and others, and a short note from Mr. T. FRANCIS RIVERS, on certain experiments in regard to variations in plants showing that the nectarine is only a form or variety of the peach, and not a different species as some have stated, therefrom inferring an argument for the doctrine of the Transmutation of Species. Dr. J. FRASER, B.A., LL.D., F.R.S. (N.S.W.) on “The Aborigines of Australia; their ethnic position and relations,” the author’s long residence among the people in question has enabled him to show how entirely mistaken have been the popular views hitherto held in regard to them and their origin; his paper is supported by several communications from others who have made the subject their study. Professor G. MASPERO gives the results of his investigations extending over many years, in a paper (accompanied by a map) “On the Geographical Names of the List of Thothmes III., which may be assigned to Judæa,”* which has been ably translated by that careful student of Egyptology, the Rev. H. G. TOMKINS; it is followed by remarks by Professors A. H. SAYCE; Canon

* For M. Maspero’s paper on those assignable to Galilee, see Vol. XX. of the “Transactions.”

LIDDON, D.D.; Major CLAUDE REIGNIER CONDER, R.E.; Mr. LE PAGE RENOUF; the Rev. Dr. EDERSHEIM, and others. The Right Hon. Sir CHARLES MURRAY, K.C.B., contributes a brief note "On Flint Arrowheads of Delicate Structure." Mr. JOSEPH JOHN MURPHY, a paper on "A Physical Theory of Moral Freedom," to which Sir JOSEPH FAYRER, K.C.S.I., F.R.S., the Hon. J. M. GREGORY, LL.D., (of Washington), and others have added remarks. The Rev. Professor G. E. POST, M.D., a unique and valuable treatise on "The Botanical Geography of Syria and Palestine";—the need of a work dealing with the whole botany of these Bible lands induced the Institute four years ago to ask Dr. POST to undertake to prepare it,—it is accompanied by the author's useful map; the comments of Dr. CHAPLIN and others acquainted with the botany of the East are appended. The President, Professor G. G. STOKES, P.R.S., an Address on "Science and Revelation," to which is added the remarks of Sir HENRY BARKLY, K.C.B., G.C.M.G., F.R.S.; Sir J. RISDON BENNETT, F.R.S.; Admiral Sir F. LEOPOLD MCCLINTOCK, R.N., F.R.S.; Mr. HORMUZD RASSAM, and others. The Rev. F. A. WALKER, D.D., F.L.S., a paper on "Oriental Entomology," to which Mr. W. F. KIRBY and many other Entomologists have added remarks, including Mr. E. B. POULTON, M.A., F.R.S., who contributes an abstract of all that he can find recorded upon the subject of mimicry. It should be added that Dr. D. G. BRINTON's paper in regard to "The Ancient Human Footprints in Nicaragua" appears in this volume; in it he deals with the contention of Dr. EARL FLINT, their discoverer, that such footprints place the first appearance of man as early as the Eocene period: Dr. EARL FLINT's reply and some further remarks are added in an appendix. This volume also includes a short notice of the late Professor ASA GRAY, one of the foremost among American men of science.

To all who have added to the value of the present volume, the best thanks of the Members and Associates are due.

During the past year the Institute's work has advanced more

effectually and decidedly than in any year since its foundation ; the steady support accorded both by Members and Associates has been of the utmost value, giving solidity to the Institute, strengthening its working, and causing many who might otherwise not have joined its ranks or aided in its work to do so. The remarkably few retirements have also shown how fully all have realised that cordial co-operation is of inestimable value to the Institute and its objects.

FRANCIS W. H. PETRIE, *Capt.*,

Hon. Sec. and Editor.

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, 19TH JULY, 1887.

The President, Professor G. G. STOKES, M.A., D.C.L., P.R.S.,
IN THE CHAIR.

CAPTAIN FRANCIS PETRIE, Hon. Sec., read the following Report:—

Progress of the Institute.

1. IN presenting the TWENTY-FIRST ANNUAL REPORT, the Council is glad to be able to record that the progress of the Institute has been steady, although less marked than usual, by reason of those adverse influences which still affect every class and interest, not only at home but in several of the Colonies.

2. It is a source of no small gratification to find the undiminished interest taken in the Institute's welfare by the Members and Associates, as on them and their loyal support depends almost entirely the efficiency with which it carries out its objects.

3. An increased number of those in high walks of Science are being drawn into co-operation with the Institute, thus adding to the importance and solidity of its work.

4. It is satisfactory to note the continued progress of the "American Institute of Christian Philosophy," an independent Society, founded on the lines of the Victoria Institute, whose statement of objects was adopted by it. Its founders are still members of this Institute, and amongst the foremost to bear testimony to the value of our work.

The following is the new list of the President and Council as elected :—

President.

Professor G. G. STOKES, M.A., D.C.L., P.R.S.

Vice-Presidents.

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

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A. J. WOODHOUSE, Esq., M.R.I., F.R.M.S.	J. F. BATEMAN, Esq., F.R.S.
Rev. Principal RIGG, D.D.	The BISHOP of BEDFORD.
Rev. Prebendary C. A. ROW, M.A.	Rev. Dr. TREMLETT,
H. CADMAN JONES, Esq., M.A.	Surg.-Gen. GORDON, C.B., M.D.
Rev. W. ARTHUR.	R. H. GUNNING, Esq., M.D., F.R.S.E.
Rev. G. W. WELDON, M.A., M.B., F.L.S. &c.	Principal WAGE, D.D.
Rev. Principal J. ANGUS, M.A., D.D.	Rev. J. J. LIAS, M.A.
J. BATEMAN, Esq., F.R.S., F.L.S.	General G. S. HALLOWES, Cor. Sec.
	Rev. A. I. McCAUL, M.A.

5. A more complete library of reference is of much importance, and it is hoped that the support of the library fund may be made adequate to the necessary demands upon it.

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

The Rt. Hon. A. S. Ayrton, M.; Rev. W. R. Arrowsmith, M.; Rev. C. B. Bowles, A.; T. K. Callard, Esq., F.G.S., A., whose many valuable contributions to the Transactions have been of much service in the work of the Institute; R. R. Cheyne, Esq., F.R.C.S.E., F.M.; Rev. S. Duffield, M.A., A.; The Rt. Rev. Bishop Eden, D.D., C.; D. C. Fox, Esq., M.;

Professor E. A. Hildreth, M.D., *A.* ; Professor A. A. Hodge, D.D., *M.* ; Rev. J. James, M.A., *F.M.* ; The Rt. Rev. Bishop Lay, D.D. ; The Rt. Rev. Bishop McDougall, D.C.L., *C.* ; S. Morley, Esq., M.P., *Vice Patron*, who took an active interest in the Institute, especially in promoting the Special Fund. Rev. R. Phayre, M.A., *M.* ; Rev. D. Playfair, *A.* ; Rev. T. Powell, F.L.S., *Life A.* ; G. Race, Esq. F.G.S. *A.* ; The Rt. Rev. Bishop Titcomb, D.D., *M.*, whose many contributions to the Journal, and active labours as a member of the Council, were of special value to the Institute. Rev. J. H. Usill, M.A., *A.* ; Professor M. Wagner, LL.D., *C.*

* * *M.* Member ; *A.* Associate ; *C.* Corresponding Member.

7. The following is a statement of the changes which have occurred :—

	Life		Annual	
	Members.	Associates.	Members.	Associates
Numbers on 17th May, 1886	50	38	310	657
Deduct Deaths		1	9	7
„ Retirements, &c.		—	7	24
		37	16	31
Joined since July 4th	2	—	294	626
		—	18	66
	52	37	312	692
	89		1004	
Total.....	1093			

Hon. Correspondents number 102. Total..... 1195*

Finance.

8. The Treasurer's Balance Sheet for the year ending December 31, 1886, audited by two specially-qualified Members not on the Council, shows a balance debtor of £1. 8s. 8d., after the payment of the debts and liabilities for the year. The amount invested in New Three per Cent. Annuities is £1,365. 18s. 9d.

THE EARLY PAYMENT OF THE YEAR'S SUBSCRIPTIONS CONTRIBUTES SO MUCH TO THE SUCCESS OF THE YEAR'S WORK that it is hoped that no subscriptions will ever remain unpaid after the first quarter in the year (*see also Rules*).

9. The arrears of subscription are as follow :—

	1879.	1880.	1882.	1883.	1884.	1885.	1886.
Members ...	1	1	3	5	6	10	10
Associates	1	8	3	11	20	20
	1	2	11	8	17	30	30

* Founded in 1865. The total number in 1871 was 200.

10. *Meetings.*

- MONDAY, DECEMBER 6.—“Worship and Traditions of the Aborigines of N. America.” By S. D. PEET, Editor of the American Archaeological journal.
- MONDAY, JANUARY 3, 1887.—“The Hittite Empire.” By the Rev. W. WRIGHT, D.D. With additional remarks by Prof. TRISTRAM, D.D., F.R.S.
- MONDAY, JANUARY 17.—“New Assyrian Discoveries.” By W. ST. C. BOSCAWEN, Esq., F.R.Hist.Soc.
- MONDAY, FEBRUARY 7.—“On the Beauty of Nature.” By the Right Hon. Lord GRIMTHORPE.
- MONDAY, FEBRUARY 21.—“Caves: their Age, Origin, and Age of Deposit.” By T. MCK. HUGHES, F.G.S., Professor of Geology at Cambridge University. With remarks by Sir W. DAWSON, K.C.M.G., F.R.S., Sir W. W. SMYTH, F.R.S., and others.
- MONDAY, MARCH 7.—“Oriental Entomology.” By Rev. F. A. WALKER, D.D., F.L.S. Notes by Mr. ST. KLEIN, F.L.S., and others.
- MONDAY, MARCH 21.—“Krishna and Solar Myths.” By Rev. R. COLLINS, M.A., late of Travancore, Author of the important paper on “Buddhism” read 1884. With communications from Sir MONIER MONIER WILLIAMS, K.C.S.I., Professors MAX MÜLLER, LEITNER, COWELL, RHYS DAVIDS, DOUGLAS, DE LA COUPERIE, EDERSHEIM, &c.
- MONDAY, APRIL 4.—“On the Pedigree of Coral Reefs.” By S. R. PATTISON, Esq., F.G.S. Notes by Prof. G. G. STOKES, P.R.S., and others.
- MONDAY, APRIL 18.—“Practical Optimism.” By Canon SAUMAREZ SMITH, B.D., Principal of St. Aidan’s College, Birkenhead.
- MONDAY, MAY 2.—“Petra, the Rock-hewn Capital of Idumæa.” By Professor HULL, LL.D., F.R.S., Director of the Geological Survey of Ireland.
- MONDAY, MAY 16.—“On Time and Space.” By Rev. W. ARTHUR.
- THE ANNIVERSARY, JULY 19.—The President’s Address; Speeches by Sir H. BARKLY, K.C.B., F.R.S., Sir J. RISDON BENNETT, F.R.S., Sir F. LEOPOLD MCCLINTOCK, R.N., F.R.S., Mr. RASSAM, and others.

Publications.

11. During the past year the Queen has again been graciously pleased to signify that Her Majesty would be “happy to accept the further volumes of the *Transactions of the Victoria Institute.*”

12. The twentieth volume of the *Journal of Transactions* has now been issued, and contains the carefully-prepared Papers read before the Institute, communications thereon from home and foreign Members, and the Discussions,* and will show

* The Journal of Transactions contains the papers read at the Meetings and the Discussions thereon.

Before these are published in the Journal, both are finally submitted to their Authors for any revision, and MS. comments and supplementary remarks are added, which have been seen in by such British, American, and other Members, to whom as being specially qualified to contribute information upon the respective subjects proof copies of the Papers had been sub-

the importance of the recent work of the Institute. From an examination of the contents of the preceding volumes of the Journal, it will be seen how carefully the Council has watched the course of Philosophical and Scientific inquiry, and how anxious it has been that the rising questions of the day coming within the scope of the Institute's objects should be adequately considered.

That the utmost use may be made of the Journal,* and of the Institute's organisation, is a matter the importance of which must be felt by each Member and Associate.

13. *Additional Work.*

It is not many years since the issue to the Members and Associates of the Journal containing the year's transactions was regarded as completing the work of the Institute, but of late the wish to turn that work to the utmost account has resulted in the following additional operations, which the Council has sought to encourage, and it is hoped their adoption may become very general.

First.—Members and Associates, at home, in India, America, and in several of our Colonies, make use of the papers in the Journal as lectures, or as the basis of such, in their several localities (often corresponding with the Institute as to the preparation of such lectures), and excellent results have followed the adoption of this system.

Secondly.—Many Members and Associates secure the translation and reprinting of papers or useful portions thereof in periodicals or journals in the various countries in which they are resident. Such translations are made in France, Italy, Spain, and other countries, and in India by a large Indian Society.

Thirdly.—Many home, foreign, and colonial public libraries are regular purchasers of the Journal, and to further encourage

mitted for consideration—the authors of Papers adding their final comments. These arrangements, which are found to add greatly to the value of the Journal, are carried out with a view to securing its special usefulness to all, whether home or Non-resident Members or Associates: who thus find in the Journal much valuable matter, contributed by men of learning in all parts of the world, in addition to that which had come before those actually present at the Meetings.

* Letters from Members and non-Members in all parts of the world urge the great value of the Papers and Discussions in the Society's Journal, on account of their careful and impartial character; and also by reason of their taking up those questions of Philosophy and Science said by its enemies to militate against the truth of Revelation.

this Members and Associates often use their influence in their respective localities to secure that the local libraries and Institutions shall subscribe for the Journal, and thus bring its pages before a still wider circle of readers. The great importance of so doing has long been evident to the Council, and only this year a Member travelling in the Colonies has drawn attention to the fact that in several Colonies he has found the new public libraries to contain numerous works tending to show that there is opposition between Science and Revelation, but no works corrective of such a view.

14. *The Special Fund.*

With a view of still further advancing the influence of the Institute, the Council have arranged for a Special Fund. It is used—I. To extend the library of reference—so useful to Members of the Institute, especially to those preparing lectures, &c.—II. To make the Institute more widely known.—III. To publish summaries of the Institute's important work throughout the world.—IV. For organising the publication of the People's Edition at home and abroad.

The *proved* importance of each one of these objects is such as to make this fund merit that wide support which it will doubtless receive when attention is drawn to it.*

15. THE PEOPLE'S EDITION.—Twelve of the more popularly useful papers published of late years in the Journal have been reprinted and published in neat covers, at sixpence each, and these have been brought before the general public at home, in America, and all our leading Colonies, through a regular system of bookseller agents, which has been formed by the Council. In India the agents have been arranged with, and when further funds admit, the system will also be in working order there.

The importance that has been attached to the People's Edition by the public, both at home and in every part of the world to which the Institute's publications have reached, shows the value of this fourth object.

16. *Conclusion.*

The care with which the Council ever seeks that the work of the Institute should be done will, it is hoped, always meet

* The second has helped to raise the number of Foreign and Colonial Members from three to upwards of three hundred, and has brought about the foundation of the "American Institute of Christian Philosophy."

with the warm approval and support of the Members and Associates; but, the more each individual connected with the Institute, remembering its high objects, seeks to take a part in its work, or in increasing the number of its adherents, the greater will be the value of the results attained, all being—in the words of its motto: *Ad Majorem Dei Gloriam*.

G. G. STOKES,
President.

SPECIAL FUND IN 1886,

For the People's Edition, &c., see Sec. 14.

	£.	s.	d.
J. Barton, Esq.	20	0	0
I. Braithwaite, Esq.	10	10	0
T. K. Callard, Esq., F.G.S.	3	3	0
H. C. Dent, Esq., F.L.S.	1	1	0
G. Burns, Esq.	1	0	0
Miss G. Harrison	0	10	0
	<hr/>		
	£36	4	0
			<hr/>

The following Balance-Sheet was then read :-

[THE HONORARY SECRETARY (Captain Francis Petrie) said that although the Report was in the hands of all present, yet he would venture to draw attention to the way in which it indicated the development of the Institute. First it showed, that the Institute had been careful to carry out the main object for which it was founded,—the investigation of important philosophical and scientific questions, especially those which some sought to turn against the truth of Revelation,—and that it was receiving the aid of those in the highest ranks of science. The Journal which was circulated among its members and associates was the record of this work. But it was felt that the time had come when the knowledge gained by all this valuable work must not be confined to a comparatively limited circle, but that by every means the world at large should be benefited by it; and the most valuable helpers in this were now the members at home and in many parts of the world who sought to increase the number of those supporting the Institute, and to adopt some of the many means described in the thirteenth section of the Report for making its work known.]

Sir HENRY BARKLY, K.C.B., G.C.M.G., F.R.S.—Professor Stokes, Ladies, and Gentlemen, I rise with great pleasure to move that the Report you have just heard read be received, and 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 am sure that among the Honorary Officers you will not forget the Honorary Secretary, to whose indefatigable exertions the Institute owes so much. I have only a few words to offer, as I did not come here under the impression that I should have been called upon to move this resolution. It was to have been moved by one much more competent than myself to recommend it to your acceptance. I allude to the Bishop of Ontario, who, however, has unfortunately been prevented at the last moment from being present, and consequently I have been requested to undertake the duty in his stead. I do not think it will be a difficult task to offer the few words that are necessary to call attention to the report presented. It must be evident to all who have heard it read, or who have glanced at its contents, that this Society has, during the past year, been carrying out the objects for which it was formed in an efficient and admirable manner. It has done this, not merely so far as regards the reading and discussion of papers,—although several of great importance have been read and very interesting discussions have followed,—but it has also been carrying out its objects most satisfactorily by the exertions it has made to spread a knowledge of its labours and publications, which include a special People's Edition, of twelve of the most popularly useful of its papers, in every country where there is an English-speaking population, and in others where by means of translations its works have been rendered valuable. Some of our Colonies can bear witness to the fact that the work of this Society has been most useful in their several communities, that it has formed a sort of centre and bulwark under which those who wish to repress the attacks of infidelity

and agnosticism, now unhappily so prevalent all over the world, may be enabled to rally their forces, and make head against the spread of opinions which, in our opinion, are deleterious to the welfare of society. We have, I am glad to say, seen the example set by this Institute followed by the formation of a kindred society in America, founded on the same lines and doing a great deal of good. I have no doubt that other societies of a kindred character will spring up and be the means of proving to society at large that there is no necessary opposition between the truths of religion and of science. I may, perhaps, be permitted to say in this context how great an advantage it is to us, and also how great an honour we esteem it to be, that we have been enabled to secure as our President a man occupying the eminent position of Professor Stokes. His name alone is a tower of strength to the Victoria Institute, and I am quite sure that his presence here to-night will do much more than I can say to advance the objects of the Society. Indeed, I feel that if I take up one moment of your time unnecessarily in moving this resolution, I shall be doing you an injury by keeping you from listening to the Address Professor Stokes has been good enough to prepare for us to-night: therefore, instead of extending my remarks further, I will conclude by moving the resolution I have already read.

Sir J. RISDON BENNETT, F.R.S.—I have great pleasure in seconding this motion. As I feel how undesirable it is that I should detain you from the Address to which you are looking forward with great interest, I shall confine myself to the simple discharge of my duty, except in so far as I feel unable to sit down without emphasising what has been said with reference to the obligations we are under to our indefatigable Secretary, and also how deeply we are indebted to Professor Stokes, whose time is so valuable, and who is so greatly over-worked, for giving us, not only his name, but also his labours in support of the objects we have in view. Seeing how these things add to the efficacy of our endeavours, we ought to feel obliged to such men when we find them willing to devote a portion of their time to the furtherance of our work. [The resolution was carried unanimously.]

Rev. ROBINSON THORNTON, D.D., responding, said: I have been asked on behalf of the Council to return their sincere thanks for the way in which you have appreciated what we have endeavoured to do, and I am also in a position to say that the members of the Council have attended most conscientiously to their duties. The President's Address is now so nearly at hand, that I feel disinclined to detain you with any disquisition on the labours of the Council; nevertheless, I cannot help looking back for some twenty years or more, to the time when we first met together, and I had the honour of taking part in the formation of this exceedingly successful Institute. I remember when we thought of publishing the first volume of our Transactions we had in our minds, rather the wail of the Latin satirist

“Quis leget hæc? min' ter istud ais? nemo hercule. Nemo?
Vel duo, vel nemo.”

We thought, perhaps, there might be two or three persons, or, it might be none at all, who would care to look at our lucubrations. We are now a

Society, not confined to London, nor to England, for our members are doing good earnest work in our Colonies, in the United States of America, and in foreign countries in different parts of the world. We have proceeded all through with our object the *Major Dei Gloria*, and with our text, that which cannot be repeated too often,—namely, that between the Scriptures rightly interpreted, and the facts of science rightly understood and fairly weighed, there can be no possible discrepancy; that if there be any apparent discrepancy, it arises either from the Scriptures being misinterpreted, or the scientific conclusions being improperly drawn. Our President is one of those scientific men who are able to grasp this great truth—to hold the belief that there may be two books written by the same hand—the Book of God and the Book of Nature, the latter written in one language and the former in another, but the truths they convey one and the same, as proceeding from one and the same Author. This text we have always had before us, and the result is to be seen in the present condition of the Institute. We return you our most sincere thanks.

The PRESIDENT then delivered the following Address :—

ON the present anniversary, which is the conclusion of my first year of office as President of this Institute, I propose to address a few words to you bearing on the object of the Institute, and on the spirit in which, as I conceive, that object is best carried out.

The highest aim of physical science is, as far as may be possible, to refer observed phenomena to their proximate causes. I by no means say that this is the immediate, or even necessarily the ultimate, object of every physical investigation. Sometimes our object is to investigate facts, or to co-ordinate known facts, and endeavour to discover empirical laws. These are useful as far as they go, and *may* ultimately lead to the formation of theories which in the end so stand the test of what I may call cross-examination by Nature, that we become impressed with the conviction of their truth. Sometimes our object is the determination of numerical constants, with a view, it may be, to the practical application of science to the wants of life.

To illustrate what I am saying, allow me to refer to a very familiar example. From the earliest ages men must have observed the heavenly bodies. The great bulk of those brilliant points with which at night the sky is spangled when clouds permit of their being seen, retain the same relative positions night after night and year after year. But a few among them are seen to change their places relatively to the rest and to one another. The fact of this change is embodied in the very name, planet, by which these bodies are desig-

nated. I shall say nothing here about the establishment of the Copernican system: I shall assume that as known and admitted. The careful observations of astronomers on the apparent places, from time to time, of these wandering bodies among the fixed stars supplied us, in the first instance, with a wide basis of isolated facts. After a vast amount of labour, Kepler at last succeeded in discovering the three famous laws which go by his name. Here, then, we have the second stage; the vast assemblage of isolated facts are co-ordinated, and embraced in a few simple laws. As yet, however, we cannot say that the idea of causation has entered in. But now Newton arises, and shows that the very same property of matter which causes an apple to fall to the earth, which causes our own bodies to press on the earth on which we stand, suffices to account for those laws which Kepler discovered,—nay, more, those laws themselves are only very approximately true; and, when we consider the places of the planets, at times separated by a considerable interval, we are obliged to suppose that the elements of their orbits have slowly undergone slight changes. But the simple law of universal gravitation, combined, of course, with the laws of motion, not only leads to Kepler's laws as a very close approximation to the actual motions, but also accounts for those slight changes which have just been mentioned as necessary to make Kepler's laws fit observation exactly. We are inevitably led to regard the attraction of gravitation as the *cause* which keeps the planets in their orbits.

But it may be said, what is the difference in the two cases? Is not the law of gravitation merely a simpler mode of expressing the observed facts of the planetary motions just like the somewhat less simple laws of Kepler? What right have we to introduce the idea of causation in the one case more than in the other?

The answer to this appears to be that in the one case, that of Kepler's laws, supposing them to be true, we have merely a statement of what, on that supposition, would be a fact regarding the motions of the planets, whereas in the other case the observed motions are referred to a property of matter of the operation of which in other and perfectly different phenomena we have independent evidence.

I have purposely omitted to mention the important difference between the two cases, which lies in the circumstance that Kepler's laws require correction to make them applicable to long intervals of time, whereas the law of gravitation shows no sign of failure; because, even if the former had been perfectly exact, however long the interval of time to which

they were applied, I doubt if they would have carried with them the idea of causation.

To take another simple illustration, let us think of the propulsion of a bullet in an air-gun. We speak of the motion of the bullet as being *caused* by the elasticity of the compressed air. And the idea of causation comes in because we refer this particular instance of motion to a property of gas, of the existence and operation of which we have evidence in perfectly independent phenomena.

It is thus that in scientific investigation we endeavour to ascend from observed phenomena to their proximate causes; but, when we have arrived at these, the question presents itself, can we in a similar manner regard these causes in turn as themselves the consequences of some cause stretching still further back in the chain of causation? If the motion of the bullet in an air-gun be caused by the elasticity of the compressed air, can we account for the elasticity of a gas? If the retention of the planets in their orbits be due to the attraction of gravitation, can we explain how it is that two material bodies should attract one another across the intervening space?

Till a time well on in the present century, we could only take the elasticity of gases as a fact, and deduce the consequences which flow from it. But the researches of Joule and Clausius, and Maxwell and Crookes, and others, have accumulated so much evidence in favour of the general truth of the kinetic theory of gases, that we are now disposed not to rest in the elasticity of gases as an ultimate property beyond which we cannot go, but to regard it as itself a consequence of the molecular constitution of bodies, and of the motions and mutual collisions of the ultimate molecules of a gas. Respecting the attraction of gravitation we have not at present made a similar advance. Speculations, indeed, have not been wanting on the part of those who have endeavoured to account for it. But none of these so fits into the known phenomena of Nature as to carry with it a conviction of its truth. Yet there is one indication that though we cannot at present explain the cause of gravitation, yet it *may* be explicable by what are called second causes. The mass of a body is measured by its inertia; and, though we commonly think of a body of large mass as being heavy, and though we compare the masses of two bodies most easily and accurately through the intervention of weight, yet the idea of mass may be acquired, and means might easily be suggested by which the ratio of the masses of two bodies might be experimentally determined, without having recourse to gravi-

tation at all. Now, according to the law of gravitation, the force with which a given body attracts another at a given distance is strictly proportional to the mass of the latter. If we suppose the attracting body to be the earth, and the attracted bodies to be in one case a brass weight, and in the other a piece of marble, it follows that if they make equilibrium when placed in the pans of a true balance—I make abstraction of the effect of the buoyancy of the air—their masses are strictly equal, and, accordingly, that weight is a true measure of mass. But there is no reason *à priori*, so far as with our present knowledge we can see, why this should be so. We know that if the bodies in the scale-pans were formed, one of brass and the other of iron, and there were a magnet concealed under the table on which the operator placed his balance, the masses would not be equal when there was equilibrium. But that the law is true, and that, accordingly, weight is a true measure of mass, follows with the highest probability from the third of Kepler's laws, and was proved experimentally by Newton, by experiments with pendulums. Newton's experiment has since been repeated by Bessel, with all the refinements of modern appliances, with the result that, so far as the most exact experiments enable us to decide, the law is strictly true. This is perhaps the only instance, as Sir William Thomson remarked to me in conversation, in which there is an exact agreement between two quantities, and yet we are unable to give any reason why they should agree. That such is the case, holds out some prospect of scientific men being able some day to explain gravitation itself; that is, to explain it as the result of some still higher law.

Such is the nature of our progress in scientific investigation. We collect facts; we endeavour to co-ordinate them and ascertain the laws which bind them together; we endeavour to refer these laws to their proximate causes, and to proceed step by step upwards in the chain of causation. Presently we arrive at a stage at which, even after long trial, we do not see our way to going further. Yet we are not able to demonstrate that further progress in the same direction,—that is, along the chain of secondary causation,—is impossible. Science conducts us to a void which she cannot fill.

It is on other grounds that we are led to believe in a Being who is the Author of Nature. A conclusion so important to mankind in general is not left to be established as the result of investigations which few have the leisure and ability to carry out. Doubtless, where it is accepted, the study of

science enlarges our ideas respecting the greatness of that Being, and tends to keep in check notions of too anthropomorphic a character which we might form concerning Him. Still, the subject-matter of scientific study is not, at least directly, theistic; and there have not been wanting a few instances of eminent scientists who not merely rejected Christianity, but apparently did not even believe in the being of a God.

The religious man, on the other hand, who knows little or nothing of science, is in the habit of contemplating the order of Nature not merely as the work of God, but in very great measure as his *direct* work. Of course, the concerns of everyday life present innumerable instances of the sequence of cause and effect; and few are now so ignorant of the very elements of science as not to allow that the sequence of day and night, of summer and winter, is proximately due to the rotation of the earth about its axis, and the oblique position of that axis with reference to the plane of the earth's orbit. But when we get beyond the region of what is familiarly known, still more, when we get outside the limits of well-ascertained scientific conclusions, and enter a region which is still debatable ground, where men of science are attempting to push forwards, and are framing hypotheses with a view to the ultimate establishment of a theory in case those hypotheses should stand the test of thorough examination; when, I say, we get into this region, a man such as I have supposed may feel as if the scientists who were attempting to explore it were treading on holy ground; he may mentally charge them with irreverence; perhaps he may openly speak of them in a manner which implies that he attributes to them an intention to oppose revealed religion.

To take a particular example. I can imagine that a man such as I have supposed may have always been in the habit of regarding each one of the thousands and tens of thousands of species into which naturalists have divided the animal and vegetable kingdoms as having originated in an independent creative act; that the supposition may have become entwined among his religious beliefs. Such a man would be apprehensive of any attempt to introduce second causes in explanation of the observed fact of the great multiplicity of species.

Akin to the feeling which I have attempted to describe is another, against which we must be on our guard. The religious man is strongly impressed with the truth of certain things which lie outside the discoveries of reason or the investigations of science, and which bear on the whole conduct of his life here, and on his hopes regarding a life hereafter. He

believes these truths to be divine, and, accordingly, that no legitimate deduction of human reason is liable to come in conflict with them. But the precise mode in which a conviction of the truth of these things was arrived at depends, to a considerable extent, on each man's idiosyncrasy. His natural bent of mind, his early training, his later associations, have all a good deal to do with it. Divine truth is one thing; our own apprehension of it, and the steps by which in our own minds it has been arrived at, are another. These are liable to human imperfection, and we may not attribute to them the infallibility which belongs to that which is divine. We are not to confound the scaffolding with the building; nor, if we are anxious for the safety of the edifice, need we therefore fear that, if the scaffolding were tampered with, the whole might come tumbling down, nor should we regard as a dynamiter a fellow-workman who would remove a pole or two.

That truth must be self-consistent, come from whence it may, is an axiom which nobody would dispute; the only question can be, What is truth? Now, there are truths which we know by intuition, such as the axioms of mathematics; and there are others, again, which, though we do not perceive them by intuition, yet demonstrably follow from what we do so perceive; such, for example, are the propositions of mathematics. Then there are other conclusions which we accept as the result of the application of our reason to a study of Nature. Here the evidence is not demonstrative, and the conclusion may have all degrees of support, from such overwhelming evidence as that on which we accept universal gravitation, to what hardly raises the conclusion above the rank of a conjecture. On the other hand, there are conclusions which we accept on totally different grounds, namely, because we think that they have been revealed. Why we accept a revelation at all, is a very wide question which I cannot here enter into. That we do accept it is implied in the membership of this Institute. But, granting the acceptance of revelation, the question remains, What and how much is involved in revelation? That is a question respecting which there are differences of opinion among those who frankly accept a revelation, and with it the supernatural.

Now, the primary object of the establishment of the Victoria Institute was to examine questions as to which there was a *primâ facie* appearance of conflict between the conclusions of science and the teachings of revelation. In order that such examination may be usefully carried out, it must be undertaken in a thoroughly impartial spirit, with a readiness honestly to follow truth

wherever it may lead. It will not do to assume that the immunity from error which belongs to the divine belongs also to our apprehension of what constitutes the divine, and that therefore, if a conflict there be, the error must be on the side of science. It is true that many statements which are really little more than scientific conjectures are represented, at least by those who take their science at second or third hand, as if they were the well-established conclusions of science. But it is true also that the progress of science has corrected the assertions of a crude theology. We are disposed nowadays to smile at the idea of any opposition between the Copernican system and the teaching of revelation; but we need not go back to the days of the persecution of Galileo to find an example of a well-supported scientific conclusion having met with a similar opposition, issuing in a similar result.

To gauge thoroughly the amount of evidence on which an asserted scientific conclusion rests, one ought to be well acquainted with the branch of science to which it relates. Still one can get a fair general notion of the evidence by an amount of reading which is by no means prohibitive, or by conversing with those who have made that branch a special study. It may be that the impression thus left on the mind will be that the votaries of science, carried away by an excess of zeal in the attempt to discover the causes of natural phenomena, have really, though honestly; over-estimated the evidence. It may be, on the other hand, that the inquirer will perceive the evidence to be weighty and substantial, in which case it behoves him to reconsider the supposition with which he started, that the conclusion was opposed to the teaching of revelation.

One should always bear in mind the great responsibility one incurs, and the mischief one may do, by representing as bound up with revelation that which really forms no part of it. Being by hypothesis no part of it, but only erroneously tacked on to it, it may be false; and being false, it may be in opposition to a conclusion supported by the weightiest evidence, it matters not of what kind, but say scientific. What then, will be the effect of the error committed by the upholder of revelation? The educated man of science may see through the fallacy; but will it not put a weapon into the hands of the infidel lecturer wherewith to attack revealed religion?

But whether we can agree or cannot agree with the conclusions at which the scientific investigator may have arrived, let us, above all things, beware of imputing evil motives to him; of charging him with adopting his conclusions for the purpose of opposing what is revealed. Scientific investigation is

eminently truthful. The investigator may be wrong, but it does not follow that he is other than truth-loving. If on some subjects which we deem of the highest importance he does not agree with us,—and yet it may be he agrees with us more than we suppose,—let us, remembering our own imperfections, both of understanding and of practice, bear in mind that caution of the Apostle: “Who art thou that judgest another man’s servant? To his own master he standeth or falleth.”

Mr. SAMUEL SMITH, M.P.—I have now to discharge the very pleasant duty of moving a vote of thanks to our very able President for the interesting address he has delivered to us this evening, and also for the services he has rendered to this Institute during the past year. I perform this task with the greater pleasure, because I am sure Professor Stokes, by filling the post he occupies, confers an honour on this Society, and he very fitly represents in his own person that union between Religion and Science which was exemplified in his great predecessor at Cambridge, Sir Isaac Newton. It is, of course, known to most of you that Professor Stokes occupies the chair which was once filled by Sir Isaac Newton, and consequently there is something peculiarly appropriate in his being here to certify to us that there is nothing unreasonable in the combination of faith in science and faith in religion. I have not been able of late to follow the proceedings of the Institute with the same attention I have given to them in former years. A great variety of occupations has not allowed me time to watch what has been going on here with the same care as in an earlier period. For several years, however, I have found great pleasure in reading the able papers presented to this Institute, and I was glad to perceive that it was doing a very valuable work. We had, as you will remember, some years ago, a very violent and aggressive type of speculative scientific infidelity brought before the British public. Those who remember some fifteen or twenty years ago, will bear me out in saying that at that time the attitude of scientific speculation was more violently opposed to revelation. There has been a very marked change passing over scientific speculation of late years. Whether that is owing in part to the work of this Society I will not say; but, as to the fact, every one present can bear witness to its truth. We have of late years had not a few of the most eminent of our men of science who have boldly avowed their faith in revelation. This was not the case fifteen or twenty years ago. At that time the cause of religion seemed to go by default in scientific assemblies. That is not so now. We now find men who are ready in our scientific assemblies to defend their faith in revealed religion without weakening their hold on science. This is a thing for which we ought to be thankful, as it marks some progress in an age which presents many features calculated to produce anxiety and sadness. We must acknowledge the truth of the closing remarks in the paper just read, that the defenders of Christianity have now abandoned some of their untenable positions. The somewhat

cramped and limited views of Divine Truth held by our forefathers have received a certain degree of widening and broadening, but that is only another way of saying that the Bible is a book so written, that it was intended to suit all ages ; for the infancy of mankind as well as its maturity ; that it was meant to be read in non-scientific epochs and to suit non-scientific minds. The cosmogony of the Old Testament was addressed to the infancy of the world. If it had been written only for scientific minds it would have been unintelligible to the rest of the human race for thousands of years ; and therefore, we need not be surprised at the varieties of interpretations that have prevailed during such long periods of the world's history. As the human mind advanced it was able to perceive more and more where the language of figure and parable was employed, and many things that were interpreted in a literal sense in the infancy of the human race—and very properly so interpreted—are now with equal propriety understood in a different way ; while, on the other hand, science has abandoned many of her untenable positions, and we have arrived at a point at which it is possible that men of scientific attainments and of devout Christian belief may have full conviction of the truth both of science and religion. We may congratulate ourselves on one advance that has been made of late years, and that is the wonderful testimony that has been brought out, by means of modern research, to the truth of the Old Testament history. We can most of us remember the time when the greatest doubt was cast on the truth of the history set forth in the Old Testament. It was largely believed in certain scientific circles that the historical accounts contained in that Book were little superior in point of accuracy and truth to the legendary myths of Greece and Rome. The discoveries, however, that have been made amid the ruins of Babylon, Nineveh, and other cities which prominently figure in Biblical history, together with the further discovery of the true method of interpreting the cuneiform characters of Assyria and hieroglyphics of ancient Egypt, have thrown a flood of light on the truthfulness of the Bible record, and I am inclined to think that, even when regarded from a merely historical point of view, the leading facts of the Old Testament are amply established. What we are now called upon to do is, not so much to refute scientific objections addressed to the more educated classes, because that has been done so largely during the last twenty years that there is not much more remaining to be accomplished in that direction. This Institute has dealt very copiously with those objections, and there is very little more requiring to be said ; but the work we have to do is this : Those objections and difficulties which were started in scientific circles during the first half of the century have since been popularised and have sunk down to the lower strata of society, so that many of us are scarcely aware how largely the working classes of the metropolis, and, generally speaking, the less educated classes of the British and Anglo-Saxon peoples, are being plied with all sorts of scientific difficulties of a very crude character, which have been dealt with and refuted in the higher circles of scientific thought many years ago, but which at the

present moment are being widely employed with deadly effect among the more ignorant portions of the population. Well, this being so, what I think is required now is to popularise the great body of scientific research which this Society especially has been the means of prosecuting for the last twenty years; to break it down into crumbs, so to speak, so as to make it intelligible to any one who can read the English language, and issue it in papers available to the working classes. I am glad I have been able to be present to-night, and can only express my regret that I am very seldom permitted, owing to a multitude of engagements, to attend your meetings. I have great pleasure in moving "that our best thanks be presented to the President for the annual address now delivered, and to those who have read papers during the session."

Mr. HORMUZD RASSAM.—I have great pleasure in seconding the well-deserved vote of thanks which has just been moved to our respected President for his very able and valuable Address. I am not sufficiently versed in science to enable me to say anything worth the attention of this assembly; but, I thank God, as one of the believers in Revelation, I am not afraid of any supposed difference between the two. On the contrary, as they both belong to the same Author, we ought to do all we can to support the men of science, because we know they cannot do us any harm. As our President has said, both ought to agree, otherwise the study of science and religion would be nonsense. We are aware that there are many things which have yet to be examined into, and there are many mysteries that will yet be explained, if not in this generation, at any rate in the future. We know from the discoveries that have been made in Assyria and Babylonia how much has been elicited therefrom to throw light upon many obscure passages in the Bible, especially as to the kings who have reigned in those parts of the world. When we resume our researches, which we hope to be able to do before very long, we shall probably come upon many other discoveries which will explain certain other seemingly unintelligible passages in the inspired writings. We cannot but join in returning hearty thanks to Professor Stokes for his learned and interesting Address, and in expressing a hope that he may long continue to be our President.

Admiral Sir F. LEOPOLD M'CLINTOCK, R.N., F.R.S.—It is my very pleasant duty as a stranger to express my warmest approval and highest appreciation of the objects of this Institute, and also of the admirable way in which you have hitherto endeavoured to carry them into effect. I have always deemed it to be one of the highest privileges of those who have sufficient talent and knowledge for the task, to compare the book of Nature as it lies spread open before us, with the Book of Revelation as we have had it handed down to us, and show the complete accordance which subsists between the two. I will not, however, take up the time of the meeting by enlarging upon this topic, because I did not come here prepared to speak upon it. This is, indeed, my first appearance here, but I am delighted to range myself on the side the Institute has taken up.

The resolution was then carried with acclamation.

The PRESIDENT.—As I am one of those mentioned in this resolution, although only one, because it also includes the authors of the various papers read during the session, I take it upon myself to return thanks for the way in which my services, imperfect though they have been, seem to be appreciated by the Institute, and also to thank you on behalf of those who have read papers during the year just terminated. I must confess that when I thought of addressing you this evening my heart rather failed me, for I had not much time in which to prepare anything worth your hearing; and I may truly say I feel the imperfection of what I have brought before you. But among the papers read before this Institute during the session have been many elaborate contributions to the Transactions of this Society—papers which I have no doubt have cost the authors a great deal of careful thought, and I am sure that your thanks to the authors of those papers are well deserved.

The members and their friends then adjourned to the Museum where refreshments were served.

NOTE.

THE following remarks by Professor G. G. Stokes, P.R.S., were delivered by him on another occasion, and their insertion here seems not inappropriate :—

“We all admit that the book of Nature and the book of Revelation come alike from God, and that consequently there can be no real discrepancy between the two if rightly interpreted. The provinces of Science and of Revelation are, for the most part, so distinct that there is little chance of collision. But if an apparent discrepancy should arise, we have no right, on principle, to exclude either in favour of the other. For however firmly convinced we may be of the truth of revelation, we must admit our liability to err as to the extent or interpretation of what is revealed ; and however strong the scientific evidence in favour of a theory may be, we must remember that we are dealing with evidence which, in its nature, is probable only, and it is conceivable that wider scientific knowledge might lead us to alter our opinion. We should be ready to hear the whole of the evidence, and judge honestly from the whole. We should admit the principle of hearing both sides ; not that we should each make the examination, for comparatively few would be competent to do so.

“It is impossible for the bulk of our population, whose lives are spent in earning their daily bread, to weigh the evidence of what are stated to be the conclusions of science. They take them on trust, if they attend to them at all ; and if scientific conjectures are represented to them as the conclusions of science, they are predisposed to accept them as such from the general knowledge they possess of the great things that science has done. It is quite possible that a stumbling-block may thus be placed in the way of religious belief ; for though our fundamental idea of the unity of truth involves, as an axiom, the absence of antagonism between real science and revelation, we have no such guarantee respecting scientific conjecture.

“As the dangers referred to arise from a separation of Science from Revelation, and a determination to ignore one of these two modes of arriving at truth which are open to man, it follows that they are best guarded against by a hearty recognition of both, as coming, in different ways, from the Author of our being.”

ORDINARY MEETING, MAY 16, 1887.

D. HOWARD, ESQ., VICE-PRES., CHEM. SOC., IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following Elections were announced :—

ASSOCIATE :—Mrs. Woodrow, Middlesex.

HON. CORRESPONDING MEMBER :—Professor E. Hull, M.A., LL.D F.R.S., Director of the Geological Survey of Ireland.

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

“Abraham, Joseph, Moses.” By Professor A. H. Kellogg, D.D.

“Witnesses from the Drift.” By D. C. Fradenburg.

The following Paper was then read :—

*ON TIME AND SPACE: TWO WITNESSES FOR A
CREATOR.* By the Rev. WILLIAM ARTHUR.

WE speak of both Time and Space now in a narrower, now in a broader sense. When contrasting Time with eternity, as we habitually do, we plainly mean by the former a terminable duration contained within an interminable one. But when contrasting Time with Space, we as plainly mean all duration whatsoever, irrespective of any limits. Again, when we contrast Space with Infinity, we clearly mean by the former a measurable extension contained within one which is immeasurable in length, breadth, or height; but when we contrast Space with Time, we mean by Space, all extension whatsoever, without any respect to bounds.

When it is in the narrower sense that we speak of Space, we may have in mind either the whole extension of our planet, or that of the solar system, or even that of all the worlds hitherto brought to view by the telescope. In any of these cases our conception of Space is that of a measurable extension, surrounded on all sides by an absolutely immeasurable one. So also when it is in the narrower sense that we speak of Time, we may have in mind either the duration of an individual life, or that of the human race; but in either case the conception of Time is that of a limited duration, included within an unlimited one which went before it and will run on after its termination.

It must not be supposed that I use the term Duration as a definition of Time or the term Extension as a definition of Space. In such matters I am wary of the definitions even of the masters, and should be timorous of any of my own. The term Extension is a wider one than Space, and so is Duration a wider than Time, as I apprehend the terms. Now the process of defining a term by a wider one is one which it would be easy to cover by the most distinguished patronage, but, in spite of that fact, to me defining by generalising is in philosophy like what condensing by vaporising would be in physics.

I shall not refer to writers whom I have had occasion to combat, and with whom defining by generalising is exalted into an art. But to take one for whom my intellectual respect is profound, Sir William Hamilton defines Time as "the image or the concept of a certain correlation of existences"; a formula to which also his definition of Space is conformed. Now this has not even the merit of being a mere generalisation. It begins to define an object by setting it under a class to which it does not belong, which class is that of mental images to which indeed does belong *our idea of Time*, but not Time itself. The human idea of Time never arose in the whole course of Time, until after countless worlds had for uncounted ages run through days and nights, through summers and winters, of different lengths. Now it is not of man and his thoughts that Sir William speaks, but of that Time itself, which long pre-existed man and all his ideas. Time an image! a concept! Time a child of Adam's brain, and not Adam a birth of Time!

Professor Calderwood so far improved upon this definition as to say that Time is "not an image or a concept" of a correlation, but is a "correlation of existences." This makes the immense difference of taking a thing out of a class to which it does not belong and setting it in one to which it does belong. If we accept the abstract term correlation as the name of the concrete thing which relates other things to one another, then Time is a correlation, *i.e.*, a correlator of existences. But correlators of existences are a large class. A chessboard correlates the existences of the chessmen, the House of Commons correlates the existences of the members; the sea correlates the existences of the fishes, the air those of the birds, and so on. Defining an object like Time, which under its own name is something perfectly distinctive, by referring it to so wide a class as that of correlations is defining by blotting out the boundaries.

I have assumed that Duration is a wider term than Time, and Extension a wider one than Space. The ground on

which I do so is this, that "Time" never expresses the mere idea of unregulated and unmarked duration, without order of succession or note of periodicity. On the contrary, as Locke says; "Duration as set out by certain periods, and marked by certain measures or epochs, is that, I think, which we most properly call Time."*

We do not think of the regular succession in Time of the swings of a pendulum as a mere matter of unregulated duration. No more do we think of the conformity of the arc described by each beat to that described by the foregoing and following ones as a mere matter of unregulated extension. We look upon both as proceeding by rule, which rule is set by a centre of action above the metals of the instrument.

Some would have us make believe that we do regard it only as "a mere series" of beats; but we cannot make believe anything so puerile. It is a series of beats with an overruling cause and fixed order. We do not think of the rise of day and the fall of night, of the regular coming and passing away of summer and winter as "a mere series," without prescribed order and sufficing cause. When men have to fit the facts of nature to a doctrine, they may get so far towards presenting processes like these as "mere series," that their fancy takes form in type, but a footing they cannot gain for it on the firm ground of enduring thought. Regulated or, as we say, "timed" succession, that is periodicity, is a structural fact in creation, and as such self-evident, and borne in upon the perceptions both in external and internal observation, so that our idea of Time, whether it is or is not pervaded *à priori* by a conception of rule, is so as matured, and that inevitably, by force of what James and John Mill would call inseparable association.

In itself, the term Time does not imply either the existence of limits to duration or their absence. But it does imply order in successions, and notes of periodicity, such notes as afford data for the measurement of duration. Wherefore, whatever else Time may mean, it does at least mean DURATION UNDER RULE.

In a manner analogous to what we have seen in the case of Time, the term Space does not express the idea of mere extension unreclaimed, neither traversed nor surveyed,—of blank continuity without correlated areas, notes of distance, or graduated scales, whereby to take dimensions. This would be, in the words of Locke, "the undistinguishable inane of infinite Space." We do not think of the successive orbits of the

* Book ii., c. xiv. § 17.

planets, or of the alternations of body and interspace in the sky, or of such alternation in a quill, or a shell, or in the animal frame, as a "mere series." Not any more than we so loosely think of the succession of cog and notch in a revolving wheel, or of the fitting of the cog of one wheel into the notch of another. In each of these cases the successive dispositions in Space are not "a mere series," they are a series embodying a pre-arranged order, and therefore answering to a pre-conception.

Like the term Time, in itself the term Space does not imply either the presence of limits or their absence. But it does imply the idea of measure in extension, of related distances, and of marks whereby distances may be noted. That is, whatever else Space may mean, it does at least mean
EXTENSION WITH ORDER.

The question as to whether our conception of duration under rule, and of extension with order, was born with us, or is the fruit of our experience, is one which has intensely interested thinkers. Many of them, however, have seemed to take pleasure in confusing this question with a very different one, namely, whether our minds did or did not give origin to Time and Space themselves. Born with us or not, none of us can remember the first time when we acted upon the assumption that if we wanted to lift our hand we could move it out of the spot wherein it was at that moment, and move it into another spot the next moment. In saying this, we say that earlier than the first record of memory, every one of us has acted in Time as well knowing that it was duration under rule, and acted in Space as well knowing that it was extension with order. We acted as knowing this, not in the sense of being able to put it into words, but long before we could put anything into words, as knowing it with that unquestioning knowledge which anticipates action and shapes it.

Let our conceptions of Time and Space originate how they may, the truth remains the same, that these two factors in the Cosmos mingle with all our movements of thought, and give colour to our conceptions both of ourselves and of nature generally. As Locke says, there are few things "Whose modes give more exercise to the minds of men than these do." From its first anticipation, by a desire, the mind finds itself counting upon a Time not yet come. From its first act of memory, by a recollection, it finds itself recalling a time already past away. The two blend into one on the shifting ground of the Time actually passing. Time is thus at first declared to be, and ever after is shown to be, the arena of all events, of all antecedents and consequences, of all causes and effects,

of all change of states, of all mental action, of all growth, of all, to use a wide word, becoming; that is, of all progress from what has been to what hitherto has not been.

So also from its first sensation of touch the mind finds itself thinking of a place where a thing is, and a place from which a feeling comes. From its first sensation of sight it finds itself looking at a place where a thing is, surrounded by places where it is not. Then it sees a place where some other thing is, and this surrounded once more by places where it is not. Every touch upon the frame from without, every movement of a limb from within, as well as every sight, confirms and enlarges this experience of different places, some filled up by objects, some void of them. Thus from our earliest hours Space is encountered as the arena of all objects which can affect the senses; which means of all bodies, and of all physical movement. Hearing, taste, and smell still further extend this experience.

Every motion, whether seen, felt, or made, gives an experience of both Time and Space. The fly cannot pass over the cradle without consuming Time and traversing Space. It was yonder, and is not; it was not here, and is. So the nurse cannot grasp the arm without causing us to feel that something which was not at that spot a moment ago is there now. No more can we lift our hand to our head without being taught that where it lately was it has ceased to be, and where lately it was not it has come to be. It is a one-sided view to speak of Space as offering to us co-existences and Time successions. Things co-exist in Time as in Space, and things endure, succeed, and change in Space as in Time. Time is the essential condition of all action, and Space is the essential condition of bodily existence; it implies and presupposes Time in the origin, continuance, and changes of bodies. There are questions of Time, as changes of thought, which are not questions of Space; but there is no question of Space which is not also a question of Time. Mr. Herbert Spencer's mode of contrasting the two as the *forms* or abstracts respectively of successions and co-existences is more than an exaggeration of Kant's position; for the latter is perfectly clear as marking succession in Time, and in not excluding it from Space, and as saying that nothing can be in two contradictory states, except at two different times. Kant's dictum that Time has only one dimension, length, is a mere metaphor. Time has three tenses, past, present, and future, but no dimension; and Space has three dimensions, but no tense.

Neither of these two great elements in the system of

creation is presented to any one sense as its direct object, as are many great things and many inconsiderable ones. Yet they are both capable of being verified by all the senses, and are suggested to the mind by every object of sense and every change of sensation. Hence, like gravitation, which strikes no sense, they fill a larger space in our thoughts than many objects which not only appear to the senses, but greatly impress them. Even of these the importance is often felt to be higher as indices of Time and Space, than as objects of sense. The moon herself holds a place in thought as marking Time by her lights and shadows, greater even than that which she holds as a spectacle in the sky. The stars also influence thought by their function as marks of distance in Space, more even than by their beauty as points of light. Matter strikes the senses; but if it is in a great mass, its limits as set in the sky, or on the ground, imprint upon the mind the lesson of how narrow its circle is, as compared with the sweep of Space. And if, on the contrary, matter is presented in a germ, which has to grow before even the microscope can discern it, then it imprints on the mind the lesson that on the descending scale of littleness, as on the ascending scale of magnitude, our measurements lose themselves in the abysses of Space. Motion also strikes the senses; but if it be the travel of a world which takes ages to go round its orbit, it ends by impressing us with the brevity even of its long year compared with the whole compass of Time. And if the motion be the vibration of a ray of light, the repetitions of which in a single week would compel science to tax its powers of expression in vain, then does this multiplication of movements in a brief duration tell us that our plummet cannot sound the capacity of Time for admitting of actions.

Thus does every event emerge out of its own non-occurrence and disappear in it; and thus does every body begin out of its own non-existence on one side, and end in its own non-existence on the other. The event may be the flash of a new conception or the beat of a heart, it may be the fall of a shower or the revolution of a comet, or it may enclose as many events as a great war or a reign of fifty years; but in any case, it is a fleeting pulse in a permanent order. It is bounded before by the "ere it began," and is bounded behind by the "after it ceased." In every event the IS arises out of the WAS NOT, and disappears in the NO MORE. The body may be a huge planet or an invisible particle of cosmic dust, but in either case it is a dot of matter in a sea of the intangible. An insect has a world to stand upon, but a world stands on intangible space. To the right and the left, above and below, it is bounded

by its own non-existence; and if matter only be existence, then by absolute non-existence. In the case of every body the IS arises out of the IS NOT, and disappears in the IS NOT.

Thus at every step in our course through space are we challenged to tell how existence originates amid non-existence, and how these two have been combined so as to constitute a harmonised structure. And at every point in the course of Time we are challenged to tell how action can arise amid inertness, and how these two can be combined in a rhythm of movement. Does non-existence bring forth existence, or is there a Maker? Does inertness initiate and control action, or is there a Fountain of Life, a Ruler?

Whether our original conception of Time and Space is native and anticipates experience, or grows out of it,—technically speaking, whether the conception is *à priori* or experiential,—all these facts just mentioned develop and mature the conception. And I am bound to say that to me, citing experience as accounting for origins, and not merely for developments, is like citing drill as accounting for soldiers. Get your recruits, and drill will make soldiers of them, but to think of the drill as the origin is lamentably short thinking. You may overawe me with umbrageous names, but no name and no array of great names can alter the fact that experience develops, but does not create. To speak of “powers” of mind as being originated by experience, as Mr. Mill does, to me represents helpless hanging to a theory. What experience can elicit, depends on what it finds.

The experience of a wall on which an astronomer casts the spectrum will never engender either a poem, a theory of optics, or a fresh addition to chemical knowledge. No more will any of these arise out of the experience of a bird which, just as well as Locke could have done, sees at Niagara the numberless little rainbows which dance in the spray.

The ancient hills have had more extended experience than we of Time and Space, yet that experience has elicited from them no theory, no controversy, no science, no devotion. In human experience no fact is more certain than that no man can recall in his own experience a single passage upon which he did not enter, carrying with him the idea of a NOW and a HERE, together with the feeling that the NOW stood in connexion with a THEN, both foregoing and following, and also that the HERE stood encircled by an ELSEWHERE. When the mind was ripened, we found that on whatever side we followed up the ELSEWHERE, whether underfoot, over head, to the right hand or to the left, it always led not to an end but to the ENDLESS; and moreover, that whether we followed up the WAS or the IS TO-BE,

between which our Now palpitates, they both reached over into the unlimited, and merged in a FOR EVER.

The sum total of our Now and the WAS and IS TO BE we learned to call Time, and the sum-total of the HERE and the ELSEWHERE we learned to call Space. And as children may ask what gold is made of, and beginners in science may ask what carbon is made of, so we ask what Time is, and what Space is; and we prefer sonorous answers rather than being told that gold is gold and nothing more, and that carbon is carbon and nothing more. Metaphysicians, instead of taking Time and Space as ultimate facts, admitting of no analysis, make magnificent guesses, and dress out definitions in imposing academic robes. Meanwhile, mathematicians and physicists, taking them as ultimate facts, have studied their properties and relations to the boundless advantage of mankind. So has the common mind likewise done, taking Space in the structure of the Universe, and Time in its processes as ultimate facts just as they are in this city; for the space in which London stands is the same to it as that in which the world stands is to the world; and the Time in which the stones of London are quarried, hewn, built up, and worn away to dust, is the same as that wherein the world received its existence, and has its being. The common mind rests on Space as on the ultimate fact in structure, the indispensable arena of finite bodies and motion; and it rests in Time as the ultimate fact in origins, as the indispensable arena not only of bodies and motion, but also of finite minds, thoughts, and deeds. In the one it sees body and void, existence and non-existence, uniting together to point to a Creator; and in the other it sees life and death, thought and unconsciousness, action and inertness, uniting together to point to a Lord and Giver of Life.

But this acceptance of Time and Space, as ultimate facts not to be analysed, but to be built upon, which has shown itself to be the mine of the mathematicians and the highway of the common progress, is just what the metaphysicians have refused to submit to, albeit it is what true metaphysical insight would dictate as the right course. Kant formally raises the question what are Time and Space, and instantly starts aside from it, saying he will first discuss the *conception* of Space. But unable to keep either to the one subject or the other,—that is, either to Space itself or to *our conception* of it,—he replies, “Space is not an empirical conception deduced from external experience.” He afterwards adds to this negative the affirmative that it is a pure intuition.* In both

* *Kritik der Reinen Vernunft*, pp. 62, 63, ed. of 1853, Hartenstein.

these propositions one thing is obvious, namely, that the predicate is not spoken to the subject expressed, but to another subject understood. The subject expressed is Space, but the subject spoken to is *our conception* of Space. The peculiarity of two subjects to one predicate cleaves to Kant in the first place all through his discussions of Time and Space, and in the second place in many of his returns to the subject throughout his great work to which that subject is fundamental. Hence much of the obscurity and self-contradiction which have been freely censured, notwithstanding which, however, the lights breaking in at point after point, even in the most cloudy places, are real openings into the unbounded blue.

We have seen that Sir William Hamilton fell into the pit digged and left open by Kant, and defined Space, as "an image or concept," which trap Professor Calderwood avoided. Another of Kant's expressions, perhaps his most prevalent one, is that Space and Time are forms of phenomena, Space the form of external, and Time the form of both external and internal phenomena. His lead in this respect is so far followed and so far declined by Mr. Spencer, that the latter calls them forms, not of thought but of things, and *abstract forms*, describing Space as the abstract of co-existences, and Time as the abstract of sequences. His words are, "The abstract of all sequences is Time. The abstract of all co-existences is Space."* Probably Mr. Spencer means that our conception of them is an abstract conception, for it is to that his reasoning points.

Locke, who had treated of Space and Time before Kant, had avoided the perils of definition. So far from confounding body and Space, as Victor Cousin supposes him to do, he proposes that Space should be called expansion, and that the term extension should be confined to bodies. "They are as different as resistance and not resistance." The extension of body he declares to be that of solid, separable, movable parts, while the extension of Space is that of unsolid, inseparable, immovable parts. To those who ask whether Space is body or spirit he replies, "Who told them that there was or could be nothing but solid beings which could not think, or thinking beings which are not extended?" which is all they mean by body or spirit. To those who ask whether Space is substance or accident, he says, "I know not, nor shall be ashamed to own my ignorance, till they that ask show me a clear and distinct

* *First Principles*, § 62. See more fully his *Classification of the Sciences*.

idea of substance," to which he adds that "it helps not our ignorance to feign a knowledge when we have none, by making a noise with sounds without clear and distinct significations."*

Lotze, who in the main follows Kant, discusses Space at length, and his view is thus summed up: "Space and all spatial connexions are merely forms of our subjective intuitions not applicable to those things and those relations of things which are the efficient causes of all particular sensuous intuition." †

This does not tempt one any more than earlier definitions to frame a new one.

The reality or non-reality of Time and Space has been a favourite topic with philosophers. Not to go back further than Lucretius, he makes Space a thing in itself, but Time not so. The ground of this distinction is "that it is only from events which occur that our sense gathers what has been done in the past, what is now being done, and what will hereafter be done; and no one feels Time by itself separated from motion and rest." ‡ Indeed, the Trojan war was only an accident of a certain people and a certain country, and its events are clean passed away. That, he thinks, proves the non-reality of Time, and it is quite as reasonable as much of what Kant and others say, and far better said. But as to the reality of Space, the same facts prove it, for had there been no matter, and no room and Space, there could not have been any campaign, siege, or wooden horse. Actions, therefore, is his dogmatic conclusion, exist not by themselves, but matter and Space do, and actions and events are their accidents. He forgets that matter cannot exist without Space, any more than actions can take place without Time; and that therefore his principle would require him to call matter an accident of Space as well as action an accident of Time. He also forgets that, as no one feels Time separated from motion and rest, so also no one feels Space separated from matter and motion. Kant is right as against Lucretius in putting Time and Space into one category, but Lucretius is right in affirming the reality of Space, which carries that of Time. He does not reflect that if a war could not take place without Space, no more could it without Time; and that if events pass away, so do bodies. Where is the wooden horse? All of permanence he has enjoyed is due to the greater persistence of thought than of body. Had not mind kept his memory alive, but left body to sustain body, the dead would have buried the dead. As body

* See Book ii., c. xiii. §§ 12-18.

† *Microcosmos*, vol. ii., p. 615.

‡ Book i., p. 459.

is the link between place and place, bringing into correlation two Spaces which otherwise would exist in isolation, so is mind the link between Time and Time, bringing the past to life in this present, and giving work and fruit to the future ere yet it has come to pass. The reality of Space was anterior to that of Mycenæ or Troy, and more permanent as well; so the reality of Time was anterior to that of Greece and Phrygia, to that of earth, or the planets, or any given space on earth, or on other planet, and is likewise more permanent.

One favourite method of bowing a reality out of existence is to begin by saying that the universe consists of such and such things; and whereas this thing is not one of those, it is nothing. Suppose we first agree that Westminster Abbey consists only of stone, timber, mortar, glass, metal, and tiles; we can at once proceed to say that such things as design and proportion are no realities in its system, no constituent elements of its structure. Proportion, what is that? Is it stone or lime, timber or metal, glass or slate? Nay, not any of such lower things. It is an ordinance of mind, set for the ordering of all these inert bodies, ere yet they could rise from the condition of mere stuff into the higher rank of a structure. This ordinance was made in Time hidden from all eyes and inaccessible to all measures; and mind issued it forth from itself, and impressed it on insensible lumps till all answered back again, and came into a system conformed to its behests. Without proportion, there could have been no Abbey. Therefore, let us not begin by settling it that the Abbey consists absolutely only of material, for we may possibly find that there is in it also a mighty reality of mind. Without proportion no structure, without a design no proportion, without an end in view no design, without anticipation of Time to come no end in view, without utilising of Time present no anticipation of Time to come, without experience of Time past neither utilising of Time present nor anticipation of Time to come, without Time itself none of these three, and without a finite mind no such use of Time. This chain gives us at one end an agent, at the other a structure. Between them lies the condition and the means. Time is the condition of the planning of the agent and of all his operations. But it is not the only one. In Time he can conceive his end and also his means, and can devise the plans for executing them; but it is only in Space that he can execute; this, then, is a second condition. But another is dominion, for no Time or Space would enable a man without power over his own body and other bodies to make a structure. Even power over his own body and other bodies would not suffice for the rearing of such a structure as Westminster Abbey.

He must also have power to command other minds, power to make them apprehend his instructions and obey his orders. Thus not only are Time and Space illustrated in every coigne of the Abbey, but also mind, and its dominion over both subordinate mind and matter. Its dominion over matter includes dominion over form and position; and, in a measure, over substance. The glass is an instance of a new substance, the work of man, and many substances show new qualities which man has superinduced upon their natural ones. Every point in the structure of the Abbey implies design. Every moment of its existence records the persistent and controlling power of mind; so in the space of the great structure of the Universe, every point displays design, and every moment of its existence records the rule of a mighty Governor.

Locke gives a neat instance of how the fallacy of incomplete division works. To one who asks, "Is Space spirit or body?" he replies, "Who told you that there were not other things than spirit or body?" Manifestly Space and Time are neither; but that does not hinder their being the most momentous realities in the system of creation: any more than the fact that design and proportion are neither stone nor timber hinders their being more momentous realities in a structure than any stone or any timber. You may substitute for all the stones and timbers others and preserve the structure; you cannot substitute other proportions and designs without destroying it. Kant did not put the concrete cases of spirit and body, but two abstract ones. Are Time and Space things in themselves, actual entities, or only states or relations of things? * By entities he evidently means substances in which properties can inhere, and states be developed, and, of course, he means finite substances. Now, who told Kant that there were not realities, which were antecedent to finite substances; realities, the pre-existence of which was a condition necessary to the coming of finite substances into existence, as necessary as was the Space between Norwood and Hampstead for the coming into existence of London, or a clear design and fixed proportions for the coming into existence of Westminster Abbey? Lucretius also has his pair

* It is hard to translate the word *Bestimmungen*. The ordinary "determinations" is not good English, is ambiguous, and is far more material than the really good German word. Perhaps "state" comes nearer to it than "property," or "condition." The German word means a condition of things fixed, appointed, settled by voice, not by physical force. Hence, in mechanics, "determination" is the right translation, but in metaphysics, though most natural, is a misleading one, except to practised readers.

of all-comprising elements. All things consist of body or void, *i.e.*, of matter and Space; a vastly nobler conception than the familiar materialistic one of our own day, which assumes that all realities are either organic or inorganic, which may be called the philosophy of the gallipot. Now, be it remembered, he ascribes, and properly ascribes, as clear a reality to Space as to body. Moreover, he so states the relation of the two as to show that this is the reality which takes the precedence, and on which the other reality depends. "Were there no room and Space, void, as we call it, bodies could not be set anywhere, and could not move in any direction."* Thus Space is so real that motion could not take place without it, and, indeed, bodies could have no place to stand in, no place to move out of, no place to move into.

Mr. Herbert Spencer names three constituents of the system of the Universe,—matter, force, and motion. Obviously each of these pre-supposes Time and Space. The authors of *The Unseen Universe*—who, though wary of metaphysics and holding to science, have ten times the philosophical faculty of some writers who affect above all things philosophy,—take as constituents of the *physical* universe, matter and force; but, of course, pre-suppose Time and Space.

These instances suffice to illustrate the fact that whether in words men assert or deny the reality of Time and Space, or whether they, like Kant, sidle into a position of asserting their non-reality in idea, but their reality in experience,† they all as working thinkers assume their reality, and must assume it, just as the mathematicians do and must. How could matter be real, and Space, without which matter could not exist, be unreal? How could force be real, and Time, without which force could not give an impulse, be unreal? How could motion be real, and Time and Space, without either of which motion is impossible, be unreal? The reality of Time and Space is equal to that of matter and force. It is more than equal; it is a reality older and higher, more fundamentally constituent than theirs. Let us take two tests of reality, one adopted by Mr. Herbert Spencer, and the other by the authors of *The Unseen Universe*. Mr. Spencer's test is, that whatever persists in consciousness is real. Nothing persists in consciousness more than Time and Space. The Pyramids, when I took my last look at them from the heights above Bisateen, as they peaked up like opaque gables in the

* Book i., p. 426.

† Technically, their transcendental ideality and empirical reality.

lemon light of the after-glow, had more to say about Time than anything else. The test of the authors of *The Unseen Universe* is that whatever does not admit of being either added to or deducted from, in its aggregate, by our power, is real. What objects more completely meet this test than Time and Space? I do not say that either test will bear criticism; but that taking them, however exaggerated they may be as tests of reality, Time and Space stand both of them. Kant himself cannot overcome that reality. As matter of experience, he fully admits it. It is only when we ascend to "pure intuitions," and those are they into which enters *no element of experience*, that Time and Space become merely ideal. When he makes them, as he constantly does (for in that he is consistent throughout), the indispensable conditions of all phenomena, he implicitly concedes to them a reality above that of any single phenomenon. This implication becomes stronger when, without referring to Locke, Kant expands an important observation of his, saying that we can conceive of the absence from Space of any of the objects in it, but what we cannot conceive of is no Space; and that we can conceive of the non-occurrence in Time of any particular event, but positively cannot conceive of no Time. This recognises the great fact in Nature that, whatever is present here and absent there, Space is all-persistent; and that, whatever is actual now and past to-morrow, Time is ever-persistent. You may think of every house, street, and vehicle from Norwood to Hampstead as out of existence, but the Space abides. There with them, there without them, there before them, there after them, it and Time, though not even gases, are the most steadfast of all cosmic realities.

Perhaps the sharpest note of the reality of Space, half confessed by Kant with reluctance and inconsistency, occurs in the expression, "two cubic feet of Space." How would Kant give us two cubic feet of "a pure intuition"? When he tells us that Space has three dimensions, how would he give us the length, breadth, and thickness of the "subjective condition of sensibility," which is one of his most formal descriptions of Space? When he asserts that geometry determines the properties of Space synthetically, and yet *à priori*, he does not tell us how the properties could be geometrically determined of a something which is "nothing as soon as we leave out the conditions of the possibility of all outward experience, and take it as something which underlies things in themselves"?* When

* *Kritik der Reinen Vernunft*, p. 67, ed. 1853.

Sir William Thomson, seeking the lowest possible density of ether, takes a cubic mile of Space, and shows that in one cubic mile we must have at least ether enough to weigh the thousand-millionth part of a pound, how would he find his cubic mile of a "form of our subjective intuitions," as Lotze has it? When you can take of a given thing cubic feet, cubic miles, cubic leagues, and find that your length, breadth, and thickness are always secure; and when you can take nothing measurable, without first having this thing to underlie it, as indispensable to it and its activity as the floor of the stadium was to the horse, the chariot, and the race, it is not easy to admit that even ideally this thing can be made into a nothing, and very easy to assert that in experience it is one of the immovable realities. In fact, Kant's assertion that you cannot even think of the non-existence of either Space or Time is a prod of a sharp sword which lets out the gas from the arguments going to prove that ideally they are unreal. No, in idea, they, of physical things, are the two which cannot be moved. Listen to Kant himself, when not undertaking to tell us what an ultimate fact consists in; but when dealing with the ultimate fact itself as the basis of others. "Wherever and however often I may think of a cubic foot of Space, my conception of it is always identical." Does not that prove its reality and persistence in the ideal, as in the sensible world? But he continues:—"But nevertheless two cubic feet are distinguished in Space only through their positions (*numero diversa*);"* that is, they are not separated, they are perfectly united, but they are in different places. Are two "pure intuitions" or two "necessary representations," *i.e.*, mental images, in different places? Again: "One part of Space, even though perfectly similar and equal to another, is nevertheless outside of it, and by that fact is separate from it."† How can two parts of a "pure intuition" be one outside of the other and separate in space from one another?

From the gross reality of solids we are led to the finer reality of liquids, from that to the rarified reality of gases, from that to the subtle reality of forces, from that to the super-sensuous reality of ether, from that to the immaterial reality of Space and Time, from that to the potent reality of spirit. As grossness diminishes, significance in the system of universal structure increases. Rock is real, but cannot move itself; forces are real, but cannot either begin their own

* *Kritik der Reinen Vernunft*, p. 254.

† *Ibid.*, p. 243.

motions or terminate them; ether is real, but cannot either think or act; Time and Space are real, but cannot either design or fashion; spirit is real, and even as finite spirit can move, can originate motion, can design, can fashion, can rule. Time and Space are the one groined archway, through which we look from the world of bodies away into that of infinite and eternal spirit, from things which are made, moved and governed to that which designs, and creates, and orders things in their courses.

Our consciousness of existing in a passing NOW and in a circumscribed HERE is always attended by the experience that neither the foregoing Time by which our NOW is bounded on the one side, nor the following Time whereby it is bounded on the other, ever discloses a limit. The same experience attends all inquiry for an end to the Space which environs our HERE in every direction. Thus, from the first moment of reflection, we are placed under the tuition of a system which marks out ourselves and our sphere as representing finites in the midst of the infinite. One idea never presented to us in nature, but only in the speculations of men, is that of finites without an infinite. For ourselves it is only at one pin's point, as it were, of the universe, that we are present; and in all the rest we exist not. Yet, with that vast expanse where we are not, our connexions are manifold and vital. So also it is only at one moment of eternity that we are thinking, feeling, or acting; the past has ceased to be, the future has not begun to be; yet in that past are all the roots of our being, and in that future all its issues.

Body everywhere is confronted with the absence of body, motion is always alternating with intervals of rest, and in the higher realm of mind consciousness alternates with periods of unconsciousness. Now, whether it be the alternate solid and void, the alternate pulse and pause of motion, or the alternate consciousness or unconsciousness of minds, the opposites do not clash as in chaos, nor yet do they mix confusedly like water and earth in a gutter, but they combine into an order, like dry land and sea. The alternation of body and space is structural, that of the arc of motion and the node of rest is functional, that of consciousness and unconsciousness is functional in a nobler sphere. Take the interspaces in the wing feather of a hawk, or those in the shell of a nautilus, or those in the solar system,—in each instance they are as clearly structural as are the interspaces in Westminster Abbey. If it be said that what is not matter cannot form part of a structure, all we can say in reply is that bad metaphysics must give way to good facts. The interspaces

are an essential part in a system of structure. The term "structureless" might be worse interpreted than by saying that it describes a body without ordered interspaces. Change the interspaces in the eye, in a honeycomb, in a bell, or in a microscope, and the utility of the solids is destroyed.

Between world and world the interspaces spread out into chasms which the imagination cannot comprehend, and yet, in experience, those chasms are found not only to be consistent with common action as members of one system, but to be themselves part of that system. Between finger and finger of the same hand, between mote and mote of the same dust, between molecule and molecule of the same metal, interspaces mark off the individual. They constitute in every case breaches in material continuity; but wherever there is a structure the order and arrangements of those breaches is an essential part of the structural design. We may call these interspaces void, pure space, empty space, but under any name we must bear in mind the fact that they are an essential part of the system of structure. The immaterial Space may extend over the thousandth part of a hair-breadth, or over a thousand millions of miles; but in either case in it reigns a design common to the bodies and the voids which are combined in one system. Design pervades the bodies, design pervades the interspaces, and both bear witness to the control of a common mind, supreme over tangible and intangible alike.

When in the midst of a great chasm of space a solid body appears, whence came it? The space had no more tendency to produce either planets or atoms than has the air to produce birds or eggs. Well suited as is the bird to the air, and the air to the bird, they are not the authors one of the other. The surrounding air does not more clearly mark out the bird as a finite creature, than does the surrounding interspace so mark out the largest globe, as well as the invisible molecule. This defines matter as being not a unit, but a countless host of atoms existing individually, and related to one another across ever-recurring breaches of continuity; thus matter not only lacks infinity, but has not continuity, and yet the breaches of material continuity are not necessarily destructive of connexion, but are often made the means to a higher form of inter-relation. In the words of Bacon, matter is "an army of infinite small portions or seeds."* No number of finites can make up an

* Works, ii., 290, ed. of 1824.

infinite; and things which are at every point ending and beginning cannot be things which themselves had no beginning.

Not less clear than the mark of finite set by interspaces on the nature of matter, is the mark set by them upon it of dependent. Neither molecule nor planet exists for itself. The very interspace which displays the individuality of each particle or each world, while preventing contact, provides for intercommunication. Across it are maintained interdependence and interaction; for no world suffices for itself, and no particle exists without contributing somewhat to the general plan. Interdependence and interaction across interspaces are kept up, in the absence of material continuity, by currents of force. Every chasm is crossed by invisible, intangible, inaudible strings of touch which hold now world and world, now mote and mote, in practical relations. Not one hand-breadth of space can we select but is crossed by operative action and reaction. No more can we in the "army of infinite small portions" select a particle which supports itself, or one which in moving does not keep step with the others. The unity of a battalion is not maintained by material continuity, nor does the separate individuality of its component parts destroy its unity; but it is a higher unity, unity by ordinance of mind, not by cohesion of body; by oneness of design, not by a single centre of physical force. Rising from a battalion to an army, we find that a single centre of mental and moral force can, by a slight motion of the lips, set a hundred thousand centres of physical force in timed and ordered movement, and that, in its turn, each of these does with a number of inert bodies whatsoever it wills, or even with the body of an animal.

Whether the atom be a hard and indestructible solid, as Lucretius has it, or a vortex, as Sir William Thomson with great show of reason has it, it is pre-eminently a centre of force. Not more distinctly does each mind contain its own store of powers, fitting it to act and be acted upon, than does each atom. In Herschel's words, which have been a light to me ever since I was a boy, it is "a manufactured article." But it is not manufactured for solitary existence any more than are hooks and eyes, or buttons and buttonholes, or valve and cavity in a pump. As clearly as each of these declares itself originated to fit to and work with the other, so clearly does each atom declare itself made to work with others. By one set of qualities it sends out impulses, by another it receives impressions. It is made for combined action.

Every atom is a platform of forces, with its departure and

arrival side. What those forces consist in, it is as impossible to say as it would be to doubt their reality. Lucretius ascribed cohesion,—and I suppose adhesion also, though I do not remember that he distinguishes between them,—to the fact that certain kinds of atoms were made with hooks. But if Sirius, without any hook, can fix my eye upon him, some finer tie than a hook may link particle of gold to particle of gold, and particle of oil to particle of oil. Whatever cohesion comes from, it takes but short steps. A little way off and it is no more effective. So also with adhesion. Let the putty, the glass, and the wood be one inch apart, and they will never adhere. No Space will avail always to keep asunder two bodies moving towards one another, but the least Space will permanently keep asunder two destitute of motion. Now, suppose that all forces were short range, like cohesion and adhesion, then interspaces would be blank gulfs, untraversed and impassable. But matter which cannot either move itself or stop itself when once moved, shoots out from itself something, we know not what, which acts farther off than either adhesion or cohesion, or yet chemical affinity,—something which acts across appreciable and even considerable interspaces,—for instance, magnetism. This operates not promiscuously on all bodies alike, but discriminatively, producing its characteristic effect only on some. But at distances far beyond those to which the action of a magnet can be traced, we find heat and gravitation effective. Is gravitation body or spirit? Is it organic or inorganic?

If you only adopt the favourite method of saying that it must be some one of a few things, you will easily prove that it is nothing at all. Fifty stronger arguments than those of Lotze or Kant to prove the non-reality of Space might be constructed to prove the non-reality of gravitation. On the principle of Democritus, of “either body or void,” of course it is nothing at all; for it is not body and it is not void, any more than a letter is either a writer or a distance between writer and reader. But as the letter is a link of communication between mind and mind across an interspace of a mile or a thousand miles, so is gravitation a link of communication between body and body across gaps of any dimensions. At every point in Space, its crossing-lines, all well laid and well trodden, raise the question, “Who laid down these lines, and who keeps them up?” The whole traffic of creation depends upon them, yet are they as invisible to Stephenson or Lesseps as were the rays of the evening star to blind John Milton. Yet it is not of so much consequence to us here in London that the crossings at all the junctions should be kept

right as it is that nothing should go wrong at any point in Space where line and line intercross, as they do at all points ; for any failure there, and we, our traffic, our London, our globe, were all undone in one collision.

Finite, then, and dependent, matter is also marked out by the interspaces as combined. Just as the individuality of its particles proves that they are not self-originated, and as their inter-dependence proves that they are not self-sustained, so does their co-operation to common ends prove that they are related to what lies beyond themselves in Space, and what is future in Time ; and that, consequently, they are directed from some common centre of order. The position of every molecule relatively to its own mass is strictly ordered. That of every mass relatively to every other mass is also strictly ordered. In the march through Space each mote and each constellation follows a line laid down, and proceeds at a pace measured and timed. The lines are dispersed over incalculable distances ; the paces are various beyond count ; the objective points are unknown to the separate columns ; yet, in all the host, the throb of progress and the interval of rest keep time,—time divided as by One able to make much of the millionth part of a minute ; and every courser steps to notes of a silver bugle too fine for mortal ears.

Bacon ranks among things of the utmost incredibility the supposition that “an army of infinite small portions or seeds, unplaced, should have produced this order and beauty without a Divine marshal.” Yea, verily ; such numberless individuality, such close inter-dependence, such complex combinations, without a common seat of direction, would be a chimera of imagination so grotesque that, in Bacon’s words, a few sentences earlier than those just quoted,—“I had rather believe all the fables in the Legend, and the Talmud, and the Alcoran, than that this universal frame is without a mind.”* “Unplaced” is one of Bacon’s much-meaning words. A great army of individuals unplaced would be a great mob. Yet the materialist is in this double perplexity ; in the first instance all particles were unplaced,—were, he thinks, self-existent. Democritus himself assumed that whatever is one is necessarily self-existent, and as the atom is one it is self-existent. I should reply the egg is one, and is therefore self-existent. But these same materialists have to teach that in practice the entire value of things depends on how they are placed. We find them placed as they are, and the materialist sagely

* Works, ii., 291.

instructs us that the difference between one substance and another is a mere difference in the distribution of their particles in Space. Therein lurks the ordinary fallacy of a half-truth. It is not a *mere* difference of distribution. The distribution is by rule; the difference is one responding to a conception. Attempt to make particles of hydrogen and oxygen in equal proportions constitute water, and you will learn that they are placed, that there are certain positions into which you cannot put them, and others out of which you cannot keep them, if given conditions arise. The law of definite proportions has settled the question as to whether atoms have qualities, and shows that their qualities do not, as Democritus thought, wait for combinations to originate them, but that combination has to wait obediently upon pre-existing qualities, as it cannot take place except in conformity with their requirements. A conception of mind imposed on matter had anticipated future Time, and ruled future combinations in Space. Just as a conception of mind imposed on thread, loom, and shuttle anticipates future Time, and determines how in Space warp and weft shall combine. Or as in architecture, a conception of mind imposed on a stone will compel it to fit in at a certain part of an arch, and not fit at another.

Now the alternative of this view is that of the materialists, who, however the metaphysical setting of their atoms may vary, have to face the fact that the atoms are all finites, and that Space demonstrates them so to be; and also that they are all inter-dependent and fitted for combination, not in mere series, but in fixed proportions, and after pre-determined rules. They must hold that this pre-determined order is itself a birth of chaos, and not the offspring of design. No one is abler, ancient or modern, than Lucretius, and no one more honest. He faces his own theory, which is what few modern materialists have the courage to do. There was no god, no mind, no original order, or congenital qualities of things. Atoms and Space had existed from eternity. Atoms had been driven in perpetual motion. They came into collision. After many collisions things came right. The world arose, life began. It was all by *spontaneous* action of the atoms, all the work of nature. He never hesitates, lest any one should ask what is nature, what is the *sponte sua*, the free will or the own accord of an atom that has no qualities? What is the force to drive atoms about in Space, when there is nothing else in existence save atoms and Space only? On the contrary, he strains words to express the idea of mindless movement, and issues without foregoing design. Bacon evidently had in view his language when he spoke of seeds unplaced, "seeds in

number numberless and sum unfathomable fly about in manifold ways driven on in ceaseless motion this world has been made by nature, and the seeds of things chancing spontaneously to clash,* after being brought together in manifold wise *without purpose, without foresight, without result*, have at last combined in such masses as, suddenly thrown together, became on each occasion the rudiments of great things, of earth, or sea, or heaven, and the race of living things.”†

A favourite illustration of the philosopher who thus slightly constructs us and our “environment,” is that of the letters of the alphabet, which being so few, supply all the words of his poem merely by occupying different relative positions in Space. This crowning proof he repeats several times; but not once does he inform us that Space and the alphabet having been left to themselves evolved out of their *sponte sua*, their own free will, a wind blowing equally on all sides which drove the letters about; that they, so driven, chanced to come into collision, and repeating clash after clash did not, as might have been expected, seeing that they had no pre-established affinities, clash themselves into super-chaotic chaos, but instead thereof, without purpose or foresight, clashed into nouns and verbs, cases and tenses, particles and propositions. Nor does he tell us that thus aimless and mindless they had, in addition to the arrangement of themselves in Space, so come to preconceive Time as to bring in short syllable and long, stress and pause, in due alternation, thus anticipating the tendency to rhythmic movement in the reader’s voice, and the love of timed “numbers” in the hearer’s ear, as they had already by their arrangements in Space anticipated and prepared for his eye and his understanding.

We come upon a deep if not a fathomless mystery in human nature when we see a man of large and luminous genius bending over his pages, by forces of thought giving birth to what had never before been, by lights of mind foreseeing both the movement of his own intellect and that of other intellects, fore-arranging symbols composed of lines and voids, lines often inclosing interspaces, so as to evoke in other minds thoughts never there before, thoughts of Time and Space, of matter and intellect, of gods and men; so as to evoke now images of coarsest animal passion, and now ideas of profound philosophical import; and so, moreover, at the same time to lead the voices of others through rhythmic movements, and to regale their ears with harmonious numbers;

* “Sponte sua forte offensando semina rerum.” Book ii., 1059.

† I here use the translation of Mr. Munro, and underline some words,

and yet, he who does all this, seizes upon the process as one which shows how the letters did it all.

He forgets mind. Yet mind did it all. He wants to exclude God from creation, and excludes man from his own handiwork. Mind made the letters. Mind fixed upon the form of each so that the individual elements were unchangeable. Mind fixed their combinations so that permanently certain groups formed new individuals, composite but compact. These composite individuals, or words, mind assorted, as previously it had assorted simple individuals or letters. Then mind again grouped these individuals into higher wholes, called sentences, and so forth. Yet mind is the one element omitted in the argument. The clay is the power and the potter is forgotten. Thus are so-called systems formed by eliminating the one element which controls all the others.

The limits of this paper have not permitted of more than a mere glimpse at the range of subjects opened up by the contemplation of the interspaces, and have not permitted even of entering upon the corresponding subjects which have been indicated, namely, the intervals of Time in alternations of motion and rest, and those of consciousness and unconsciousness. Under these are comprised the two branches of inorganic and organic motions. The class of inorganic motions embraces *motions of transport*, in which a mass not only changes place, but carries with it other bodies; *motions of transference*, in which a mass merely changes its own place; *motions of transmission*, in which a mass remains stationary, but receives and transmits a wave of force; *motions of emission*, in which a stationary mass throws off particles of its own substance; *motions of impulse*, in which a mass imparts to an external substance a wave of force, which wave that substance passes on; and, finally, *motions of attraction and repulsion*, in which one body draws another to itself or pushes it off from itself. Under the class of organic motions we have the two great branches of voluntary and involuntary motions, extending from the movements of growth up to the planned actions of an intelligent agent, and then on from him to the artificial movements of tools, implements, and machines. In all these, when brought under patient survey, it will appear that what I before said holds good,—the opposites of motion and rest do not clash as in chaos, and do not mix in disorder, but harmonise on a system responding to a pre-conceived ideal, and pointing to an anticipated use.

How clearly Lucretius recognised the fact that in all processes which come within the range of human experience forms and events answer to a pre-conception of mind, becomes

evident when, in speaking of such a simple experiment in Time and Space as what we call walking, he says :* "No one begins to do anything until after his mind has foreseen what it aims at." So teaches experience, absolutely so. No experience of man's work shows us ordered arrangements in Space or ordered events in Time, except as they respond to a pre-conception. Absolutely no experience has ever been had of a case in which things having no nature to begin with, clashed themselves first into a nature, and next into an order. To us the printer's types are an apt illustration of the atoms; and to conceive of the types as originally so many pieces of shapeless metal, clashing themselves first of all into *a*, *b*, *c*, and *d*, as a preparation for other performances, exceeds surely the self-command even of a materialist. It is only in a region beyond the limits of all our experiences that such unfledged fancies can dream that they take wing.

Let him look at each letter, and then say if, in every case, the conjunction of interspace with body is not structural, and if structure does not point back to proportion, proportion to design, and design to an intelligent agent.

The illustration of type was not, of course, present either to Lucretius or his precursors. To them the letter formed under the hand as a direct act of mind. To meet their theory, pen, ink, and paper were all the pre-requisites to writing; the scribe was a superfluity, an agent too much. Thomas Moore, in one of his satires, gives a letter of a young lady describing the preparations for her father's great poem; he had pens, ink, and paper, many accessory facilities, "in short, everything he has that a poet can want except words and ideas." Now, ideas are just the elements with which materialism dispenses. But they are the elements which all experience tells us are the governing ones. Therefore, as standing in one spot of Space, we look above, below, before, behind, to the right hand, to the left, and feel that on every side the end is nowhere, and the Infinity everywhere, we ask, can Infinity mean nothingness? can extension reach beyond being? And as breathing in our one instant of Time, we look behind and before, and see that the end is not in either and the Eternity in both, we ask, can Eternity be nothingness? Can duration last beyond being? No; every hand-breadth of space records the work of a Maker, and every tick of Time speaks to the presence of a living Preserver.

* Book ii., 883.

The CHAIRMAN (Mr. D. Howard, V.P.C.S.).—We have to thank the writer of the paper for the profound study of which it is the evidence. There are a good many people who say, What have we to do with metaphysics, and what have we to do with Lucretius? The best answer I know is, What *have* we to do with them? The very people who say, What have we to do with metaphysics?—as a rule before very long, will proceed to indulge in metaphysics without being aware of it, and therefore will indulge in them with no more chance of success than a painter would have of painting if he did so without being aware that he was painting. So a metaphysician who begins by despising metaphysics will not be very successful in his work. The study of thought, or the study of mental processes, is surely not rendered unnecessary by the study of physical science, of which we are so proud, but of which little enough was known to Lucretius. Yet you will find, in what purposes to be the result of modern scientific study the ideas of Lucretius repeated with marvellous exactness; so much so, that one wonders if men who write books on metaphysical subjects have ever remembered that Lucretius has written before them. Had many modern writers of the agnostic school read Lucretius, it should have saved their writing, for a good translation would have been all that they needed to give to the world. These studies are just as necessary to us as they were to Aristotle. Indeed, the idea of metaphysics,—that which comes after the physics in the scheme of Aristotle,—is perhaps more needful to us than to Aristotle. Much of what we are pleased to call physical science is not physics, but metaphysics. You never get an elementary treatise on scientific subjects without finding yourselves at once landed in metaphysical subjects, and metaphysics, not known to be metaphysics, are of a most doubtful character. Take the assumption which the author of the paper has contended against, take the illustration he gave as being evidence of a Divine power behind them, and we find those very facts of time and space used as an argument against the Creator simply because the writer of such an argument has never remembered that before talking of time and space he should have tried to understand what time and space are. I hope those who have studied this subject will give us the benefit of their remarks.

Rev. Professor W. F. SLATER.—I should be sorry to think that the visitors to-night would maintain absolute silence after the very eloquent paper which has been given us through Mr. Arthur's kindness, upon subjects which are more or less interesting to all. I do not profess to be able, just at this moment, to review practically or scientifically the discussion of this wide subject. As the paper has proceeded I have observed one or two matters which might be open to remark. The criticism of the various systems of Philosophy has been full of enlightenment. It struck me, from my slight acquaintance with Kant's views of time and space, that he was open to the criticism which Mr. Arthur advanced; namely, that he was in danger of the confusion of these two things as they are in themselves with our ideas respecting them. At the beginning I thought that the essayist was intending to set before us a system of dualism,—that he was about to assert

that for us time and space were both finite and infinite, but, subsequently, the opinion was advanced that matter must be regarded only as finite. On this point my mind is somewhat doubtful. The great question of metaphysics is whether unity of thought upon these subjects is possible. The metaphysician may be right when he asserts that his general conceptions are real ; but can we say that the physicist is not right when he asserts that, so far as our knowledge and reasoning go, the material system is practically infinite? However, all will allow that the essayist has brought into the service of his exposition a very abundant mind, and that his essay furnishes glorious illustrations such as are too seldom found in metaphysical disquisitions where the reasoning goes straight on without such assistance. Those given to-night have illuminated the whole track of thought and have enabled us to see most clearly the drift of the writer.

The CHAIRMAN.—It is always a great disadvantage to the discussion when a paper is very thorough and very true, while if an author indulges in some grand defect there is generally a pretty lively discussion ; and I feel this evening that the paper has been so very thorough in its treatment of a very difficult subject, that it has, as has been well said, perhaps been rather hard for others to join in after so admirable a treatise. It is a subject on which, I believe, the more we think, and the more we really go over this paper, the more we shall value the thoroughness of it. I believe more and more in the importance of these questions. We have everything to gain, and nothing to lose by going to the very bottom of the subject. I do not consider that the Christian thinker need, in the least bit, fear *depth*. It is *shallowness* which is the great, terrible danger, and the very danger of much thought in the present day lies in its shallowness. When we consider how marvellously clear, how marvellously profound the scepticism of Lucretius was, and yet how little did it avail against those whom he would have called ignorant men, unworthy of the name of philosopher, against whom he was then pitted ; we may, I think, trust that in the future, as in the past, the truth will not suffer from profound attacks any more than from superficial attacks. The truth will not suffer from superficial attacks, but the thinker may, and it is in the superficiality of modern thought that lies the great danger. I am sure we welcome with great heartiness so thoughtful and deep a paper, and I will ask you to join in a most cordial vote of thanks to the author on this occasion.

The AUTHOR.—I must acknowledge the great kindness shown, first in the patience of the audience, and secondly in the toleration of the observations made. I confess I felt rather afraid in dealing with the subject, not that the fear was of this kind, that I was going where I did not know my way, because I confess I have long thought upon the subject, and I felt I knew where I was going ; but, on the other hand, I knew that it was a subject that was not likely to be very taking. In regard to an observation as to infinite matter, the word "infinite" is used in so many senses. Generally speaking, it only means indefinite. When you speak of an infinite series of numbers, of course that has nothing to do with infinity

at all, except that you never get to the end. Infinity, to my mind, is a word that includes all fulness of everything and that excludes all possible breach of continuity. What is a series of numbers but simply a series of breaches of continuity? The moment you admit a breach of continuity, infinity proper is gone, utterly gone, and the whole question of infinite matter is settled by this other question, Is there any breach of continuity? If there is, then infinity in the proper sense there is none, though in the popular sense there may be. So far from looking upon this as a complete paper, it is a very dry abstract of a rather lengthy study. I thought at one time that I would probably confine myself to giving a series of Kant's views, with arguments upon them; and then I thought I would do the same with Lucretius; but I found that either would be too cumbrous, so I put together as well as I could in haste, at the last, certain abstracts from careful hard work. I was reminded as I sat here of what I believe were my earliest meditations upon this subject. I was a child, perhaps five years of age, and was being led down in the glens of Antrim to the shore to be bathed, and I wanted to know something about the ships that were in the offing—where they were going to? I was told that some were going to Belfast, some to other places, and some to the end of the world. I asked, "What is the end of the world like?" I do not remember the answer, but I know that whatever it was it called out the rejoinder, "I want to know what it is like; do the sky and ground break off both together, or does the ground break off, and the sky go on?" I do not remember the answer, but I never forgot the controversy, and it shows that even in childhood the mind is filled with these conceptions, and that in childhood it was easy to conceive of an end of things below, but not easy to conceive of an end to the things that are above.

The Meeting was then adjourned.

ORDINARY MEETING, MAY 7, 1888.

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

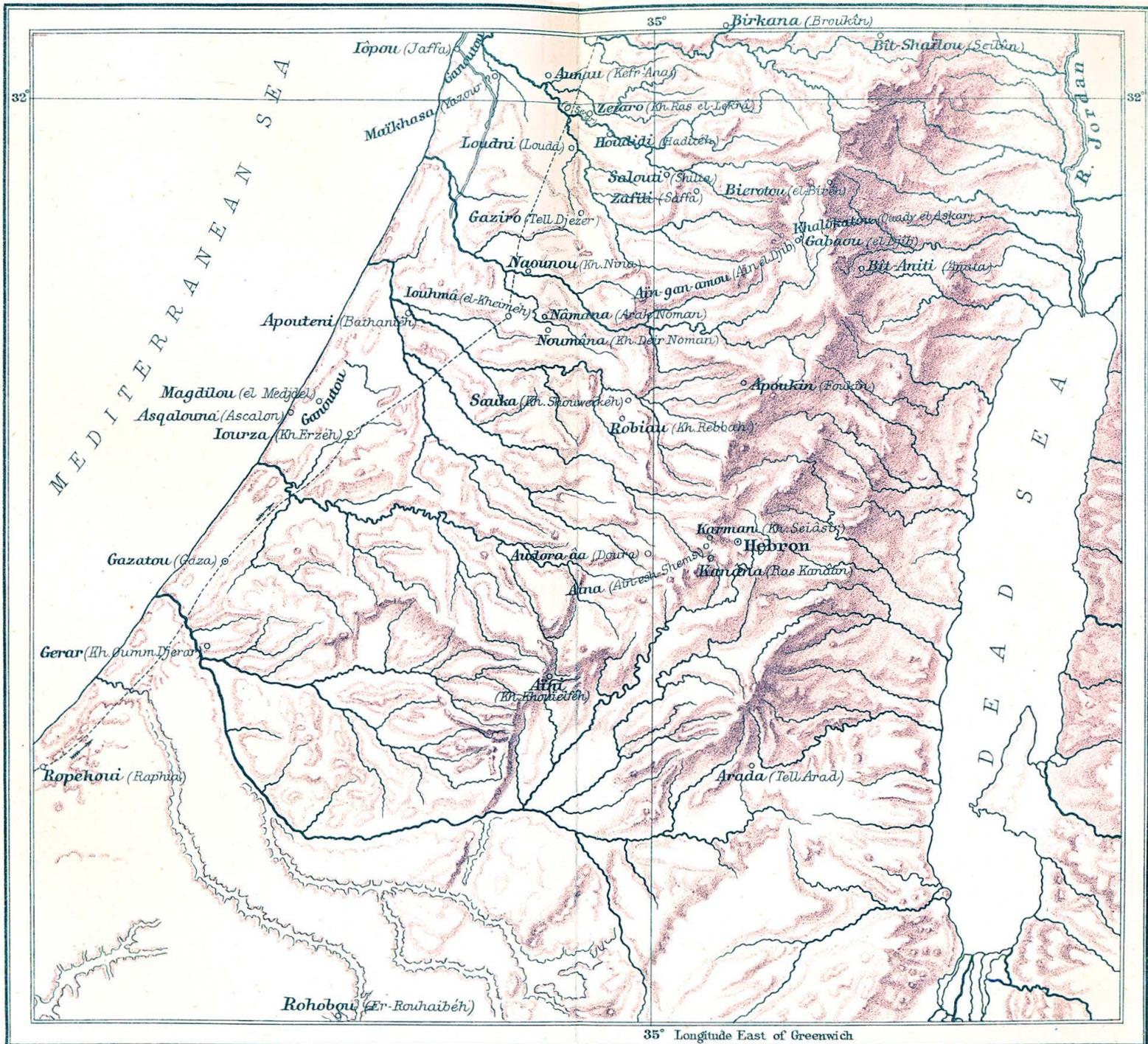
The minutes of the last meeting were read and confirmed.

As M. Maspero was unable to be present, owing to duties at the Collège de France, in Paris, the Rev. H. G. Tomkins read the translation which he had made of M. Maspero's paper.

Rev. H. G. TOMKINS, before reading his translation of M. Maspero's paper, said: "As it was found that M. Maspero would not be able to attend here to-night, I have had great pleasure in preparing a translation of his paper, which is an addition to the former one written by the same author, and I wish to explain more fully the bearing of these Karnak lists on the general inquiry into the history of the ancient peoples and places referred to. I should say that these lists, not alone of Palestine, but the more extended list of Syria, and, in addition, the very important lists of Kush and Arabia, have formed my special study for the last half-dozen years, and I may add that I had the honour of bringing forward a good deal of expository matter in connexion with the subject at the meeting of the British Association in Manchester, when I explained the fine collection of casts from Thebes,—casts of ethnic types of the races known to the Egyptians, and brought over here by Mr. Flinders Petrie, who has so greatly distinguished himself in Egyptian exploration. Therefore, I cannot say I am unacquainted with the subject. I lately submitted to the Society of Biblical Archæology my investigations of the Palestine list, as well as the list of places in Northern Syria; and I shall be glad to answer any question it may be within my power to afford information upon. In the meantime, I wish to mention what is significant of these lists, namely, that they were discovered by the late lamented M. Mariette, the great head of the Exploration and of Egyptian Archæology, under the late Khedive; and in connexion with M. Mariette's name I would say that these matters first became subjects of popular interest in England on the occasion of the Great Exhibition of 1862, when many of us were attracted to the gallery of the building to see the splendid and

unique collection of jewels that had belonged to an Egyptian queen, which had been sent by M. Mariette from the Bulaq Museum. That was when M. Mariette's name first became known to many of us in England; and subsequently, as you all know, he became most distinguished as an Egyptian Archæologist. In uncovering the walls of the magnificent hall of Karnak, at Thebes, he displayed, and, for the first time, rendered available, the geographical lists of Karnak,—lists which are of the very highest importance, both in their geographical and ethnographical relations, and, indirectly, in regard to Biblical study. When I tell you that they contain 119 names of places in Palestine, and that all of these were sculptured in Karnak long before the Exodus,—we may say, nearer to the time of Joseph than to that of Joshua,—you will at once see how very important this document is—a document which I will call a “tribute-list” of the places in Palestine of that greatest of all the Pharaohs, Thothmes III. We thus began to be influenced by M. Mariette, and those who have studied the geographical lists of Karnak know that he did much to clear up the matter; but there still remained a vast deal to be done, and M. de Rougé and the late M. Lenormant did a good deal, while there are others who have also thrown more or less light upon the subject. Then, as a matter of course, the question came before our own estimable staff of the Palestine Exploration Fund: but it is to be regretted that up to the present time there has not been that thorough collaboration of Egyptologists, on the one hand, and of survey officers and travellers on the other, which is necessary to bring about the proper focusing required for throwing all the light it is possible to get upon the questions at issue. In order to bring this about we ought to encourage, by all means, the sound and valuable work of such men as Professor Maspero in the contribution of elaborate and learned papers like that which is now offered to the Victoria Institute. We desire to bring, as tribute to the study of God's Holy Word, all the spoils of the ancient world, and many other things which I will not stop to explain, as I know that the imagination of my hearers will easily fill up the gaps. The immense value of all this monumental evidence is now beginning to be appreciated for the first time. With regard to the particular things referred to in this paper, you will see, as I go along, the perfect similarity that exists between these hieroglyphic names and the Biblical names. When they are transliterated into Hebrew, a number of them are found to be

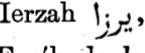
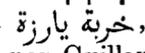
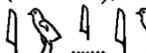
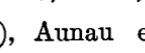
simply the names that stand recorded in the Book of Joshua and elsewhere in the Old Testament. Of course, we have to consider the geographical order in which we find the names, and that is a matter of elaborate inquiry; but we find them in connexion with the military events with which they are associated. They are in reality the names of tributary places in Palestine and Northern Syria; but this evening we are concerned with the southern part of Palestine alone. They are in connexion with one particular campaign,—the celebrated campaign of Megiddo, where Thothmes, by great good fortune, having by forced marches, by splendid enterprise and valour, and by indomitable pluck, against the advice of his own staff, come upon the enemy on the plain below the walls of Megiddo,—wherever Megiddo may have been,—and there and then beaten them hollow, and shut them in, as Alfred did the Norsemen, and starved them into submission, said, in the plenitude of his enthusiasm, “It is as good as taking a thousand towns to have taken Megiddo”; and I dare say he was quite right. He had all the places in which he had achieved his victories enrolled in these 119 names. The paper begins outside the borders of Palestine altogether. We begin with Kadesh on the Orontes, the headquarters of the Hittites, and then Thothmes enrolls the names in order. But in what order, we must ask? In geographical order or not? I cannot go fully into this to-night; but you will easily see that the question is in the first place one of military strategy as to what line the army of Thothmes took. How far did they deviate from the direct line of march? These are interesting matters to inquire into. Then we come to regard the matter from the Biblical side, and ask, How many of these are presumably Biblical names? The answer is, a very large portion of them; and as we go more microscopically into the matter, the more do we find the Bible at the bottom of it all. I need not explain to Biblical students how deeply interesting it is to find one after another of the Old Testament names, and some of the New Testament names, which have only to be transliterated from hieroglyphs into Hebrew, and there they stand exactly as they are in the Bible. I hope I have made clear, although in this rapid manner, the value of these particular studies to students of the Bible. I will now read my translation of M. Maspero’s paper, only premising that, while his former contribution as to the names on the Karnak list related to Galilee (*Victoria Institute’s Journal*, vol. xx.), the present paper deals with names referable to Judæa:—



MAP TO ACCOMPANY A PAPER PREPARED BY M. MASPERO FOR THE VICTORIA INSTITUTE.

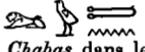
March of the Egyptian Army.

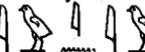
**SUR LES NOMS DE LA LISTE DE THOUTMOS III.
QU'ON PEUT RAPPORTER À LA JUDEE.** Par
G. MASPERO.

LES cinquante-neuf premiers noms de la liste de Thoutmos III. se rapportaient à la Galilée, au moins pour la plupart. Avec le No. 60 commence l'énumération de localités qu'on peut attribuer à la Judée. Le premier groupe, de  (No. 60), Iarza, à  (No. 68), Iouhmâ, comprend six noms qui ont été identifiés d'une manière à peu-près certaine: , Iarza avec Ierzah , Kharbét Iarzeh  خربة يارزة, de Guérin, Kharbét Erzéh de la carte anglaise, par Guillaume Rey* et par E. de Rougé,†  (No. 62), Iapou, Iopou, avec Joppé,  (No. 64), Loudni, avec  لڨ, Loud, Louddah, par Mariette,‡  (No. 65), Aunau et  (No. 68), Iouhmâ, avec  اونڨ, Ono, aujourd'hui Kefr 'Ana, et el-Khéiméh,  الحيمة, par F. de Saulcy,§  Sauka (No. 67), avec Shokoh de Juda par Mariette, qui nia toutefois l'identité

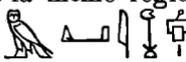
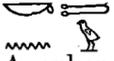
* *Étude topographique de la tribu de Juda*, p. 121.

† *Étude sur divers monuments du règne de Thoutmès III.*, p. 54.

‡ *Les listes géographiques des pylones de Karnak*, p. 32. Le  n, final, qu'on trouve à la fin de ce mot et de plusieurs autres noms géographiques transcrits par les Égyptiens, me paraît être le suffixe de l'éthnique:  Loud, la ville de Loud,  Loudn[i], l'habitant de Loud, le Loudien.

§ *Lettre à M. Chabas dans les Mélanges d'Archéologie Égyptienne et Assyrienne*, t. i, pp. 98-99, pour la discussion de la valeur du groupe  dans  Ono-gasa, et pp. 122-123, pour Iouhmâ. Le sens d'Ono une fois reconnu par de Saulcy dans les composés, Mariette n'eut plus qu'à l'appliquer au groupe  isolé, quand il le découvrit en 1875 (*Les listes géographiques*, p. 32).

de ce nom avec celui de  Shauka qu'on trouve dans la liste de Sheshonq.* Je crois, quant à moi, que les deux noms ne font qu'un. La présence de  s, au commencement de l'un, et de  sh, au commencement de l'autre, loin d'être un obstacle, n'est qu'une confirmation d'un fait intéressant pour l'histoire de la région. Sous Thoutmos III et sous les Ramessides, la sifflante prédomine dans les mots comme Astarté, Ascalon, Dimasqou, Sauka; si on trouve, sous Sheshonq, une shuintante à Shauka, c'est que, dans l'intervalle, les Judéens avaient envahi la contrée et avaient imposé leur prononciation grasse, *Shoko* pour *Soko*, *Ashqalon* pour *Ascalon*, *Ashtoreth* pour *Astarté*. Il y a une notion de linguistique à tirer de l'orthographe double des monuments égyptiens, non pas une différence de site géographique.

Les six noms connus nous transportent, soit sur la lisière de la plaine Philistine, soit dans cette plaine même. Je chercherai donc dans la même région les trois localités de site encore incertain:  (No. 61) Mâikhasa,  (No. 63) Ganoutou, et  (No. 66) Apouken, Apoukni. M. de Rougé† a montré que le premier est la transcription exacte de , *refugium*, de la racine , *fugit, confugit*, ce qui nous permet d'écarter sans rémission un rapprochement avec la ville de , Makkaz, proposé par Mariette.‡ La place que Mâikhasa occupe immédiatement avant Joppé semble indiquer un site voisin de cette ville, mais aucune carte, aucun récit de voyage ne me fournit un nom que j'ose rapprocher du nom antique.§ A

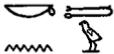
* *Les listes géographiques*, p. 33.

† *Études sur divers monuments*, pp. 54-55.

‡ *Les listes géographiques*, p. 32. M. de Rougé avait repoussé virtuellement cette identification, en n'admettant point que le bourg égyptien Mâikhasa pût être comparé au village moderne de  Makass, le   de l'Égyptien n'ayant aucun rapport avec le  de l'arabe. L'objection qu'il fait à Makass est d'autant plus valable contre Makkaz, qu'à l'impossibilité de rapprocher le  de  se joint la difficulté de retrouver le   de l'Égyptien dans le  du nom hébreu.

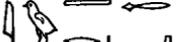
§ Le site de Mouhassir ou Kharbét Dêir Mahsen, que j'avais proposé (*Zeitschrift*, 1881, p. 127) d'après Guérin (*Judée*, t. ii, p. 32-33), nous transporte trop loin de Joppé.

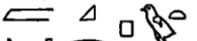
défaut d'autre renseignement, la signification de *refuge* qu'avait Mâikhasa, m'inspire une hypothèse que je donne pour ce qu'elle vaut. Joppé était le seul port de la côte. Le commerce de la Syrie Méridionale y passait en grande partie, et plusieurs routes y aboutissaient qui y conduisaient les produits des montagnes de Juda et d'Ephraïm. Ces richesses devaient être une tentation perpétuelle pour les populations nomades de ce temps-là, comme les bandes de pèlerins chrétiens l'étaient pour les Bédouins des siècles passés. Les maîtres musulmans du pays avaient jalonné le chemin qui va de Jaffa à Jérusalem de tours de garde pour la protection des marchands et des dévots. Le mot Mâikhasa מַיְחָסָה pouvait désigner un *refuge* établi de très haute antiquité dans le voisinage de Jaffa, à l'usage des voyageurs, et autour duquel un village se serait formé. Si cette hypothèse est exacte, il faudra chercher l'emplacement aux confins de la banlieue de Joppé, sur l'une des routes qui conduisent au Nord-Est ou au Sud-Est. Comme les Egyptiens de Thouthmos III venaient de Gaza par Iarza, c'est sur la route du S.E. qu'il convient de le placer. Le site de Yazour, auprès duquel s'élève encore la première tour de garde moderne, et qui est vide, depuis que M. Clermont-Ganneau en a banni Guézer, me paraît répondre aux conditions que j'ai indiquées, et je proposerai sous toutes réserves d'y installer

Mâikhasa. Le No. 63  Ganoutou, ne me semble pas

désigner nécessairement une bourgade. On rencontre le même mot deux fois encore dans notre liste, au No. 70

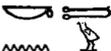
entre  Khabizana et  Mag-

dilou, au No. 93 entre  Audor-âa (No. 91) et

 Mâkarpout (No. 94). J'ai déjà eu l'occasion

de montrer, à propos de la liste de Sheshong, que les scribes égyptiens ont joint, aux noms propres de villes qu'ils connaissaient dans le pays situé entre la plaine Philistine et la Mer Morte, des noms communs empruntés aux idiomes indigènes et désignant des accidents de terrain.* Dans une région aussi mal arrosée, des vergers et des prairies bien entretenues sont une singularité, une modification inattendue du paysage, qu'on remarque et qu'on n'oublie plus jamais. Je ne serais donc pas étonné si l'on venait à prouver que

* Dans la *Zeitschrift*, 1880, p. 47.

les nom de  Ganoutou, גַּנוּת, les jardins, et de  Aubilou, אֲבִיל, la prairie, qui se présentent souvent dans le reste de notre liste, ne désignent pas toujours un bourg, mais un ensemble de jardins ou de prairies dont la ville nommée immédiatement auparavant était entourée. La chose est d'autant plus vraisemblable ici que les jardins de Jaffa, célèbres aujourd'hui dans toute la Palestine, existaient déjà au temps des Égyptiens, comme le prouve un passage du Papyrus Anastasi No. I.* Le groupe formé par les Nos. 61-63, se composerait alors de Maïkhasa, le refuge qui commandait la route de Loud, de la ville de Joppé même et de ses jardins.†

Le No. 66,  Apouken, Apoukin, est pris entre Ono et Shoko. Mariette l'a rapproché dès le début de l'Aphékah אֲפֶקָה de Juda‡ et son hypothèse a été généralement admise.§ Il peut en être en effet d'  Apoukni, ce qui en est de  Loudni, où le  n final me paraît être l'ethnique. Ici pourtant je pense que le  n exista réellement dans le nom même de la bourgade, car on trouve sur la carte moderne un village de فوكين Foukîn,|| qui répond à Apouken, de la même manière que Fík répond à Aphek. Comme Foukîn n'est pas très éloigné de Kharbét Shouwëikéh, où l'on reconnaît Shoko, j'admets volontiers qu'il répond à Apouken.¶

* Pl. xxv, l. 2-4. Cfr. Chabas, *Le Voyage d'un Égyptien*, pp. 250, sqq.

† Le Talmud mentionne de même des jardins de Zoriphîn גַּנוּת הַצְּרִיפִין qui étaient peut-être situés dans le voisinage de Loud (Neubauer, *Géographie du Talmud*, p. 81).

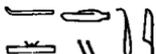
‡ *Les listes géographiques*, p. 33.

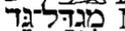
§ Cfr. Conder dans les *Q. Stat. du Palestine Exploration Fund*, 1876, p. 142.

|| Guérin, *Judée*, t. iii, p. 321, qui mentionne le village et l'Ouady. La carte anglaise et Conder (*Q. St.*, 1883, p. 180) ne connaissent que l'Ouady.

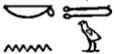
¶ Il serait assez séduisant d'identifier, comme le fait Conder (*Q. St.*, 1883, pp. 180-81), Foukîn, et par conséquent Apouken, Aphoukin, avec le Pekiin du Talmud (Reland, *Palastina*, pp. 621-622; Neubauer, *Géographie du Talmud*, p. 81). Malheureusement, כפר פקיען Kefer Pekiin, ou בקיען Bekiin, renferme un *y* que n'a pas Aphoukin, et la position que lui assigne le Talmud est diamétralement opposée à celle de Foukîn. Il est dit en effet de deux rabbins qui vivaient à Yabnéh, qu'ils se rendaient à Lod par Pekiin. Yabnéh et par conséquent Pekiin est au Sud-Ouest de Lod, tandis que Foukîn est au Sud-Est.

Le second groupe s'étend du numéro 69 au No. 76, et contient beaucoup plus d'éléments indéterminés que n'en renfermait le premier. Sur huit noms, deux seulement, ceux

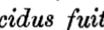
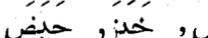
de  (No. 71), Magdilou, et de  (No. 76), Houditi sont identifiés certainement, le premier,

comme le  Magadilou de la liste de Sheshonq * avec  Migdal Gad de la tribu de Juda,

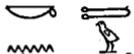
aujourd'hui El-Medjdel; † le second, Houditi, avec  Hadid de Benjamin, ‡ aujourd'hui el-Haditéh ou peut-être Kharbét Hadid de la carte anglaise, près du Deir-Eyoub, dans le voisinage d'Amwâs. Les six autres noms se divisent en deux groupes inégaux, dont le premier ne comprend que

 (No. 69), Khabizana et  (No. 70),

Ganoutou. Le rapprochement de Khabizana avec  Kézib de Juda, que Mariette a proposé, § a l'inconvénient d'exiger une interversion des éléments *b* et *za*, ainsi qu'une transcription impossible de  par  *Kha*. Le nom lui-même n'a point

d'analogie en hébreu, à moins qu'on admette qu'il vienne de  *acer fuit*, *acidus fuit*,  *salsus*, par une substitution du *b* à *m*, qui n'est pas sans exemple. Il a plus d'affinité avec l'arabe, où les racines comme  peuvent indifféremment donner une transcription égyptienne

 [] Khabiza[na]. Le nom est donc d'origine sémitique, mais je ne trouve, ni dans les environs d'El-Khéiméh, ni dans ceux d'El-Medjdel, aucun site qui lui

convienne. Pour le , Ganoutou, qui précède Magadilou, je proposerai une solution du même genre que celle que j'ai proposée déjà pour le Ganoutou qui suit Joppé. El-Medjdel est aujourd'hui encore, comme Jaffa, une bourgade

* Sur la lecture de ce nom dans la liste de Sheshonq, voir *Recueil*, t. vii, p. 100.

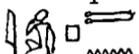
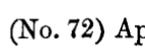
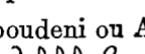
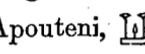
† Cfr. Guillaume Rey, *Étude historique et topographique de la tribu de Juda*, p. 120; Guérin, *Judée*, t. ii, pp. 130-132.

‡ L'identification des deux noms égyptiens appartient à Mariette, *Les listes géographiques*, pp. 33-34.

§ *Les listes géographiques*, pp. 33-34.

renommée pour la beauté de ses jardins.* De même que j'identifie le Ganoutou du No. 63 avec les jardins de Joppé, j'identifierai le Ganoutou du No. 70 avec les jardins d'El-Medjdel, de Hamaméh, et de Djoura,† c'est-à-dire avec la banlieue d'Ascalon. Ascalon elle-même ne paraît pas, soit que les bandes égyptiennes ne l'aient pas prise, soit plutôt qu'elle fût, comme Gaza, occupée, dès avant le commencement de la campagne, par une garnison égyptienne.

Les quatre noms compris entre Magdilou et Houdidi sont :

 (No. 72) Apoudeni ou Apouteni,  (No. 73) Shabtouina,  (No. 74) Diaïou,  (No. 75) Naounou. Reland cite un nom d'Apadno,‡

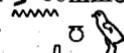
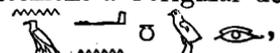
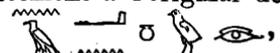
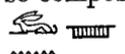
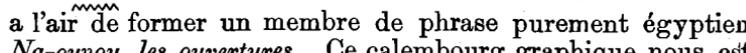
Apadanos, qui ressemble singulièrement à Apoudeni, Apouteni. C'était une localité située non loin de Jérusalem, près de Nicopolis-Emmaus, mais la forme du mot, emprunté au persan Apadâna, indique une époque plus récente que celle où nous transportent les listes de Thoutmos III. Si on admet que le voisinage des deux noms de Magadilou et d'Apouteni sur la liste indique le voisinage des deux localités, la carte anglaise nous fournira plusieurs noms convenables, un Kharbét-Fatounéh qui est un peu au Sud de Yebnah, et surtout deux Bouthani **البطاني**, la Bathaniéh orientale **البطانية الشرقية** et la Bathaniéh occidentale **البطانية الغربية**, qui sont situées à peu de distance au nord d'El-Medjdel, et possèdent toutes deux quelques débris antiques.§ La Bathaniéh occidentale est plus considérable que l'autre et plus proche de la route des invasions.

* "À dix heures quarante minutes, nous entrons dans les belles plantations d'oliviers de Medjdel. Laisant ce bourg à notre gauche, nous prenons la route de Hamaméh (bourgade située à vingt minutes au Nord d'El-Medjdel). . . . Les jardins de Hamaméh sont de la plus grande fertilité. Séparés par des haies de gigantesques cactus, ils sont plantés d'oliviers, de figuiers, de grenadiers, de mûriers et d'abricotiers. Ça et là aussi s'élèvent de sveltes palmiers et de gros sycomores. . . . À une heures dix minutes, nous longeons, vers le Sud-sud-ouest, au sortir de Hamaméh, les dunes du rivage. Les jardins bordent la lisière de ces dunes. Au-delà de ces vergers, nous traversons de beaux champs de blé, près des plantations d'oliviers et d'autres jardins appartenant à El-Medjdel. À midi, nous faisons halte dans le bourg. . . . Les jardins d'El-Medjdel environnent ce bourg d'une ceinture verdoyante. Le sol de ces jardins est sablonneux, mais néanmoins très fertile. Ils sont remplis de figuiers, de grenadiers, d'oliviers, de mûriers et de citronniers, que dominant de distance en distance d'énormes sycomores et d'élégants palmiers."—Guérin, *Judée*, t. ii, pp. 129-131.

† Guérin, *Judée*, t. ii, pp. 134-135.

‡ Reland, *Palastina*, p. 571.

§ Guérin, *Judée* t. iii, pp. 80-81.

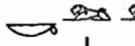
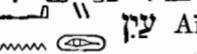
J'y placerai provisoirement Apouteni. Shabtouna est bien, comme Rougé l'a dit le premier,* un dérivé de la racine שָׁבַת, *quievit, feriatust est*, et s'appliquait à plusieurs localités : les textes de Ramsès II signalent une seconde Shabtouna dans la vallée de l'Oronte, à peu de distance de Qodshou. Shebtîn et Kharbét Shebtîn, près de l'Ouady-Natouf, nous ramènent assez près de Houditi pour convenir à notre Shabtouna. Pour Dijai ou Tiaï, je ne vois aucune étymologie convenable dans l'hébreu, ni aucun emplacement possible sur la carte moderne. Il n'en est pas de même de Naounou. Mariette avait proposé pour ce dernier endroit un rapprochement avec le nom hébreu שלמון *Naoumân*, qu'il avait fini par rejeter, faute de trouver dans l'Égyptien le *y* du nom sémitique.† J'avais songé de mon côté au bourg moderne de Naânéh,‡ et je vois que M. Conder met sur les trois noms de Naounou, Naâmah, et Naanéh sur la même ligne.§ Diverses raisons ne me permettent plus de soutenir cette opinion. En premier lieu, si le nom sémitique avait renfermé un *y* comme seconde radicale, les Égyptiens l'auraient rendu par  *Naânou*, qui aurait correspondu exactement à l'original de  *Nâanéh*, ou plutôt par le mot  *Naânou*, *gracieux, joli*, qui sonnait de même. L'orthographe qu'ils ont adoptée prouve au contraire qu'ils voulaient exprimer une vocalisation *Naounou* ou *Naouonou*, sans *y*. Elle se compose en effet de l'article pluriel  *Na*, et du mot  *Ounou*, *ouonou*, *ouvrir*, si bien que l'ensemble  de former un membre de phrase purement égyptien *Na-ounou*, *les ouvertures*. Ce calembourg graphique nous est un sûr garant, 1° que le nom sémitique ne renfermait point de *y*; 2° qu'il sonnait *Naounou*, *Naoun*. L'identification avec *Nâamah* et *Nâanéh*, me paraît donc manquer de fondement. Je préférerai le Kharbét-Nina de la carte anglaise, qui est situé sur le Ouady Serar au sud de *Nâanéh*, et nous ramène, comme cette dernière, dans la direction d'El-Haditéh, le Houdidi de notre liste.

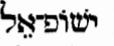
* *Sur divers Monuments du règne de Thoutmès III*, p. 55.

† Mariette, *Les listes géographiques*, p. 35.

‡ *Notes sur différents points de Grammaire et d'Histoire dans la Zeitschrift*, 1881, p. 128.

§ Telle est du moins son opinion dans le *Handbook to the Bible*, qu'il a publié en 1882 avec son frère, p. 248.

La section qui s'étend du No. 77  Haro, au numéro 104  Gaziro, est celle qui présente le plus de difficultés au géographe. D'espace en espace, on y relève quelques noms, dont l'identité se laisse reconnaître au premier coup d'oeil, No. 80,  Gerar, Oumm-Djerar,* No. 82,  Robiau רבדה, Rabbah de Juda,† No. 86,  Aini, la ville lévitique du territoire de Siméon,‡ No. 104,  Gezer.§ Trois de ces localités se trouvent au Sud et au Sud-Est de Gaza, dans le désert de Juda et de Siméon; la dernière nous ramène vers le nord, sur la route de Joppé à Jérusalem. Il sera malaisé de reconnaître l'endroit précis où le scribe égyptien a changé de région.

Les trois noms qui précèdent celui de Gerar peuvent se rattacher indifféremment soit à Houdidi-el Haditéh, soit à Oumm-Djerar. L'un d'eux, celui de  (No. 78), Ioushep-ilou, rapproché par Mariette du nom de  Shaphir,|| puis transcrit plus exactement  Ieshouph-el, Ioushep-el,¶ a été l'objet d'une étude fort ingénieuse de la part de M. Groff.** L'hypothèse de Mariette ne tient pas devant la critique: la terme  Shaphir, d'où dérive le nom de la ville de Shaphir, signifie *beau, joli*, et n'a rien de commun avec le nom théophore de *Ioshep-el, Ioshep-ilou*. M. Groff propose de reconnaître dans ce nom et dans un autre, qu'il rencontre plus loin au No. 102, "l'antique et vraie prononciation du nom de Joseph sous la forme Ioshep-el, aussi bien que celle du nom de Jacob sous la forme Iakob-el. . . Nous avons donc ici sous la forme des noms de tribus de Iakob-aal et Joseph-al, c'est-à-dire des familles de Jacob et Joseph, la plus ancienne mention des personnages bibliques, sur un monument original gravé à cette époque reculée." L'idée de M. Groff a quelque chose de très séduisant: un seul fait

* Mariette, *Les listes géographiques*, p. 36.

† E. de Rougé, *Sur divers monuments*, p. 57.

‡ Mariette, *Les listes géographiques*, p. 38.

§ Maspero, *Notes*, dans la *Zeitschrift*, 1881, p. 120.

|| Mariette, *Les listes géographiques*, p. 36.

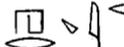
¶ Maspero, *Notes* dans la *Zeitschrift*, 1881, p. 128.

** Groff, *Lettre à M. Révillout sur le nom de Jacob et de Joseph en Égyptien*, dans la *Revue Égyptologique*, t. iv, p. 85, sqq. (cfr. p. 146, sqq.).

m'empêche de l'adopter. Les listes de Thoutmos **NI** ne renferment en fait de noms bien identifiés que des noms de villes, Magido, Lais, Hazor, Taanak, Ako, Joppé, et aucun nom de tribus : les noms qui échappent à cette règle, comme Ganoutou, Aubilou, sont appliqués à des cantons de peu d'étendue, et non à des populations. Les autres listes égyptiennes présentent la même particularité, et, quand les noms de peuples comme Routonou, Khiti, y figurent, c'est au commencement de chacune d'elles, comme titres du chapitre, et non pas dans le corps du chapitre lui-même. Ioushep-ïlou, Iakob-ïlou, représentent donc, d'après l'analogie, soit des villages compacts, soit des cantons de peu d'étendue formant ce qu'on appelle aujourd'hui encore en Orient un *beled*, c'est-à-dire un ensemble de maisons ou de huttes, disséminées par petits groupes mais relevant d'un même chef ou des mêmes chefs. Est-ce à dire pour cela que ces noms soient entièrement étrangers aux deux patriarches hébreux ? Les écrivains qui ont recueilli l'histoire primitive de la Judée, ont trouvé les récits relatifs à Jacob et à Joseph disséminés à la surface du territoire, et ont dû souvent les localiser en se servant des assonnances que certains noms géographiques présentaient avec les noms des patriarches. La ville de Gerar et l'Ouady Gerar jouent un grand rôle dans l'histoire d'Abraham et d'Isaac ; les localités Ioshep-ïlou, Iakob-ïlou peuvent avoir été rattachées de même au nom de Jacob et à celui de Joseph, par quelque tradition aujourd'hui perdue. La proximité de Ioshep-ïlou et de Gerar dans la liste m'engage à chercher l'emplacement de Ioshep-ïlou dans ce Ouady Gerar où résidèrent Abraham et Isaac. Aucune des cartes dressées jusqu'à ce jour ne donne rien qu'on puisse faire servir à l'identification ; mais le pays a été, somme toute, peu exploré, et il est fort possible que des recherches plus minutieuses révéler l'existence d'un tell ou d'une ruine, qui porte encore un nom dérivé du nom cananéen dont les monuments égyptiens nous ont appris l'existence.

Le nom  (No. 77) Harou, , la montagne, est trop vague pour que j'espère en retrouver aujourd'hui la trace. La seule chose qu'on puisse en dire c'est qu'il nous reporte vers le désert, c'est-à-dire vers Gerara plutôt que vers el-Haditéh.  (No. 79), Rogaza ne saurait être ni Ziklag  comme le pense Mariette, * ni

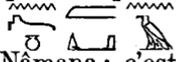
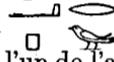
* Mariette, *Les listes géographiques*, p. 36.

Lakish, comme le voudrait Conder: * le nom a été exactement transcrit par le scribe, ainsi que le prouve le terme רָגוּ, *commotio*, † et nous n'avons pas le droit d'y rien changer pour obtenir une identification hasardeuse. La localité ne devait pas être bien loin de Gerar, non plus que 

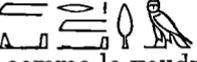
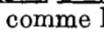
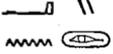
(No. 81) Har-îlou, הַרְיָלוּ, la montagne du dieu Ilou, El. Celle-ci prend un intérêt particulier, si l'on considère que les prophètes hébreux mettaient volontiers dans le désert montagneux du Sud la résidence de Dieu. La présence du nom divin Ilou, El, dans trois noms rapprochés l'un de l'autre, montre probablement que les habitants de ce canton méridional donnaient, comme les Giblites, le titre de Ilou, El, à une de leurs principales divinités.

Avec Robiau  (No. 82) nous rentrons sur un terrain moins incertain. Si Robiau, la Rabbah de Juda,

est  Kharbét Rebbah, † (No. 84) Nâmana peut avoir donné son nom au Deir Nâmân de la carte anglaise, qui n'est pas très éloigné de Kharbét Rebbah. Le No. 83,

 Noumâna forme une allitération évidente avec Nâmana: c'est presque le même fait que j'ai remarqué ailleurs à propos des deux  Apoulo, Apouro de Galilée. La

carte porte en face l'un de l'autre ' Arak-Naman et Deir Naman. Arak-Naman, n'est séparé du couvent de Namân, Deir Namân que par un ravin assez profond. Faut-il voir dans l'un de ces noms le Noumana de notre liste, dans l'autre le

Nâmana? Maromam  (No. 85), מְרוֹמִים n'est pas Mambré , comme le voudrait Mariette: § c'est tout ce que j'en puis dire. Le voisinage de  Aini

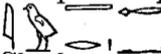
* *Pal. Expl. F.*, 1876, p. 143.

† E. de Rougé, *Sur divers monuments*, p. 56, qui ne propose l'identification avec Lakish que pour la repousser aussitôt.

‡ Guérin, *Judée*, t. iii, pp. 336-337; Conder, dans le *Pal. Expl. Fund.*, 1876, p. 161, rapproche Kharbét Rebbah de la Rebbô d'époque chrétienne (Reland, *Palästina*, p. 968).

§ Les listes géographiques, pp. 37-38. L'identification proposée par Conder (*Palestine before Joshua*, dans les *Quart. Stat.*, 1876, p. 143), avec En Rimmon de Siméon, aujourd'hui Oumm er-Roummamin, a également le tort de substituer un mot hébreu signifiant *Grenade* à un autre mot hébreu dérivé de la racine רָגַם ou d'une racine analogue.

(No. 86), qui est Aïn de Siméon, nous ramène certaine ment au Sud, mais le site de Aïn elle-même est contesté.* Je suis porté à le placer à Kharbét Khouïelféh, خربة خويلفة. Aïn est en effet si près de Rimmon, qu'au retour de la captivité, le livre de Néhémie réunit les deux villages dans une même expression, En-Rimmon. Or, Rimmon est évidemment Oumm er-Roummamîn, خربة أم الرمامين. † Il s'agit donc de trouver, dans les environs d'Oumm er-Roummamîn, un emplacement antique voisin d'une fontaine assez abondante pour justifier le nom de Aïn. Les ruines de Khouïelféh sont à une demi-heure environ au nord d'Oumm er-Roummamîn, et "recouvrent les pentes et le sommet d'une colline. Ce sont celles d'une petite ville, dont il ne reste plus que des citernes, des silos, les vestiges de nombreuses habitations et ceux d'un édifice qui, à l'époque chrétienne, avant l'invasion de l'islamisme, était probablement une église. . . . À une faible distance, vers l'Ouest, des ruines de cette petite ville, est situé dans une vallée un puits antique dont l'eau est très abondante : il est appelé بئر الخويلفة Bîr el-Khouïelféh. . . . Un peu au nord de ce puits, j'examine les restes d'un village antique appelés خربة متاع خويلفة, Kharbét mtâa Khouïelféh. Le groupe de maisons dépendait probablement, comme son nom actuel l'indique encore, de la ville voisine, dont Kharbét Khouïelféh nous offre les débris." ‡ L'ensemble de ruines qui existent autour de cette citerne pourrait répondre à l'Aïn des textes hébreux, Aîni de la liste égyptiennes.

 Rohobou (No. 87) est-elle Rehoboth רְהוֹבוֹת d'Isaac? Avant de rien décider à ce sujet, il faut examiner la direction que prend la liste avec les cartouches suivants, c'est-à-dire fixer sur le sol un au moins des sites énumérés. Le plus important était probablement celui de No. 91  Audor, Autor-âa, car on le retrouve sur la liste de Sheshonq avec l'orthographe  Ador-âa (No. 98).

* On a voulu voir dans ce nom de Aïn (*Josué*, xv, 32, xix, 7, xxi, 16; 1 *Chron.*, iv, 32) une abréviation du nom de En-Rimmon (*Néhémie*, xi, 29). La liste égyptienne montre que les localités appelées simplement Aïn, la source, étaient fréquentes dans ces régions. S'il fallait corriger le texte des livres bibliques, ce ne serait donc pas le passage de Josué et des Chroniques, que je modifierais d'après Néhémie, ce serait Néhémie que je modifierais ("à Aïn, à Rimmon, à Zorah, à Iarmouth"), d'après Josué et les Chroniques.

† Van den Velde, *Memoir to accompany the Map of the Holy Land*, p. 344.

‡ Guérin, *Judée*, t. iii, pp. 352, 357.

Brugsch a montré que le signe  pouvait prendre, au moins à partir de la XIX^e dynastie, la valeur *a*, *aa*, .* C'est, je crois, à la suite de la confusion de deux signes,  et , dont le second a en effet la valeur , *a*, *aa*, *ai*, et qui revêtaient une forme identique en hiéroglyphique : la plupart des mots où  se présente avec cette valeur, ont en effet une variante en . Quoi qu'il en soit de cette explication, le fait est là, et l'orthographe    est, à l'époque de Sheshonq, une variante parfaitement légitime de  . Que le mot  *aa*, *grand*, soit ici une épithète égyptienne, probablement la traduction d'une épithète sémitique de même sens, on n'en saurait douter, quand on voit au numéro 117 de la liste de Sheshonq    *Adora la petite*, où l'épithète  est évidemment amenée par le  du numéro 98. L'orthographe de la liste de Thoutmos III   ne doit donc pas s'expliquer, comme j'avais cru pouvoir le faire, par un thème en *y* final, tel que , *brachium*,† mais se traduit par *Audor*, *Autor la grande*. La liste de Sheshonq ne nous donne aucun renseignement assez précis pour l'identification d'Audor : elle nous prouve, d'abord que les deux Audor étaient séparés par dix-neuf noms, parmi lesquels un seul est connu, celui d'Arad de Juda    (Nos. 104-108), ensuite, qu' *Audor la grande*, après avoir été importante au temps de Thoutmos III, était restée importante au temps de Sheshonq. Cette considération m'engage à proposer d'y reconnaître l'Adoraïm  de la Bible, comme Mariette.‡ L'absence de la terminaison duelle dans la transcription égyptienne m'inspire bien quelques scrupules : ils sont diminués par ce fait qu'elle manque également dans les transcriptions grecques. Les Septante ont *Ἀδωραί*, Josèphe,

* Dans la *Zeitschrift*, 1874, p. 143, et dans le *Supplément au Dictionnaire Hiéroglyphique*, pp. 26-29.

† Maspero, *Notes sur quelques points de Grammaire et d'Histoire*, dans la *Zeitschrift*, 1881, p. 129.

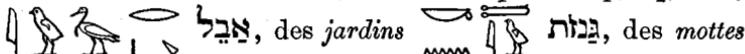
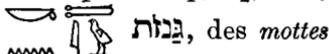
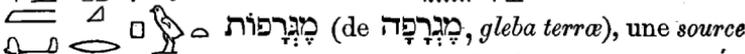
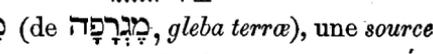
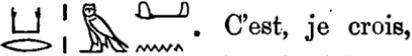
‡ Mariette, *Les listes géographiques*, p. 39.

qui enveloppent Hébron de toute part. Les bourgs ne manquent pas dont le nom se prête à l'identification. El-Kermel répond à la Carmel de Juda **כַּרְמֵל**. Kharbet-Kerma, **خربة كرم**, ne présente aucune trace de sources et n'avait que des citernes.* Au contraire, on trouve, à l'Ouest-Sud-Ouest d'Hébron, un ensemble de localités qui paraissent répondre aux conditions qu'indique le double nom de Aïna et Karmān. En partant du Ras Kanáan, le Kanāna de Sėti, comme l'a montré M. Conder, on parcourt une série de vallées, l'Oued el-Djouz **وادي الجوز**, l'Oued Abou-Roummān **وادي ابو رومان**, l'Oued el-Menchar, **وادي المنشار**, très fertiles et très bien cultivées. "La vigne principalement y abonde et y prospère merveilleusement. Elle s'enguirlande autour de tous les arbres et y forme de capricieux festons. Les grappes encore vertes sont très longues et chargées d'énormes grains, qui doivent grossir bien davantage en mûrissant. . . . À neuf heures vingt-cinq minutes, notre direction incline vers le nord-ouest. À neuf heures quarante-cinq minutes, une autre belle vallée appelée Oued el-Kerm **وادي الكرم**, à cause de ses superbes vignobles, étale à notre droite sa verdoyante parure de pampres gigantesques et d'arbres fruitiers. Les murs des nombreux enclos qu'elle renferme sont entretenus partout avec soin. . . . À dix heures, nous arrivons à la source dite A'm ech-Chems **عين الشمس**, que recouvre une voûte cintrée d'apparence antique. On y descend par plusieurs degrés. À une faible distance de cette source, j'observe un ancien pressoir à vin, aux trois quarts comblé, qui se composait de deux bassins taillés dans le roc. En me dirigeant de là droit vers le sud, je rencontre bientôt deux belles citernes creusées dans le roc. . . . À côte se trouve un second pressoir, analogue à celui que je viens de signaler. Plus loin, dans la même direction et au milieu de riches vignobles, un troisième pressoir antique, beaucoup plus remarquable que les deux autres, attire mon attention. . . . L'emplacement qu'ils occupent s'appelle Kharbét Sérasir **خربة سراسير**; on le désigne également sous le nom de Kharbét Daouirbān **خربة دويربان**, et il ne renferme d'autres ruines que celles de petites habitations ou tours éparses au milieu des vignes. Une haute colline très abrupte vers le sud-ouest, et peu distante, porte de même la dénomi-

* Guérin, *Judée*, t. iii, pp. 370-371.

nation de Daouïrban. Si une ville s'est élevée jadis en ce lieu, elle a été presque entièrement effacée du sol, à part quelques tombeaux creusés dans le roc et divers amas de pierres qui peuvent provenir de construction démolies.* On a voulu y place le Débir de Juda דְבִיר, mais cette opinion n'a pas été admise. Il me semble, quant à moi, que Kharbét-Serasir répond assez bien aux conditions spéciales de notre liste. L'Aïn-esh-Shems est le Aïna, Kharbét-Serasir le Karman dont le nom serait resté à l'Oued el-Karm. La source (aïna) et le vignoble (Karmana) sont assez rapprochés pour qu'on ait pu appeler la localité indifféremment Aïna, ou Karman, ou Aïn-Karman. L'hypothèse est si séduisante que je ne puis m'empêcher de la donner.

Cela posé, je chercherai le site des trois numéros précédents dans la même région, entre Doura et Hébron. Et d'abord, je dois faire observer que toute la série des noms est significative d'une terre bien cultivée, car on a coup sur coup, *la prairie,*

 des jardins  des mottes
 (de , *gleba terra*), une source
 un vignoble . C'est, je crois,

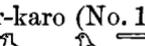
une preuve que nous sommes dans un territoire très riche, et le nom d'Adora-Doura indique le canton d'Hébron, le plus fertile de toute cette région. De l'ordre dans lequel ces localités sont énumérées on peut conclure que les trois premières sont entre Doura et Kharbét Serasir : malheureusement elles n'ont laissé aucune trace sur le sol moderne. Les noms qui suivent celui de Karman ne sont pas plus faciles à identifier.

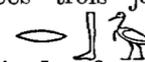
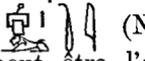
La présence d'une nouvelle  Aubilou (No. 99) me fait croire que nous ne nous éloignons pas de la région centrale de Juda, et cette conjecture est confirmée par la présence de  Tipounou (No. 98). Ce dernier mot correspond en effet lettre à lettre au Théphon, qui est mentionné parmi les villes fortifiées par Juda Macchabée,†

* Guérin, *Judée*, t. iii, pp. 260-261, 264.

† E. de Rougé, *Sur divers monuments*, p. 58. L'identification que j'avais proposée avec Dimôn de Juda tombe par ce fait que, jamais à ma connaissance, un  égyptien ne transcrit un  hébraïque : Dimôn-Dibôn ne saurait répondre à Tipounou, Dipounou.

et, bien que nous ne puissions identifier cette ville,* on s'accorde assez généralement à la placer dans les parages où nous nous sommes tenus jusqu'à présent. Les autres villes

 Bitia (No. 97),  Ierdou (No. 100),  Har-karo (No. 101),  Iâkob-îlou (No. 102),  Kapouto (No. 103), ne m'inspirent aucun rapprochement sérieux, et je ne puis rien ajouter à ce que j'en ai déjà dit il y a quelques années.†

Du No. 104 au No. 119, la liste nous transporte sur les confins de la Judée et de la Samarie.  (No. 104), Gaziro est Gézer,‡ Tell-Djézer; puis viennent, à peu d'intervalle l'une de l'autre,  Bierôtou (No. 109), la Beeroth  בְּאֵרוֹת de Benjamin, aujourd'hui el-Biréh, et  (No. 114), Gebâou, Gebâ גִּבְעָה ou Gibéah גִּבְעָה de Benjamin. La direction est suffisamment indiquée par ces trois jalons posés d'espace en espace. Rabbitou  (No. 105), Makerotou, Makelotou  (No. 106),  Amekou (No. 107), me paraissent devoir être cherchées dans les environs de Gézer. Tous ces noms sont très réguliers de forme, רַבֵּת, מְקוֹרוֹת de מְקָרָה ou מְקָרָה si le  égyptien répond à ר sémitique, מְקָלֵשׁ s'il répond à ל, et עַמְקָא : aucun d'eux n'a subsisté.  (No. 108), Sarouti, Saroudi, Salouti, Saloudi, peut être l'original du nom de Σαλαθά, que les Septante substituent à יִתְלָה Iethlah, dans l'énumération des villes de Dan, et que M. Tyrwhitt Drake plaçait à Shilta, un

* L'identification ordinaire de Théphon avec Tappuahk a le tort de ne pas tenir compte du ך final. C'est pour la même raison que le rapprochement de Mariette (*Listes géographiques*, p. 40) entre Tipounou et Tappouakh me paraît être inadmissible.

† Notes dans la *Zeitschrift*, 1881, p. 129; *cf.* E. de Rougé, *Sur divers Monuments*, pp. 58-59.

‡ La transcription du ך par le , égyptien est prouvée, entre autres, par l'orthographe  Gazatou du nom de Gaza עֵזָה, ethn. עֵזָה.

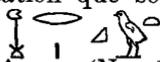
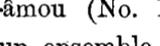
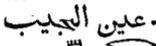
et semble établir un rapport entre ces deux localités et les gués du Jourdain; mais le paragraphe du papyrus où on lit cette mention renferme des noms du Nord et du midi, et la place qu'occupent Bit-Shailou et Direka-ilou dans l'énumération n'indique rien, si ce n'est qu'elles étaient situées entre la Judée et la Galilée. Le seul fait qui reste acquis c'est que Bit-Shailou était une ville importante. Je serai donc porté à admettre comme très vraisemblable l'opinion de Mariette, d'après laquelle ce serait שִׁילֹה Shiloh, la ville d'Ephraïm.* Bêth-Shilo בֵּית שִׁילֹה, la maison du repos, aurait perdu son בֵּית initial, comme Ἀρβηλα de בֵּית אַרְבֵּיאל Beth-Arbel, בעל מעון Baal-Meon de בֵּית בעל מעון Beth-Baal-Meon, גִּלְגַּל Gilgal à côté de בֵּית גִּלְגַּל Beth-Gilgal, et toutes les autres villes du même genre dont le בֵּית Beth initial est tombé.

Le No. 111 se présente à nous avec deux orthographes différentes: il est écrit  Bit-Anati sur deux des listes,  Bit-Baniti sur la troisième.† Bit-Anati signifie la ville de la déesse Anati, Anata, et la transcription égyptienne du nom de la déesse Anati par un  initial est conforme à l'orthographe phénicienne, où l'on écrivait  aussi bien que .‡ D'autre part, je ne suis pas convaincu absolument que la variante Bit-Baniti soit une faute de copie accidentelle. La déesse Anati-Anaïtis avait son cortège de prostituées sacrées, comme toutes les déesses cananéennes, et le nom de Bit-Baniti בֵּית בָּנוֹת, la Maison des filles, s'appliquerait bien à son temple ou à une ville consacrée à son culte. Les scribes égyptiens savaient les langues qu'on parlait en Syrie, et la variante de la troisième liste est probablement due à quelqu'un d'entre eux qui avait l'expérience personnelle des religions sémitiques. Les Bit-Anati ne devaient pas être rares au pays de Chanaan: la Bible n'en mentionne que deux בֵּית עֲנוֹת Beth-ânoth en

* Mariette, *Les listes géographiques*, p. 42.

† *Recueil*, t. viii, p. 96.

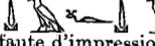
‡ *Cfr.* dans une inscription carthaginoise de la Bibliothèque Nationale  Bet-Anat, le temple d'Anat (Berger, *L'exposition de la cour Caulaincourt au Louvre*, p. 11).

Juda, בית־עַנַת Beth-ânat en Nephtali, encore sont-elles toutes deux trop éloignées pour qu'on puisse y reconnaître notre Bit-anati. La ville lévitique de עַנְתוֹת Anathoth; aujourd'hui 'Anata עַנַת, peut être une ancienne Bit-Anati. Les Juifs avaient en effet modifié, par horreur de l'idolatrie, les noms où entrait la divinité Anati, de manière à leur donnée un sens dérivé de la racine עַנָּה. Toutefois Anathoth est sur le versant du Jourdain, à quelques milles au nord de Jérusalem, dans un canton où il n'est pas certain que les Égyptiens aient jamais pénétré: je ne propose donc l'identification que sous toute réserve. Les trois numéros suivants  Khalokatou (No. 112),  Aïn-Gan-â mou (No. 113) et  Gabâou (No. 114) forment un ensemble analogue à ceux que j'ai déjà signalés autour de Jaffa et de Dourah par exemple. Gabâou est גִּבְעָה Gibéah, aujourd'hui el Djib, de préférence à גִּבְעָה גִּבְעָה, et cela me paraît résulter du voisinage même de Khalokatou. J'ai déjà appelé à ce propos l'attention des Égyptologues sur le passage de la Bible où il est dit, que les gens de Joab et d'Abner en vinrent aux mains auprès de Gibéah, à l'endroit appelé חֶלְקֶת הַצְּרִים Khelkath Ha-zurim.* Le Khalokatou de notre liste est, à mes yeux, identique à ce Khelkath, auquel l'épisode des guerres davidiques ajouta le qualificatif *Hazurim*. M. Tyrwhitt Drake pense, avec beaucoup de raison, que le Ouady el-Askar, au nord du village d'El-Djib, représente Khelkath-Ha-zurim, et est une traduction ou une réminiscence du nom hébreu. †  En-gan-â mou est dans ce cas la source d'el Djib  عين الجيب.

Les cinq noms qui terminent la liste sont  Zeraro (No. 115),  Zafiti ou Zafidi † (No. 116),  Bir-kana (No. 117),  Houma (No. 118), et  Aktomas (No. 119).§ Un seul

* *Zeitschrift*, 1881, p. 130.

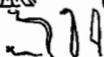
† *Pal. Expl. F., Quart. Stat.*, 1873, p. 101.

‡ Le  Zafza de Mariette (*Les listes géographiques*, p. 43) est une faute d'impression (*cf. Recueil*, vii, p. 94).

§ Pour ces deux noms que Mariette donne incomplets (*Les listes géographiques*, p. 43), voir *Recueil*, t. vii, pp. 94, 97.

d'entre eux répond à un nom connu : Bir-kana paraît être Broukîn, dans le massif d'Ephraïm. Il semblerait, d'après cela, que nous remontons vers le nord, pour aller rejoindre la partie de la liste qui a trait à la Galilée. Cette impression est confirmée de prime abord, par la présence de

 Zafiti ou Zafidi, qui pourrait être une variante

du  Zafiti ou Zafidi, qui est nommé dans le récit de

la campagne. Toutefois, ce dernier Zafidi était bien certainement dans la plaine de Mageddo, et il me paraît peu vraisemblable que le rédacteur de la liste, s'il avait voulu le mentionner, ne l'eût pas enregistré parmi les nombreuses villes qu'il avait déjà énumérées au début. Je crois d'autant plus prudent d'admettre l'existence d'une seconde Zafiti, que

le mot  *specula*, dont  et  sont

la transcription exacte, a dû être appliqué à bien des endroits différents. Le nom de Saffa,  que M. de Rougé avait déjà comparé à celui de la première Safiti,* répond très exactement à  au point de vue philologique. Au point de vue géographique, il n'est pas trop éloigné de Broukîn. J'admets donc jusqu'à nouvel ordre qu'il représente

 Zafiti de la liste. Cette hypothèse reçoit quelque appui du nom de  Zeraro qui précède

immédiatement. L'hébreu  *זֶרָרוֹ*, qui en est le prototype, signifie, *caillou*, et a pour équivalent le mot populaire  dans l'arabe de Palestine.† Or, à quelque distance de Saffa, l'Ouadi qui passe au nord de Loudd, prend le nom de Ouadi Serar.‡ Peut-être le rapprochement de Zafiti permet-il de supposer que le nom de Serar que prend le Ouady vient, non pas des galets qui encombrant son lit, comme le lit de tous les torrents de Judée, mais de la ville de Zeraro, Zerour, qui se serait élevé quelque part dans le voisinage. Le seul site, qui, de ce côté paraisse avoir convenu à une ville, est celui que Guérin décrit sous le nom de Kharbét Ras el-Lekrâ  "une

* E. de Rougé, *Sur divers monuments*, p. 38.

† *Pal. Expl. F. Q. St.*, 1877, p. 181.

‡ *Pal. Expl. F. Q. St.*, 1878, p. 116: "The vale is called Wady Sûrar (a Hebrew word, meaning *pebbles*), and is the ancient Valley of Sorek."

colline, âpre et rocheuse, entourée de ravins de trois côtés et difficilement accessible. Elle était en outre environnée, dans sa partie supérieure, d'un mur d'enceinte dont le pourtour, d'environ huit cents mètres, n'est plus indiqué actuellement que par des tas de matériaux, la plupart de petites dimensions. Au centre, s'élève un amas énorme de matériaux semblables, restes de constructions renversées de fond en comble."* C'est là, à la hauteur de l'endroit où le Ouady-en-Nâtouf commence à prendre le nom de Ouady Serar, que je serai disposé à placé Zeraro. Quant à Houmâ et Aktomas, je n'en puis rien dire, sinon que l'identification d'Aktomas avec Mikmash† est invraisemblable à tous les points de vue.

Les noms compris dans la seconde partie de la liste se rapportent, comme on voit, aux régions de la Syrie méridionale comprises entre la Méditerranée à l'Ouest, la crête du massif de Juda à l'Est, la vallée de Bersheba au Sud, celle du Nahr el-Audja au Nord, encore le point le plus septentrional, celui de Broukin, est-il situé à peu près sur la même ligne que Jaffa : Rohobou seule sort de ces limites, s'il est bien prouvé que Rohobou soit la Rehoboth d'Isaac, et que Rehoboth soit Er-Rouhaïbéh. La raison pour laquelle Thoutmos III s'est enfermé dans ce canton étroit est assez simple, et me paraît ressortir de l'étude des faits même qui signalèrent sa campagne de l'an xxiii. J'ai déjà montré que le séjour assez long des Égyptiens devant Magidi expliquait pourquoi le plus grand nombre des premiers noms doivent être attribués à des villages, même peu importants, du pays environnant. J'invoquerai une raison analogue pour justifier la composition de la portion de la liste relative à la Judée. Le bulletin de la guerre débute par nous dire que l'armée égyptienne était à Gaza, établie depuis quelque temps sans doute : elle y célèbre la fête du roi, puis se met en marche assez lentement, jusqu'au moment où, arrivé à Iouhmâ, (el-Kheïméh), Thoutmos III arrête définitivement son plan d'action et se lance rapidement sur l'ennemi campé dans la plaine d'Esdraelon. Or, si nous examinons la liste, nous y rencontrons d'abord, de Iarza (No. 60) à el-Haditéh (No. 76), un groupe de villes et de villages situés au nord de Gaza, sur la côte, dans la Shéphéla et sur la lisière orientale de la Shéphéla, à droite et à gauche de la route que parcourut l'armée égyptienne de Gaza à Iouhmâ. La marche est

* Guérin, *Samarie*, t. ii, p. 69.

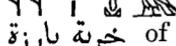
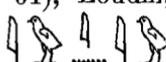
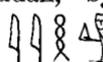
† Mariette, *Les listes géographiques*, p. 14.

lente, l'ennemi est loin encore ; les Égyptiens envoient sur les flancs de la colonne principale des bandes d'éclaireurs ou de pillards, qui mettent à la rançon les villes et les villages, en ayant soin pourtant de ne pas s'écarter dans la vallée du Jourdain trop loin du gros de l'armée. Le second groupe, de Har (No. 77), à Gapouta (No. 103), nous mène de Gerar, par les larges Ouadis qui débouchent au Sud de Gaza, d'abord dans les environs de Bersheba et de Rehoboth, puis dans la vallée centrale de Juda, à Dora et dans le canton d'Hébron. La fertilité de ce territoire devait être une tentation perpétuelle pour les Égyptiens, et nous voyons la première campagne de Sétî I^{er} aboutir à quelques lieues au Sud d'Hébron, à Ras el-Kanaan. Il n'y a rien d'étonnant que les troupes, concentrées à Gaza et oisives dans leurs cantonnements, aient été attirées vers ces vallées fertiles, et les vingt-six noms qui forment cette section de la liste témoignent du succès de leur entreprise. L'aspect extérieur de ces noms, comparé à l'aspect de ceux qu'on trouve sur la liste de She-shonq, nous montre que le pays ne devait pas différer beaucoup de ce qu'il est aujourd'hui : la nature du sol se répète dans la nomenclature des lieux, et les collines (Har, Harilou), les prairies (Aubilou), les jardins (Ganotou), les vignobles (Karman), les sources, y jouent un grand rôle. Dans la troisième section de la liste, de Gézer (No. 104), à Broukîn (No. 117), je retrouve la trace des dernières razzias faites pendant la halte de Iouhmâ. Les bandes égyptiennes remontent par les Ouadis jusqu'aux villes qui appartinrent plus tard aux tribus de Benjamin et d'Ephraïm. Puis, vient la marche rapide sur Mageddo, et l'armée égyptienne, réunie sous les ordres du roi, s'avance, en une seule masse, le long de la grande route, à travers les forêts et les défilés que j'ai décrits ailleurs d'après les documents égyptiens et classiques.* Cette manière d'envisager les choses nous explique, et la composition de la liste, et les lacunes qu'elle présente. La plus grosse correspond aux marches forcées à travers la Samarie, pendant lesquelles l'armée, sans cesse sur le qui-vive, et pressée d'arriver aux défilés, avant que l'ennemi, prévenu de son approche, eût songé à les occuper, ne détachait aucune bande à droite ou à gauche, et n'avait point le temps de rançonner les populations. Les deux groupes compacts du Nord et du Midi correspondent aux séjours prolongés qu'elle fit, avant l'action, autour de Gaza, après l'action et pendant le siège, autour de Mageddo. Dans l'énumération de ce groupe

* *Entre Joppé et Mageddo*, in-4°, 1836.

septentrional, je serai même disposé à distinguer deux sortes de villes : celles qui ont été pillées réellement, dans la plaine d'Esdraëlon et dans les cantons voisins, celles qui, situées à distance, ont fait leur soumission, et se sont rachetées avant qu'un soldat égyptien eût paru sous leurs murs. De ce nombre est certainement Qodshou et probablement Damas : leurs contingents une fois battus et leurs chefs pris dans Mageddo, elles n'attendirent pas l'arrivée du vainqueur, et se soumirent. Thoutmos III n'alla pas, cette année-là, plus loin que Mageddo, et, si les listes qu'on a dressées pour lui de ses conquêtes, portent les noms de Qodshou, d'Ashtarôth, de Damas, des villes du Haouran, c'est qu'elles surent éviter, par un tribut volontaire, la présence dangereuse du Pharaon et de ses bandes pillardes.

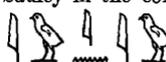
ON THE NAMES OF THE LIST OF THOTHMES III.
WHICH MAY BE ASSIGNED TO JUDÆA. BY
G. MASPERO. TRANSLATED BY HENRY GEORGE
TOMKINS.

THE first fifty-nine names of the list of Thothmes III. belong to Galilee, at least for the most part. With No. 60 begins the enumeration of places that may be attributed to Judæa. The first group, from  (No. 60), Iarza, to  (No. 68), Iouhmâ, contains six names which have been almost certainly identified: , Iarza, with Ierzah , Kharbét Iarzéh  of Guérin, Kharbét Erzéh of the English map, by Guillaume Rey* and by E. de Rougé,†  (No. 62), Iapou, Iopou, with Joppa,  (No. 64), Loudni, with , Loud, Louddah, by Mariette,‡  (No. 65), Aunau, and  (No. 68), Iouhmâ, with , Ono, now Kefr 'Ana, and el Khéiméh, , by F. de Sauley,§  Sauka (No. 67), with Shokoh of Judah

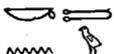
* *Étude topographique de la tribu de Juda*, p. 121.

† *Étude sur divers monuments du règne de Thoutmès III.*, p. 54.

‡ *Les listes géographiques des pylones de Karnak*, p. 32. The final  which we find at the end of this word, and of many other geographical names transcribed by the Egyptians, appears to me to be the ethnic suffix:  Loud, the town of Loud,  Loudn[i], the inhabitant of Loud, the Loudian.

§ *Lettre de M. Chabas in the Mélanges d'Archéologie Égyptienne et Assyrienne* t. i, pp. 98-99, for the discussion of the value of the group  in  Ono-gasa, and pp. 122-123, for Iouhmâ.  The sense of Ono once recognized by de Sauley in the compounds, Mariette had only to apply it to the separate group  when he discovered it in 1875 (*Les listes géographiques*, p. 32).

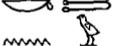
by Mariette, who yet denied the identity of this name with that of  Shanka found in the list of Sheshonq.* I believe for my part that the two names are but one. The presence of  s, at the beginning of the one, and of  sh, at the beginning of the other, far from being a difficulty, is but a confirmation of a fact that has interest in regard to local history. Under Thothmes III., and under the Ramessids, the sibilant prevails in words such as Astarte, Ascalon, Dimasqou, Sauka; if we find under Sheshonq a *shuintante* in Shauka, it is because in the meanwhile the Judæans had invaded the country, and imposed their heavy pronunciation, *Shoko* for *Soko*, *Ashqalon* for *Ascalon*, *Ash-toreth* for *Astarte*. We have a dialectic variation to infer from the twofold spelling of the Egyptian monuments, not a difference of geographical situation.

The six known names carry us either on the border of the Philistine plain or into this plain itself. I will seek, then, in the same region, the three places of still uncertain site:  (No. 61) Mâikhasa,  (No. 63) Ganoutou, and  (No. 66) Apouken, Apoukni. M. de Rougé† has shewn that the first is the exact transcription of , *refugium*, from the root , *fugit*, *confugit*, which allows us to dismiss entirely any comparison with the town of , Makkaz, proposed by Mariette.‡ The place which Mâikhasa occupies immediately before Joppa seems to indicate a site near this town; but no map, no narrative of travel, furnishes me with a name

* *Les listes géographiques*, p. 33.

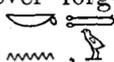
† *Études sur divers monuments*, pp. 54-55.

‡ *Les listes géographiques*, p. 32. M. de Rougé had virtually dismissed this identification by not admitting that the Egyptian town Mâikhasa may be compared with the modern village of  Makass, the   of the Egyptian having no correspondence with the  of the Arabic. The objection he makes to Makass is so much the more valid against Makkaz as there is added to the impossibility of comparing the  with  the difficulty of finding the   of the Egyptian in the  of the Hebrew name.

that I dare compare with the ancient name.* In the absence of any other information the meaning *refuge* which attaches to Mâikhasa, suggests to me a hypothesis which I give for what it is worth. Joppa was the only port on the coast. The commerce of Southern Syria in great part passed through it, and several routes ended there which led thither the products of the mountains of Judah and Ephraim. These riches would be a continual temptation to the wandering tribes of the age, as the bands of Christian pilgrims were to the Bedouins of past ages. The Musulman lords of the land had guarded the way from Jaffa to Jerusalem with watch-towers for the protection of merchants and devotees. The word Mâikhasa מַיְכָסָא may designate a *refuge* established from high antiquity in the neighbourhood of Jaffa for the use of travellers, and around which a village would have been formed. If this supposition is correct, we must seek the locality on the borders of the district of Joppa, on one of the routes leading north-east or south-east. As the Egyptians of [the time of] Thothmes III. came from Gaza by larza, it fits best to place it on the south-east route. The site of Yazour, near which still rises the first modern watch-tower, and which is unidentified, since M. Clermont-Ganneau has shewn it not to be Gezer, seems to me to answer to the conditions which I have pointed out, and I propose, under all reserves, to set Mâikhasa there. No. 63  Ganoutou, does not seem to me of necessity to denote a town. We meet with the same word twice besides in our list, No. 70 between  Khabizana and  Magdîlou, No. 93 between  Audor-âa (No. 91) and  Mâkar-pout (No. 94). I have already had occasion to shew, with regard to the list of Sheshonq, that the Egyptian scribes have added to the proper names of towns that they knew in the country situated between the Philistine plain and the Dead Sea some common names borrowed from native languages and denoting features of the land.† In a region

* The site of Mouhassin or Kharbét Dêir Mahsen, which I have proposed (*Zeitschrift*, 1881, p. 127), after Guérin (*Judée*, t. ii, p. 32-33), carries us too far from Joppa.

† In the *Zeitschrift*, 1880, p. 47.

so ill-watered, orchards and well-kept meadow-lands are a singularity, an unexpected modification of the scenery, which one notices and will never forget. I should not then be surprised if the name  Ganoutou, גַּנוּת, gardens, and  Aubilou, אָבִיל, meadow, which often occur in the rest of our list, should prove to denote not a town but a group of gardens or meadows surrounding the town next named. This is the more likely here, since the gardens of Jaffa, renowned at present through all Palestine, already existed in Egyptian times, as a passage in the Papyrus Anastasi I. proves.* The group formed by Nos. 61—63 is composed, then, of Mâikhasa, the refuge commanding the route to Loud, the town of Joppa itself, and its gardens.†

No. 66,  Apouken, Apoukin, is placed between Ono and Shoko. Mariette has compared it with Aphekah אֶפְקָה of Judah‡ and his hypothesis has been generally admitted.§ The case may be with  as with  Loudni, where the  *n* final appears to me to be ethnic. Here however I think that the  *n* really exists in the very name of the town, for we find on the modern map a village of فوكين Foukîn,|| which answers to Apouken in the same way that Fîk answers to Aphek. As Foukîn is not far from Kharbét Shouwêikéh, where we recognize Shoko, I willingly admit that it answers to Apouken.¶

* Pl. xxv, l. 2-4. Cfr. Chabas, *Le Voyage d'un Égyptien*, pp. 250, sqq.

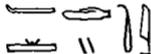
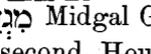
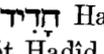
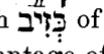
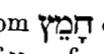
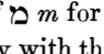
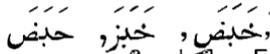
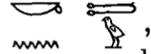
† The Talmud mentions similarly the gardens of Zeriphîn גַּנוּת הַצְּרִיפִין which were perhaps situated in the neighbourhood of Loud (Neubauer, *Géographie du Talmud*, p. 81).

‡ *Les listes géographiques*, p. 33.

§ Cfr. Conder in the *Q. Stat. of the Palestine Exploration Fund*, 1876, p. 142.

|| Guérin, *Judée*, t. iii, p. 321, who mentions the village and the Wâdy. The English map and Conder (*Q. St.*, 1883, p. 180) know only the Wâdy.

¶ It is very tempting to identify, as Conder does (*Q. St.*, 1883, pp. 180-181), Foukîn, and consequently Apouken, Aphoukin, with the Pekiin of the Talmud (Reland, *Palästina*, pp. 621-622; Neubauer, *Géographie du Talmud*, p. 81). Unhappily פקיעין Kefer Peki'in, or בקיעין Beki'in, includes an ע which Aphoukin has not, and the position which the Talmud assigns to it is diametrically opposite to that of Foukîn. It is said, in fact, that two rabbins who lived at Yabnéh reached Lod through Peki'in. Yabnéh, and consequently Peki'in, is south-west of Lod, while Foukîn is south-east.

The second group extends from No. 69 to No. 76, and contains many more undetermined elements than the first. Of eight names only two,  (No. 71), Magdilou, and  (No. 76), Houditi are certainly identified, the first, as the  Magadilou of the list of Sheshonq,* with  Midgal Gad of the tribe of Judah, now el-Medjdel;† the second, Houditi, with  Hadid of Benjamin, now el-Hâditeh, or perhaps Kharbét Hadid of the English map, near Deïr-Eyoub, in the neighbourhood of Amwâs. The six other names divide themselves into two unequal groups, of which the former only includes  (No. 69), Khabizana, and  (No. 70), Ganoutou. The comparison of Khabizana with  of Judah, which Mariette has proposed,§ has the disadvantage of requiring an inversion of the elements *b* and *za*, as well as an impossible transcription of כ by Kha. The name itself has no analogue in Hebrew, unless we admit that it comes from  *acer fruit*, *acidus fruit*,  *salsus*, by a substitution of מ *m* for *b*, which is not without example. It has more affinity with the Arabic, where such roots as  may indifferently give an Egyptian transcription  Khabiza[na]. The name is then of Semitic origin, but I do not find either in the neighbourhood of el-Khéméh, or in that of el-Medjdel any site which fits it. For , Ganoutou, which precedes Magadilou, I will propose a solution of the same kind as that which I have already proposed for the Ganoutou which follows Joppa. El-Medjdel is still, like Joppa, a town renowned for the beauty of its gardens.‖ Just as I identify

* On the reading of this name in the list of Sheshonq, see *Recueil*, t. vii, p. 100.

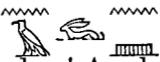
† *Cfr.* Guillaume Rey, *Étude historique et topographique de la tribu de Juda*, p. 120; Guérin, *Judée*, t. ii, pp. 130-132.

‡ The identification of the two Egyptian names belongs to Mariette, *Les listes géographiques*, pp. 33-34.

§ *Les listes géographiques*, pp. 33-34.

‖ "At forty minutes past ten we enter the beautiful olive plantations of Medjdel. Leaving this town on our left, we take the road to Hamaméh (a

the Ganoutou of No. 63 with the gardens of Joppa, I will identify the Ganoutou No. 70 with the gardens of el-Medjdel, Hamameh, and Djoura,* that is to say with the district of Ascalon. Ascalon itself does not appear, either because the Egyptian troops had not taken it, or rather because, like Gaza, it was occupied by an Egyptian garrison before the beginning of the campaign.

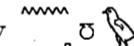
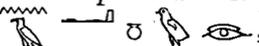
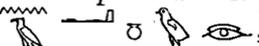
The four names comprised between Magdilou and Houdidi are  (No. 72) Apoudeni or Apouteni,  (No. 73) Shabtouna,  (No. 74) Diaïou, Dijai,  (No. 75) Naounou. Reland cites a name Apadno,† Apadanos, which singularly resembles Apoudeni, Apouteni. It was a place situated not far from Jerusalem, near Nicopolis-Emmaus, but the form of the word, borrowed from the Persian Apadâna, shews a later epoch than that to which the lists of Thothmes III. carry us. If we admit that the vicinity of the two names Magadilou and Apouteni in the list indicates the vicinity of the two places, the English map will furnish us many fit names, a Kharbét-Fatounéh which is a little to the south of Yebnah, and especially two Bouthanîs البطانى, the eastern Bathaniéh البطانية الشرقية, and the western Bathaniéh, البطانية الغربية, which are situated at a little distance to the north of el-Medjdel, and both possess some ancient remains.‡ The western Bathaniéh is more considerable than the other, and nearer the route of invasions. There I will provisionally place Apouteni.

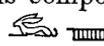
town situated twenty minutes to the north of el-Medjdel). . . . The gardens of Hamaméh are of the greatest fertility. Separated by hedges of gigantic cactus, they are planted with olives, fig trees, pomegranates, mulberries, and apricot trees. Here and there also rise slender palm trees and large sycomores. . . . At ten minutes past one we pass towards the south-south-west on leaving Hamaméh, the sand hills of the shere. Gardens fringe the border of these sand hills. Beyond these orchards we traverse fine fields of wheat, then plantations of olives and other gardens belonging to el-Medjdel. At noon we halt in the town. . . . The gardens of el-Medjdel surround this town with a verdant girde. The soil of these gardens is sandy, but, nevertheless, very fertile. They are full of fig-trees, pomegranates, olives, mulberries, and lemon trees, overtopped from place to place by enormous sycomores and elegant palms." Guérin, *Judée*, t. ii, pp. 129-131.

* Guérin, *Judée*, t. ii, pp. 134-135.

† Reland, *Palæstina*, p. 571.

‡ Guérin, *Judée*, t. iii, pp. 80-81.

Shabtouna is probably, as Rougé was the first to say,* derived from the root שָׁבַת, *quievit, feriatu est*, and applies to many localities: the texts of Ramses II. mention a second Shabtouna in the valley of the Orontes, a little way from Qodshou. Shebtîn and Kharbét Shebtîn, near Wâdy-Natouf, bring us near enough to Houditi to agree with our Shabtouna. For Dijai or Tiai, I do not see any fit etymology in Hebrew, nor any possible site in the modern map. It is not the same case with Naounou. Mariette has proposed for this last place a comparison with the Hebrew name נָוֹמָן *Naomán*, which he finished by rejecting, in defect of finding in the Egyptian the *y* of the Semitic name.† For my part I have thought of the modern town Naânéh,‡ and I see that Conder classes together the three names of Naounou, Naâmah, and Naanéh.§ Different reasons hinder me from holding this opinion. In the first place, if the Semitic name had contained an *y* as its second radical, the Egyptians would have rendered it by  Na'ānou, which would have exactly corresponded with  Nāanéh, or rather by the word  Na'ānou, *graceful, pretty*, which would sound the same.

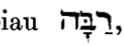
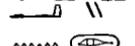
The spelling which they adopted proves on the contrary that they wished to express a vocalisation *Naounou* or *Naouonou*, without *y*. In fact it is composed of the plural article  *Na*, and the word  *Ounou*, *ouonou*, 'to open,' so perfectly, that the whole has the look of a purely Egyptian expression *Na-ouonou*, 'the openings.' This graphic pun is a sure warrant to us, 1, that the Semitic name does not include an *y*; 2, that it sounds as *Naounou*, *Naoun*. The identification with Nāamah and Nāanéh seems to me then to lack foundation. I shall prefer the Kharbét-Nina of the English map, which is situated on Wâdy Serar south of Nāaneh, and which, like the last, brings us in the direction of el-Hadîtéh, the Houdidi of our list.

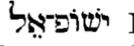
* *Sur divers Monuments du règne de Thoutmès III.*, p. 55.

† *Les listes géographiques*, p. 35.

‡ *Zeitschrift*, 1881, p. 128.

§ Such at least is his opinion in the *Handbook to the Bible*, which he published in 1882 with his brother, p. 248.

The section which reaches from No. 77  Haro, to No. 104  Gaziro, in that which presents the most difficulties to the geographer. From point to point we meet some name whose identity may be recognized at first sight, No. 80, , Gerar, Oumm-Djerar,* No. 82, , Robiau , Rabbah of Juda,† No. 86, , Aïni, the Levitical town of the territory of Simeon,‡ No. 104,  Gezer.§ Three of these places are found to the south and south-east of Gaza in the desert of Judah and of Simeon; the last brings us northward, on the way from Joppa to Jerusalem. It will be difficult to recognize the exact place where the Egyptian scribe has changed the region.

The three names which precede Gerar may attach either to Houdidi el-Haditéh, or to Oumm-Djerar. One of them,  (No. 78), Ioushep-îlou, compared by Mariette with the name  Shaphir,|| since transcribed more exactly  Ieshouph-el, Ioushep-el,¶ has been the subject of a very ingenious study on the part of M. Groff.** The hypothesis of Mariette will not hold good against critical examination: the term  שפיר, whence is derived the name of the town of Shaphir, means, ‘beautiful,’ ‘pretty,’ and has nothing in common with the name of Ioshep-el, Ioshep-îlou, compounded with a divine name. M. Groff proposes to recognize in this name and in another, which he meets not far off in No. 102, “the ancient and true pronounciation of the name of Joseph under the form Iosheph-el, as well as that of the name of Jacob under the form Iakob-el.... We have then here under the form of the names of the tribes of Iakob-aal and Joseph-al, that is the families of Jacob and Joseph, the most ancient

* *Les listes géographiques*, p. 36.

† E. de Rougé, *Sur divers monuments*, p. 57.

‡ *Les listes géographiques*, p. 38.

§ Maspero, *Notes, Zeitschrift*, 1881, p. 129.

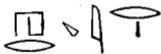
|| *Les listes géographiques*, p. 36.

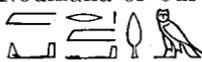
¶ Maspero, *Notes, Zeitschrift*, 1881, p. 128.

** Groff, *Lettre à M. Révillout sur le nom de Jacob et de Joseph en Égyptien*, in the *Revue Égyptologique*, t. iv, p. 85, sqq. (cfr. p. 146, sqq.).

mention of the biblical personages, on an original monument graven at this remote epoch.' The idea of M. Groff has something very tempting in it: one fact alone hinders my adopting it. The lists of Thothmes III. do not in fact include any well-identified names except the names of towns, Magido, Lais, Hazor, Taanak, Ako, Joppa, and no name of tribes: the names excepted from this rule, as Ganoutou, Aubilou, are applied to districts of small extent, and not to peoples. The other Egyptian lists present the same peculiarity, and, when the names of peoples as Routonou, Khiti, figure in them, it is at the beginning of each of them, as titles of a chapter, and not in the body of the chapter itself. Ioushep-ïlou, Iakob-ïlou, represent then, according to analogy, either compact villages or districts of small extent forming what we still call in the East a *beled*, that is a number of houses or huts scattered in small groups but belonging to one and the same chief or chiefs. But is this saying that the names are entirely unconnected with the two Hebrew patriarchs? The scribes who gathered the primitive history of Judæa found the narratives relating to Jacob and Joseph scattered over the territory, and must often have localized them in availing themselves of the assonances which certain geographical names presented with the names of the patriarchs. The town of Gerar and the Wâdy Gerar play a great part in the history of Abraham and of Isaac; the localities Ioshep-ïlou, Iakob-ïlou may have been attached in the same way to the name of Jacob and to that of Joseph by some tradition now lost. The proximity of Ioshep-ïlou and Gerar in the list induces me to seek the site of Ioshep-ïlou in this Wâdy Gerar where Abraham and Isaac lived. None of the maps yet drawn up give us anything that may serve for identification; but it has been at the most little explored, and it is very possible that more detailed researches may reveal the existence of a *tell* or a ruin which still bears a name derived from the Canaanite name of whose existence the Egyptian monuments have informed us.

The name    (No. 77) Harou, , 'the mountain,' is too vague for me to hope to recover any trace at present. The only thing that one can say about it is that it carries us towards the desert, that is towards Gerara rather than towards el-Haditéh.     (No. 79), Rogaza cannot

be Ziklag זִיקְלָג, as Mariette thought,* nor Lakish, as Conder would have it:† the name has been exactly transcribed by the scribe, as the term רִנָּו, *commotio*,‡ proves, and we have no right to change anything for the sake of a hazardous identification. The place could not have been far from Gerar, no more could  (No. 81), Har-Ilou, הַרְאֵל, the mountain of the god Ilou, El. This assumes a peculiar interest if we consider that the Hebrew prophets willingly assign to the mountainous deserts of the South the residence of God. The presence of the name Ilou, El, in three names near one another, shews probably that the inhabitants of this southern district gave, as did the Giblites, the title of Ilou, El, to one of their principal divinities.

With Robiau  (No. 82) we enter on a less uncertain region. If Robiau, the Rabbah of Judah, is حربة, ربا, Kharbét Rebbah,§  (No. 84) N'amana may have given its name to Deir Námân of the English map, which is not far distant from Kharbét Rebbah. No. 83,  Noumâna, forms an evident alliteration with N'amana: it is almost the same case that I have elsewhere remarked with regard to the two  Apoulos, Apouros, of Galilee. The map bears facing one another 'Arak-Naman and Deir Naman. Arak-Naman is only separated from the convent of Namân, Deir Namân, by a rather deep ravine. Should we see in one of these names the Noumana of our list, in the other the N'amana? Maromam  (No. 85), מְרוֹמִים is not Mambre מַמְרֵה, as Mariette would have it:‖ that is

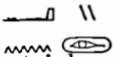
* *Le listés géographiques*, p. 36.

† *Pal. Expl. F.*, 1876, p. 143.

‡ E. de Rougé, *Sur divers monuments*, p. 56, who brings forward the identification with Lakish only to reject it at once.

§ Guérin, *Judée*, t. iii, pp. 336-337; Conder, in the *Pal. Expl. Fund.*, 1876, p. 151, compares Kharbét Rebbah with the Rebbbo of the Christian epoch (Reland, *Palastina*, p. 968).

‖ *Les listés géographiques*, pp. 37-38. The identification proposed by Conder (*Palestine before Joshua*, in the *Quart. Stat.*, 1876, p. 143), with En Rimmon of Simeon, now Oumm er-Rounmamîn, has also the fault of substituting a Hebrew word meaning "pomegranate" for another Hebrew word derived from the root רוּם, or an analogous root.

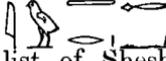
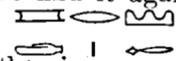
all I can say of it. The vicinity of  Aini (No. 86), which is 'Ain of Simeon, brings us certainly southward, but the site of 'Ain itself is contested.* I am inclined to set it at Kharbét Khouiéféh, خربة خويلفة. 'Ain is in fact so near to Rimmon that at the return from the captivity, the book of Nehemiah unites the two villages in one expression, En-Rimmon. Now Rimmon is evidently Oumm er-Roummamîn, خربة ام الرمامين.† Our task is then to find in the environs of Oumm er-Roummamîn an ancient site of a fountain abundant enough to justify the name of 'Ain. The ruins of Khouiéféh are about half-an-hour to the north of Oumm er-Roummamîn, and "cover the slopes and summit of a hill. They are those of a small town of which no more remains than the cisterns, the cellars, the vestiges of numerous habitations, and those of an edifice which at the Christian epoch before the invasion of Islamism was probably a church. . . . At a little distance westward from the ruins of this little town is situated in a valley an ancient well whose water is very abundant: it is called بئر الخويلفة, Bîr el-Khouiéféh. . . . A little to the north of this well I examined the remains of an ancient village called خربة متاع خويلفة, Kharbét mtâa Khouiéféh. The group of houses depended, as its present name still shows, on the neighbouring town, of which Kharbét Khouiéféh offers us the ruins."‡ The whole of the ruins existing round this cistern may answer to the 'Ain of the Hebrew texts, Aini of the Egyptian list.

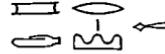
 Rohobou (No. 87) Rehoboth רְהוֹבוֹת of Isaac? Before deciding anything on this subject we must examine the direction which the list takes with the following cartouches, that is, fix on the ground one at least of the sites recorded. The most important was probably that of No. 91

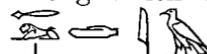
* One would willingly see in this name 'Ain (*Joshua*, xv, 32, xix, 7, xxi, 16; *1 Chron.*, iv, 32) an abbreviation of the name En-Rimmon (*Nehemiah*, xi, 29). The Egyptian list shows that places called simply 'Ain, 'the spring,' were frequent in these regions. If we might correct the text of the biblical books, it would not be the passage in *Joshua* and *Chronicles* that I would alter after *Nehemiah*, it would be *Nehemiah* that I would modify ('to 'Ain, to Rimmon, to Zorah, to Iarmouth'), after *Joshua* and the *Chronicles*.

† Van den Velde, *Memoir to accompany the Map of the Holy Land*, p. 344.

‡ Guérin, *Judée*, t. iii, pp. 352, 357.

 Audor, Autor-âa, for we find it again in the list of Sheshonq with the spelling  Ador-âa (No. 98). Brugsch has shewn that the sign  may take, at least from the XIXth dynasty downwards, the value *a*, *aa*,

.* It is, I believe, in consequence of the confusion of the two signs  and , of which the second has in fact the value  *a*, *â*, *âi*, and which assume an identical form in hieratic: the greater parts of the words where  occurs with this value have in fact a variant in . Whatever this explanation may be worth, the fact is so, and the orthography  is, at the epoch of Sheshonq, a variant perfectly allowable of .

 That the word  *âa*, 'great,' is here an Egyptian epithet, probably the translation of a Semitic epithet of the same meaning, one cannot doubt when we see at No. 117 of the list of Sheshonq  *Adora the little*, where the epithet  is evidently reciprocal to the  of No. 98. The orthography of the list of Thothmes III.  should not then be explained, as I believed it might be, by a form in ע final, such as *בְּרַעַע*, *בְּרַעַע*, *brachium*,† but is rendered by *Audor*, *Autor*, *the great*. The list of Sheshonq gives us no information precise enough for the identification of Audor: it shews us first that the two Audors were separated by nineteen names, among which only one is known, that of Arad of Juda  (Nos. 104–108), then that Audor the great, after having been important at the time of Thothmes III., still remained important at the time of Sheshonq. This consideration induces me to propose that we should recognize in it the Adoraïm אֲדוֹרַיִם of the Bible, with Mariette.‡ The absence of the

* *Zeitschrift*, 1874, p. 143, and *Supplément au Dictionnaire Hiéroglyphique*, pp. 26–29.

† Maspero, *Notes sur quelques points de Grammaire et d' Histoire*, *Zeitschrift*, 1881, p. 129.

‡ Mariette, *Les listes géographiques*, p. 39.

dual termination in the Egyptian transcription suggests to me indeed some scruples; they are lessened by the fact that it is equally lacking in the Greek transcriptions. The Septuagint has Ἀδωραί, Josephus Ἀδωρα, Ἀδωραeos, only once Ἀδωραῖμ:* the two Egyptian transcriptions may well prove that the lapse of ים was a very ancient fact in the local pronunciation. The village of Doura, to the west of El-Khalil (Hebron), answers at present to the Adora-Adoraïm of Hebrew antiquity. We must doubtless seek in the immediate vicinity  (No. 89) Higarim (*cf.*

הַגִּירִים, *fugitivi*),  (No. 88) Agar or Akaro. I consider that Higarim has nothing in common, except a very

vague assonance, with עֵגְלוֹן Eglon of Judah, and answers to no name known in the map; as to Akaro or Agaro, it is probably the Tell-Akra of the English map, on Wâdy Djézaïr, at some distance west of Doura-Audor the Great. If then Rohobou is the Rehoboth of Isaac, now Er-Rouhaibéh, as is generally admitted, it must be allowed that, after having pushed a point towards the south, in the desert, the list returns towards the north with Akaro-Akra; it will be in the mountain mass of the tribe of Judah that we should seek most of the numbers after Adora. Let us first remark

that Nos. 95  Aïna and 96  Karman, do not appear in the three lists: two of them have Karman, only one Aïna. We have the right to conclude from this either that the two names designate one locality, or that they apply to two localities different but so close that we may take the one for the other. The first impulse is to combine the two terms in one single appellation Aïna-Karman, and identify the whole with Aïn-Kerim, west of Jerusalem. But the mention of a new Abilou (No. 99) brings us farther south, in a country analogous to that where the list marks the other Abilou. Besides, the name Karman evidently belongs to פָּרִים *vine, vineyard*, and supposes a word כַּרְמֵן which would be perfectly regular; near to Doura-Audor, it invites us to seek

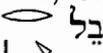
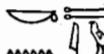
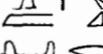
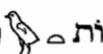
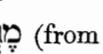
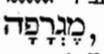
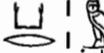
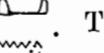
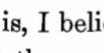
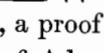
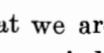
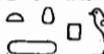
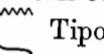
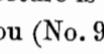
* G. Böttger, *Lexicon zu den Schriften des Flavius Josephus*, p. 12.

† Mariette, *Les listes géographiques*, p. 28. I have never met with a word where the Semitic ע answers in reality to □, ד, in Egyptian.

a site amidst the vineyards which surround Hebron on every side. Towns are not wanting whose names lend themselves to the identification. El-Kernel answers to Carmel of Judah **כַּרְמֶל**. Kharbet-Kerma, **خربة كرما**, presents no trace of springs and has only cisterns.* On the other hand, we find on the west-south-west of Hebron an assortment of places which seem to answer the conditions that the double name of Aïna and Karman indicates. On leaving Ras Kanâan, the Kanâna of Seti (as Conder has shewn), we pass through a series of valleys, Oued el-Djouz **وادي الجوز**, Oued Abou-Roummân **وادي ابو رمان**, Oued el-Menshâr, **وادي المنشار**, very fertile and very well cultivated. "The vine chiefly abounds there and prospers wonderfully. It festoons itself round all the trees and forms capricious garlands. The bunches while still green are very long and laden with enormous grapes which still swell much in ripening At twenty-five minutes past nine our direction inclined towards north-west. At forty-five minutes past nine another beautiful valley called Oued el-Kerm **وادي الكرم**, on account of its superb vineyards, displayed to our sight its verdant show of gigantic vines and fruit-trees. The walls of many enclosures which it contains are carefully kept up throughout. . . . At ten we arrive at the spring called 'Aïn esh-Shems **عين الشمس**, which is covered by an arched vault of ancient look. One goes down by many steps. At a small distance from this spring I observe an ancient wine-press, three-quarters full, composed of two basins cut in the rock. Turning to the right towards the south I soon meet with two fine cisterns hewn in the rock. . . . Beside these we find a second wine-press like that which I have mentioned. Further on, in the same direction and amidst rich vineyards, a third antique wine-press, much more remarkable than the other two, drew my attention. . . . The place they occupy is called Kharbét Serásir **خربة سراسير**; they call it also by the name of Kharbét Daouïrbân **خربة داويربان**, and it includes no other ruins than those of small habitations or towers scattered amidst the vines. A high hill very abrupt towards the south-west, and at a little distance, bears also the name of Daouïrbân. If a town was built formerly in this place it has been almost entirely effaced from the ground except some tombs hewn in the rock and several masses of stones

* Guérin, *Judée*, t. iii, pp. 370-371.

which may belong to demolished structures.”* Some have wished to place here the Debîr of Judah, דְּבִיר, but this opinion has not been admitted. It seems to me that Kharbét Sérásir answers well enough to the special conditions of our list. 'Ain esh-Shems is the Aina, Kharbét-Sérásir the Karman whose name may remain at Oued el-Karm. The spring ('Aina) and the vineyard (Karmana) are near enough for the locality to have been called indifferently 'Aina or Karman or 'Ain-Karman. The hypothesis is so tempting that I cannot withhold myself from giving it.

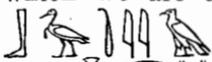
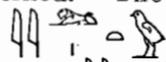
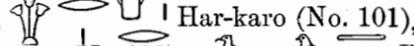
This granted, I will seek the site of the three preceding numbers in the same region, between Doura and Hebron. And first I must call attention to the whole series of names as significant of a land well cultivated, for we have one upon another 'the meadow,' , 'the gardens,' , 'the clods' , , , , (from , *gleba terræ*), a spring , a vineyard, , , , , . This is, I believe, a proof that we are in a very rich territory, and the name of Adora-Doura indicates the district of Hebron, the most fertile of all this region. From the order in which these places are enumerated, we may conclude that the first three are between Doura and Kharbét Serasir: unfortunately they have left no trace on modern ground. The names which follow Karman are not easier to identify. The presence of a new ,  Aubilou (No. 99) makes me believe that we are not far from the central region of Judah, and this conjecture is confirmed by the presence of , ,  Tipounou (No. 98). This last word corresponds, in fact, letter by letter with Thephon, which is mentioned among the towns fortified by Judas Maccabæus,† and although we cannot identify this town,‡

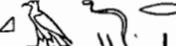
* Guérin, *Judée*, t. iii, pp. 260-261, 264.

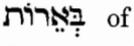
† E. de Rougé, *Sur divers monuments*, p. 58. The identification that I have proposed with Dimôn of Judah falls by the fact that never to my knowledge a  p in Egyptian transcribes a  in Hebrew: Dimôn-Dibôn cannot answer to Tipounou, Dipounou.

‡ The ordinary identification of Thephon with Tappuakh has the fault of taking no account of the final . For the same reason the comparison of Mariette between Tipounou and Tappouakh (*Listes géographiques*, p. 40) appears to me inadmissible.

there is a general agreement to place it in the parts with which we are at present concerned. The other towns

 Bitia (No. 97),  Ierdou (No. 100),  Har-karo (No. 101),  Iâkob-îlou (No. 102),  Kapouto (No. 103), do not suggest to me any serious comparison, and I can add nothing to what I have already said some years ago.*

From No. 104 to No. 119 the list carries us over the confines of Judæa and Samaria.  (No. 104), Gaziro is Gezert, Tell-Djézer; then come, at a little interval from one another,  Bierôtou (No. 109), Beeroth

 בִּיאָרוֹת of Benjamin, now el-Biréh,  (No. 114), Gebâou, Gebâ גִּבְעָה or Gibéah גִּבְעָה of Benjamin. The direction is sufficiently indicated by these three landmarks set from place to place. Rabbitou  (No. 105), Makerotou, Makelotou  (No. 106),

 'Amekou (No. 107), appear to me as if they should be sought in the environs of Gézer. All these names are very regular in form, רִבְתַּי, מְקָרוֹת from מְקָרָא or מְקָרָה if the Egyptian  answers to Semitic מְקָלֵט, ר if it answers to ל, and עֵמְק; none of them has survived.  (No. 108), Sarouti, Saroudi, Salouti, Saloudi, may be the original of the name Σαλαθά, which the LXX. substitute for יֵתְלָה Iethlah, in the enumeration of the towns of Dan, and which Mr. Tyrwhitt Drake places at Shilta, a little north-west of Bethoron the Lower.† Between Bierôtou (No. 109) and Gebâou (No. 114) the list places four fresh names. The first (No. 110),  Bit-Shaïro, Bîtshâilou,

* *Notes, &c., Zeitschrift*, 1881, p. 129; *cf.* E. de Rougé, *Sur divers Monuments*, pp. 58-59.

† The transcription of  by , Egyptian is proved, among others, by the spelling  of the name of Gaza עֵזְרָה, eth. עֵזְרָה.

‡ *Quart. Stat.*, 1873, p. 101.

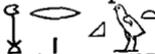
The only fact which remains to us is that Bit-Shailou was an important town. I am then induced to admit as very probable the opinion of Mariette, according to which it will be שִׁילֹה Shiloh, the town of Ephraim.* Bêth-Shilo בֵּית־שִׁילֹה, the house of rest, will have lost its initial בֵּית like Ἀρβηλα from בֵּית־אַרְבֵּאל Beth-Arbel, בַּעַל־מֵעוֹן Ba'al-Meon from בֵּית־בַּעַל־מֵעוֹן Beth-Ba'al-Meon, גִּלְגַּל Gilgal, beside בֵּית־גִּלְגַּל, and all the other towns of the same class whose initial בֵּית has lapsed.

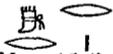
No. 111 comes before us with two different spellings: it is written  *Bit-Anati* in two of the lists,  *Bit-Baniti* in the third.† Bît - Anati signifies the town of the goddess Anati, Anata, and the Egyptian transcription of the name of the goddess Anati by an  initial is conformed to the Phœnician orthography where they wrote it  as well as .‡ On the other hand, I am not convinced absolutely that the variant Bît-Baniti is an accidental fault of the copy. The goddess Anati-Anaitis had her retinue of consecrated prostitutes, like all the Canaanite goddesses, and the name of Bît-Baniti בֵּית־בָּנוֹת, the House of the daughters, applies well to her temple, or a town consecrated to her worship. The Egyptian scribes knew the languages that they spoke in Syria, and the variant of the third list is probably due to one of them who had personal knowledge of the Semitic religions. The Bît-Anatis could not have been rare in the land of Canaan: the Bible only mentions two of them, בֵּית־עֲנוֹת Beth-ānoth in Judah, בֵּית־עֲנַת Beth-ānat in Nephtali; still they are both too remote for us to recognize our Bît-anati. The Levitical town of עֲנַתֹּת Anathoth, now 'Anata عَنَا, may be an ancient Bît-Anati. The Jews had in fact modified, through horror of idolatry, the names into which the divinity Anati

* Mariette, *Les listes géographiques*, p. 42.

† *Recueil*, t. viii, p. 96.

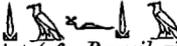
‡ *Cfr.* in a Carthaginian inscription of the Bibliothèque Nationale  Bet-Anat, the temple of Anat. (Berger, *L'exposition de la cour Caulaincourt au Louvre*, p. 11).

entered, so as to give them a sense derived from the root ענה. Yet Anathoth is on the slope towards Jordan, some miles north of Jerusalem, in a district where it is not certain that the Egyptians ever penetrated: I do not then propose the identification except with all reserve. The three following numbers  Khalokatou (No. 112),  'Ain-Gan-â mou (No. 113) and  Gab'au (No. 114) form a group analogous to those which I have already noticed round Jaffa and Dourah for example. Gab'au is גבעה, now el Djîb, in preference to Geb'â גבע, and this seems to me to result from the very nearness of Khalokatou. I have already called the attention of Egyptologists to this in the Biblical passage where it is said that the men of Joab and Abner fought near Gibeah, at the place called חֶלְקַת הַזְּרִים Khelkath Ha-Zurim.* The Khalokatou of our list is, to my eyes, identical with this Khelkath to which the incident of David's wars added the epithet *Hazurim*. M. Tyrwhitt-Drake thought, with much reason, that Wâdy el-Askar, north of the village of el-Djîb, represents Khelkath Ha-Zurim, and is a translation or a reminiscence of the Hebrew name.†  En-gan-â mou is in this case the spring of el-Djîb عين الجيب.

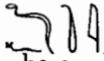
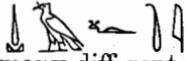
The five names which terminate the list are  Zeraro (No. 115),  Zafti or Zafidi‡ (No. 116),  (No. 117),  Houma (No. 118), and  Aktomas (No. 119).§ Only one of them answers to a known name: Bir-kana appears to be Broukîn, in the hill country of Ephraim. It seems after this that we remount towards the north, to rejoin the part of the list which has related to Galilee. This impression

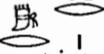
* *Zeitschrift*, 1881, p. 130.

† *Pal. Exp. F. Quart. Stat.*, 1873, p. 101.

‡ The  Zafza of Mariette (*Les listes géographiques*, p. 43) is a misprint (*cf. Recueil*, vii, p. 94).

§ For these two names which Mariette gives incomplete (*Les listes géographiques*, p. 43), see *Recueil*, t. vii, pp. 94, 97.

is confirmed at first sight by the presence of  Zafiti or Zafidi, which may be a variant of  Zafiti or Zafidi, which is named in the narrative of the campaign. Yet this last Zafidi is very certainly in the plain of Mageddo, and it seems to me little probable that the scribe who drew up the list, if he wished to mention it, should not have registered it among the numerous towns already enumerated at the outset. I believe it is the more prudent to admit the existence of a second Zafiti, since the word *צֶפֶת*, *specula*, of which  and  are the exact transcript, may be applied to many different places.

The name of Saffa *صفا*, which M. de Rougé has already compared with the first Safiti,* answers very exactly to *צֶפֶת* from the philological point of view. In a geographical point of view it is not far distant from Broukîn. I admit then in the new arrangement that it represents  Zafiti in the list. This hypothesis receives some support from the name of  Zeraro which immediately precedes it. The Hebrew *צָרֹר*, *צָרֹר*, which is its prototype, signifies 'flint,' and has for equivalent the popular word *صر* in the Arabic of Palestine.† Now, at some distance from Saffa, the Wâdy which runs to the north of Loudd takes the name Wâdy Serar.‡ Perhaps the comparison of Zafiti allows the supposition that the name Serar, which the Wâdy takes, comes not from the pebbles that encumber its bed, like the bed of the torrents of Judæa, but from the town of Zeraro, Zerûr, which may have been built somewhere in the neighbourhood. The only site which in this part appears fit for a town is that which Guérin describes under the name Kharbet Ras el-Lekrâ *خربة راس اللقرع*, "a rough and rocky hill surrounded by ravines on three sides and accessible with difficulty. It was besides surrounded, in its higher part, with a wall of enclosure whose circuit of about eight

* E. de Rougé, *Sur divers monuments*, p. 38.

† *Pal. Expl. F. Q. St.*, 1877, p. 181.

‡ *Pal. Expl. F. Q. St.*, 1878, p. 116: "The vale is called Wâdy Sûrar (a Hebrew word, meaning *pebbles*), and is the ancient Valley of Sorek."

hundred mètres is no longer indicated except by heaps of materials, for the most part of small size. In the middle arises an enormous mass of similar material, the remains of constructions overthrown in heaps from the foundations.”* It is there, at the highest point of the place where the Wâdy en-Nâtouf begins to take the name of Wâdy Serar, that I should be disposed to place Zeraro. As to Houmâ and Aktomas, I can say nothing except that the identification of Aktomas with Mikmash† is improbable from all points of view.

The names comprised in the second part of the list belong, as we see, to the regions of southern Syria included between the Mediterranean on the west, the crest of the mountain-mass of Judah on the east, the valley of Beersheba on the south, that of the Nahr-el-Audja on the north; yet the most northern point, that of Broukîn, is situated nearly on the same line as Jaffa: Rohobou alone transgresses these limits, if it is indeed proved that Rohobou is the Rehoboth of Isaac, and that Rehoboth is er-Rouhaïbeh. The reason why Thothmes III. was confined within this narrow district is simple enough, and appears to me to arise from the study of the very facts which mark his campaign of the twenty-third year. I have already shown that the rather long stay of the Egyptians before Magidi explains why the greater number of the earlier names must be attributed to villages, even of little importance, belonging to the surrounding country. I will cite a similar reason to justify the composition of the portion of the list referring to Judæa. The narrative of the war opens by telling us that the army was at Gaza, doubtless quartered there for some time: it celebrated there the festival of the King, then marched rather slowly until the moment when, arrived at Iouhmâ (el-Kheiméh), Thothmes III. definitively settled his plan of action and launched himself rapidly on the enemy encamped in the plain of Esdraelon. Now if we examine the list we first meet, from Iarza (No. 60) to el-Haditéh (No. 76), a group of towns and villages situated to the north of Gaza on the coast, in the Shéphéla, and on the eastern border of the Shéphéla, on the right and left of the route which the Egyptian army followed from Gaza to Iouhmâ. The march is slow, the enemy still far off; the Egyptians send out on the flanks of their principal column detachments of scouts, or of pillagers, who exact ransom from the towns

* Guérin, *Samarie*, t. ii, p. 69.

† Mariette, *Les listes géographiques*, p. 44.

and villages, taking care, however, not to stray into the Jordan-valley too far from the main body of the army. The second group, from Har (No. 77), to Gapouta (No. 103), brings us from Gerar by the great Wādys which open to the south of Gaza, first in the environs of Beersheba and Rehoboth, then in the central valley of Judah, to Dora and into the district of Hebron. The fertility of this territory would be a perpetual temptation to the Egyptians, and we see the first campaign of Seti I. directed to Ras el-Kan'ān, some leagues to the south of Hebron. It is nothing surprising if the troops concentrated at Gaza, and at leisure in their cantonments, should be attracted towards these fertile valleys, and the twenty-six names which form this section of the list bear witness to the success of their enterprise. The outward appearance of these names, compared with the appearance of those which we find in the list of Sheshonq, shows us that the country could not have differed much from what it now is: the nature of the soil repeats itself in the nomenclature of the places, and the hills (Har, Harilou), the meadow-lands (Aubilou), the garden (Ganotou), the vineyards (Karman), the springs, here play a great part. In the third section of the list, from Gézer (No. 104) to Broukîn (No. 117), I find the trace of the last raids made during the halt at Iouhmâ. The Egyptian troops ascend by the Wādys to the towns which at a later time belonged to the tribes of Benjamin and Ephraïm. Then comes the swift march on Mageddo, and the Egyptian army, united under the command of the king, advances in a single mass along the great route across forests and through defiles which I have elsewhere described after the Egyptian and classic documents.* This way of looking at the matter explains to us both the composition of the list and the gaps which it presents. The greatest corresponds with the forced marches across Samaria, during which the army, always on the lookout, and forced to reach the defiles before the enemy, advised of its approach, had thought of occupying them, threw off no detachment right or left, and had no time to exact ransom from the population. The two compact groups of the north and the south correspond with the prolonged halts which it made before the action around Gaza, after the action and during the siege, around Mageddo. In the enumeration of this northern group I should be even disposed to distinguish two kinds of towns: those which were actually pillaged in

* *Entre Joppé et Mageddo*, in 4to., 1886.

the plain of Esdraëlon and the neighbouring districts, and those which, situated at a distance, made their submission and bought themselves off before an Egyptian soldier had appeared under their walls. Of this number is certainly Qodshou, and probably Damascus: their contingents once beaten and their chiefs taken at Mageddo, they did not await the arrival of the conqueror, but submitted. Thothmes III. went no farther this year than Mageddo, and if the lists of his conquests drawn up for him bear the names of Qodshou, Ashtaroth, Damascus, and some towns of the Haûran, it is because they would avoid by a voluntary tribute the dangerous presence of the Pharaoh and his plundering troops.

The CHAIRMAN (H. CADMAN JONES, ESQ.).—The meeting will, I am sure, return its cordial thanks to M. Maspero for the second valuable paper he has contributed, and also to Mr. Tomkins for the great service he has rendered us by his excellent translation of it. If there is any one here who can throw further light upon the subject, we shall be most happy to listen.

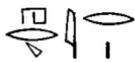
REV. HENRY GEORGE TOMKINS:—My own study of the record of the conquests of Thothmes III. has led to many concordant results, of which I need not speak, and also to many differences and additional suggestions, and these I will bring to focal points of interest as briefly as I can.

Our starting-place in Judæa is Iarza (60), which M. Maspero (following Rey and de Rougé) takes as Khûrbet Erzeh, near Askalon, thus from Galilee going straight down to begin anew in the far south. But to me it seems that our Iarza is Khûrbet Yerzeh (as proposed in 1870 by Professor Brandes), a place on the way from the central scene of the campaign of Megiddo towards Joppa; while the next name, Makhsa (61), is (as Conder suggests) Khûrbet el Maghazûn, on the way to Joppa, which immediately follows (62). Thus, without any dislocation, our list goes right down in the route which Professor Maspero has marked out as the line of march.

My next great point is No. 77, Har (the mountain), which I take as Hâr Ephraim, "Mount Ephraim," and, accordingly, I see in the district of Tai (74) Jebel et Teyi, and in the name Nûn (75) the ancestral, and perhaps tribal, name which Joshua bore as ben-Nûn, and which haunts the neighbourhood where he is said to have been buried, north and west of the Jebel et Teyi. The family had,

perhaps, possessions here to which they returned with their great leader, a prince of Ephraim. It agrees well with this that the next name, Iashepal, appears to involve the name of Joseph, as I'aqbal (102) does that of Jacob. I will not repeat what I have said elsewhere, but I am glad to find that M. Maspero agrees in thinking that, whatever the personal or gentile value of this name, there is no reason (as M. Groff thinks) against its being locally attached in Judæa. It seems to me that it may well enough represent the place anciently called Yusepheh, and now Yasûf, some four miles east of Kefr Hâris.

Professor Maspero goes to the far south for  (80), but I cannot accompany him to the Gerar of Abraham, for I believe this place may be Dâr Jerîr, nine or ten miles S.S.E. of Yasûf, and that our list proceeds with names at no very great distance from one another.

The next place is called by the remarkable name Har-el, "Mountain of God,"  unless we read it Harar. Professor Sayce believes that we have here an ancient name of Jerusalem, and has given his reasons in the *Athenæum* of October 9, 1886, and in a letter printed in my paper on this list, to which I must refer for lack of time on the present occasion. I have thought that perhaps the place may be 'Arâra, an important site of ruins, with five sacred places, but I trust we may have more light on this very interesting name. At all events, the place must lie (I think) in the region around Jerusalem, rather than in that of Gerar, in the south.

The next name to be mentioned is Higrim (89), which I take to be a tribal name, , the descendants of Hagar, and this would agree with the expression "all the unknown peoples of the frontiers of the Sati." We should expect to find the Hagarites among these. South-west of Hebron is a spring called 'Ain el Hejeri.

The two *Abels* which occur after Higrim (90 and 92) seem, not improbably, to be Abel-Shittim in the Jordan valley and the renowned Abel-Mizraïm, identified by Jerome with Beth-hogla, now 'Ain Hajla, between the Jordan and Jericho, and accordingly the *Maqerput* (No. 94) I hold to be Wâdy Makarfet el Qattûm, crossed by the pilgrim-road on the way from the great ford of Hajla to Jerusalem. In this case, 'Aina (95) may be the great spring 'Aines-Sultân, supposed to mark the site of the first Jericho, and the vineyard-name Qalman, or Qarman (96), may be the old Calamon, near Jericho (Mem. P. E. F., III., 194).

The remarkable name *Iaqob-el* occurs at No. 102, and has occasioned much speculation since M. de Rougé suggested the question whether "this local name preserves a memorial of the establishments of Jacob in Palestine." M. Groff, in a very interesting paper, with subsequent additions, earnestly denies the local element, while as strongly upholding the ethnic significance. To my mind, de Rougé's question is open to an affirmative answer, and Professor Maspero holds this opinion. It seems to me that the locality may be fixed by the name *Iqbâla*, borne by a *Wâdy* and a ruin about six miles west of Jerusalem, near the road to *Jaffa*.

Then, I think, the name *Magretu* (106) may be *Ma'arath*, identified with *Beit Ummar*, north of *Hebron*, and *'Amequ* (107) will be the *'Emeq Hebron*, with which a group of places will agree, —viz., 108, *Sertha*, which I take to be the well of *Sirah* (2 Sam. iii. 26), which I would place at *Siret el Bellâ'a*, two and a half miles north of *Hebron*; *Beth-Shar*, the present *Beit-Shar*, six and a half miles north of *Hebron*; *Beth-antha*, perhaps *Beit-'Ainûn*; *Khelqetu*, perhaps *Khûrbet el Katt*, three miles from *Beit 'Ainûn*; *'An-qn'a*, *'Ain el Qana*, one mile north-west of *Hebron*, and formerly supplying it with water; and *Qeb'au*, *קבוע*, *Jeb'a*, ten miles north of *Hebron*, "possibly *Gibeah of Judah*."

As to *Zaftha* (116), *Mariette* identified it with *Ziph*, now *Tell ez Zif*, south of *Hebron*.

Bar-qna (117) may, I think, well be found at *Khûrbet Bîrein*, close to *Khûrbet Yukîn*, which has been identified with the city *Kain* (*Josh.* xv. 57), and reminds us of the *Kenites*.

I will not now touch the two remaining names, and I have only ventured (on the present occasion) slightly to sketch the additions which I have proposed of two considerable clusters of names, the one surrounding *Jerusalem*, the other enclosing *Hebron*. My treatment of this list in detail will be found in the forthcoming volume of the *Transactions of the Society of Biblical Archæology*.

It has been a labour of love to me to translate Professor Maspero's learned and highly valuable papers for the *Victoria Institute*; and, by the united efforts of many minds, it seems manifest that this celebrated list, which carries so many *Biblical* names farther back than the *Mosaic* record, is at last being, to an unexpected extent, explained and locally identified.

Captain FRANCIS PETRIE, F.G.S. (Hon. Sec.).—I have to state that among the letters received, the first two are from Sir George

Grove and Sir Richard Temple, both regretting their inability to be present this evening. Before I read the communications that have been sent in, I wish to state that M. Maspero's former paper, upon the first portion of the Karnak lists, will be found in the *Victoria Institute's Journal*, vol. xx., together with comments by Sir Charles Wilson, K.C.B., Major Conder, R.E., the Rev. H. G. Tomkins, the Rev. Dr. W. Wright, and others. As regards the second portion of these lists, we have to-night the advantage of the views of various critics of M. Maspero's paper, his final corrections to which have now been made; the Council is, therefore, able to place before the Members in a most complete form, with M. Maspero's map, the last known results of investigations upon this subject.

Sir Charles Wilson, K.C.B., writes:—

“ORDNANCE HOUSE, SOUTHAMPTON.

“*May 4th*, 1888.

“I regret very much that I am unable to get up to town on Monday to hear M. Maspero's paper. It is a very important contribution to the literature of the geography of the Ho'y Land, and I must congratulate the Institute on obtaining such a valuable addition to their Proceedings.”

The Rev. Canon Liddon, D.D., calls attention to the great value of M. Maspero's paper, saying, “while the invasion of Palestine by Thothmes III. does not traverse (it really supports) the Bible history, his list of his conquests affords various indirect confirmations of the truth of the Bible narrative. And, moreover, it is an important contribution to the great fabric of Ancient Egyptian history, to which we may look with increasing confidence for the means of showing how mistaken are certain theories which for purely or mainly subjective reasons, would place the date of the earliest books of Holy Scripture so late as to be entirely inconsistent with belief in their general trustworthiness, to say nothing of their higher claims.”

He adds, “I regret to observe that one of M. Maspero's identifications (on the third page of his paper) is obtained at the cost of deciding that Yazour is not Gezer.”

Mr. P. Le Page Renouf, writes:—

“*May 7th*, 1888.

“DEAR SIR,

“It will not be possible for me to be present this evening at the meeting to which the President and Council have honoured me by their invitation. They would probably, however, like to know

that I agree generally with M. Maspero in the interpretation of the document which forms the subject of the paper. M. Maspero differs from every other Egyptologist in transcribing as *i* a vowel which should, I think, be considered *a*, but this makes but little practical difference through the entire list of names.

"Although this list of Thothmes III. establishes the fact that what we now call 'Hebrew' was the language of Palestine for centuries before the children of Israel took possession of the country, some difficulty in identifying names arises from the difference between the consonantal systems of Hebrew and Egyptian. Each language used important sounds which the other had not. The Egyptian language had no medial consonants, nor anything corresponding to the Semitic *y* (with its two sounds ξ and ξ'), and it made no distinction between *l* and *r*. In later times the Egyptians adopted a regular system of transcription of Semitic words, but no such system had yet come into operation at the time of Thothmes III.

"It would be satisfactory to feel assured that the syllable *ar*, which occurs at the end of certain names, is really a transcription of the Hebrew EL, signifying God. But, although this is highly probable, no true scholar would venture to assert it as absolutely certain.

"I find myself quite unable to agree with Professor Sayce when he tells us in his Hibbert Lectures that—

"Joseph was not only the father of the Israelitish tribes of Ephraim and Manasseh, he was also a deity worshipped by the older inhabitants of Canaan. More than two centuries before the date assigned by Egyptologists to the Exodus, the great Egyptian conqueror Thothmes III. inscribed upon the walls of the temple of Karnak the names of the cities conquered by him in Palestine. Among them are Yaqeb-el, "Jacob the God" and Iseph-el, "Joseph the God."

"According to the same process of interpretation, Israel, Ishmael, Nathaniel, Jezreel, Bethel are evidence of the gods Isra, Ishma, Nathan, Jezre, Beth, and ever so many others!

"Even if the transcription adopted by Professor Sayce were indisputable, the first part of each word would not be a proper name but a *verb*, as in Ishma-el 'God will *hear*,' Jezre-el, 'God has *planted*.' No such names as Jacob or Joseph occur in these Karnak inscriptions, but (at the utmost) only the verbs from which the names are derived.

"As a matter of fact, *Iāqabiār* is only one of three different readings; the other copies giving *Iāqabāmre* and *Iāqabām*.

"The second name, written *Išapār* is fully preserved in only one of the copies of the list, so that there is but little check upon its orthography. M. Maspero's derivation of the word appears to me quite as doubtful as Mariette's. The Egyptians would have used another sign than $\overline{\text{š}}\overline{\text{a}}$ to represent שׁא. I am rather inclined to look for the first element of the name in השׁא (the unused root of השׁא , a quiver), according to the sense ascribed to it by Simonis and Gesenius, *tegere, occultare, recondere*. But all this is only guess-work."

The Rev. Dr. Edersheim writes:—

"The list of Thothmes III. is not only of great intrinsic historical interest, but has, through recent theories, acquired the deepest importance for Biblical students. This monograph by M. Maspero will, in its elegant and excellent rendering by my learned friend, Mr. Tomkins, prove most helpful in various ways. No doubt some of these applications may be pointed out by speakers. I much regret that other engagements prevent my being present on this occasion."

Major C. R. Conder, R.E., is unable to be here this evening, but has kindly sent some comments, which I will ask Mr. Tomkins to read.

Remarks on the Geographical Lists of Karnak, by Major Conder, R.E.—"As regards M. Maspero's researches into the names of the celebrated Karnak list of towns in Palestine, I should not like to write off-hand on questions to which he has now for some time given so much attention. I first studied these lists in 1875-6, and came to the conclusion that the names, up to No. 119, are all to be sought in Galilee, Samaria, and the vicinity of the Philistine plain (except a section in Bashan, towards Damascus): Mariette had extended his researches over the whole of Palestine, and even sought for places east of the Dead Sea. It appeared to me more probable that the conquered towns would lie along the route taken by the army of Thothmes III.; and that it was impossible that Egyptian chariots, at least, should have scaled the mountain-walls which protect Jerusalem and Bethel, or crossed the deep Jordan valley, and passed up the yet steeper ridges of Moab and of Gilead.

"I am very glad to see that M. Maspero seeks in the same regions in which I then sought, and often accepts a site which I ventured to propose in opposition to the views of Mariette, to whom, however, we owe a most valuable monograph on the subject. I agree in

considering that the second part of the list,—beginning near Joppa,—refers to towns in the south-west; and the general definition on page 21 of the present paper thoroughly agrees with the view I have always held. My sites for Megiddo and for the Kanana of Seti (which are of great importance to Egyptian topography in Palestine) are both accepted by Rev. H. G. Tomkins, to whom I believe we owe the recovery of several very important sites in Northern Syria, mentioned in the northern list at Karnak.

“It appears that the number of sites generally agreed to is sufficient to indicate the district intended in a very definite manner; but I do not expect that there will ever be complete agreement as to all the sites in the list. I venture, however, to point out to M. Maspero that he has apparently not made use of certain sources of information which he would, I think, find useful. He never refers to the *Memoirs of the Palestine Survey*, or to the name-lists which give the Arabic spelling of the modern names. He might, by their aid, have corrected some of the mistakes made by Guerin, and would often have found fuller notes than those given by the French traveller.

“I desire to avoid any appearance of seeking to claim authority in so difficult a question, and to avoid any of that bitter controversial writing, which appears to me to be ruinous to any real study of antiquity. M. Maspero will, however, no doubt, pardon a few notes on the details which strike me in first reading his paper.

“M. Maspero's treatment of these lists is of value, because he has thoroughly examined the transliterations proposed by Mariette, and has made important notes on pronunciation. As regards geographical position, it seems to me that he has added little. He discards Mariette's proposal to include Moab Ammon and Phœnicia, and follows the proposals which, I believe, I was the first to publish in 1876, restricting our search to Galilee, Samaria, Bashan, and the west side of the Judean watershed, as far south as the plains of Simeon. In the north he has not, I think, added any acceptable identification to those which were proposed by former Egyptologists and by myself. He has accepted identifications which I proposed in 1876 and 1881, but has not, in every case, thought well to mention my prior claim to discovery (I refer to Nos. 14, 21, 22, 46, 50, 53, 54). Only in the cases of Nos. 4 and 40 has he acknowledged that the discovery is due to me.

“I have previously given reasons for not agreeing with a few new proposals in this part. Substantially we are in complete agreement as to the list in Galilee and Bashan, though I think that eleven of

my identifications might be added, some of which fix places not fixed by M. Maspero. (See Memoirs of the Survey of Western Palestine, volume of special papers, 1881.*)

"M. Maspero supposes Deir N'amân and 'Arâk N'amân to be sites of ancient towns. The one is a small ruin of a Christian convent; the other is a little cliff of limestone in a shallow valley. He also at times unconsciously gives the Arabic as he gathered it from the English lettering, thus omitting important gutturals. Again, he seems to think that a village called Fukin is omitted from the Survey map, and mentioned only by Guerin. The Turkish official list gives this village under the name Wað Fukin, and as such it appears on the map and in the Memoirs. Fukin alone is the name of no village, but an error on the part of M. Guerin.

"In his southern list, M. Maspero has made several new and, I think, valuable suggestions, such as Shebtin (No. 73) and Fâtûneh (No. 72). I think that the proposal of Gezer is also not improbable. Nina for Naunu is also very possible, though it makes very little difference geographically.

"The part in which I differ most from M. Maspero is in the section from No. 110 to 119; he here returns to the hills of Benjamin and Ephraim—a district very difficult of access, and far from the line of Egyptian advance. He has not, I think, given sufficient attention to the interesting district west of Hebron, and south of Beit Jibrin, in which nearly all the places may be found which occur on the list between Bit Shailou and the final name on the list.

"The Rev. H. G. Tomkins, in preparing lists for the Biblical Archaeological Society, has made further proposals. I hope a little later to publish a further contribution to this study, based on the newest transliterations. Meanwhile, before mentioning details, I would observe that it is by no means certain that the names are always Semitic. Those which follow No. 119—the North Syrian list—include many Turanian town-names; and it is possible that some of the strange names in the southern list may also be non-Semitic. My paper in the Memoirs, giving my latest studies, is not mentioned by M. Maspero, although it very fully agrees with his views. Even this I am now able to improve by fresh additions, and, in a few cases, by modifications.

* Major Conder, in his communication to the Victoria Institute in 1886, kindly gave a full list of his latest identifications. See vol. xx. of the *Victoria Institute's Journal*, with M. Maspero's observations.

“As regards details, I would notice No. 60, Iarza, cannot well be Erzeh, which is too far south. It is more probably Irtah, close to Jaffa. No. 68 may be el Kheimh, but I thought possibly Emmaus Nicopolis. No. 61, Makhaisa, from position and meaning, I believe to be Khürbet el Maghazûn. No. 63, Ganutu, may very well be Kefr Jennis.

“As regards Pekin, the presence of the guttural in Talmudic dialect is not fatal, as such gutturals are sometimes inserted in one instance, and omitted in another. The passage in the Talmud is not exactly as represented by M. Maspero. No. 70 and No. 71, Ganutu and Magdilu, may, I think, perhaps be Jennata and Mejdeleh, south of Beit Jibrîn. I see no reason for supposing that the lists refer to any natural features, such as gardens, vineyards, &c. Much more probably they are all town and village names. No. 72, Apoudeni, or Fâtâneh, seems to me very possible, as perhaps is also No. 73, Shabtuna, at Shebtîn, and No. 75, Naunu, at Nina. No. 82 is rather, I think, to be regarded as Lebaoth of Judah than Rabbah. As regards the ruin *Rubba*, I do not know the date of M. Guerin's suggestion, but it is at least eight years ago that I published the proposal to place it at *Rubba*, which seems now generally accepted. No. 83 and 84 are very improbable, because the names suggested, as above mentioned, have no connexion with ancient sites. No. 91, Audor, may be Adoraim, but I think that place is rather too far north, and that Jattir ('Attîr), near Beer-sheba, is more probable. No. 89, Higarim, at Tell el Akra', seems improbable, as the Arabic ends with a strong guttural not found in the Egyptian. No. 95 and No. 96 seem to me to have been better identified by Mariette at Anem and Carmel of Judah. Khürbet Kerma is not spelt as M. Maspero supposes, but with a *Qaf*.

“As to the names (No. 101) Iakobilou and (No. 78) Iushephilou, I regard Mr. Groff's ideas as very wild. Such names certainly do not appear in any ancient author with whom I am acquainted, nor do we know of any deities worshipped in Syria with such titles. Mariette's suggestion of Saphir for the first is worth more, and Iakobilou might be Akabaru, perhaps the ruin of 'Okbâr. No. 109, Bierotu, and No. 114, Kebau, I regard as the ancient Bera in Judah and Gibeah of Judah, both of which sites I have identified. No. 105, Makelotu, might possibly be Mughullis. No. 108, Saruti, is, I think, Sarîs, not Shilta. The Egyptian letter is not that used for *Sh*. No. 110, Bet Shailo, is by no means of necessity the Bet Shal of other documents, nor is it necessary to look to the remote

and inaccessible Shiloh, for we have a *Beit Sulluh* in the required direction in the Shephelah. If Bit Baniti be the better reading for No. 111, I think the most probable site is the ruin of Beit el Bân. No. 112, Khalokatu, recalls Helkath, but may be really Kharokatu. I should suggest either Huleikât or Tell Kharakah for this site; Helkath Hazzurim was a name only given 600 years later, and applied to a valley, not to a town.

"No. 113, En Ganamou, is, I think, clearly Engannim of Judah, identified by M. Clermont Ganneau at Umm Jîna.

"No. 115, Zeraro, is, I think, either *Sîrreh*, south-west of Hebron, or *Khûrbet Surrâr* further west, neither of which are mentioned by M. Maspero.

"No. 116, Zafiti, is, I think, clearly Zephathah, which I have recovered at Safieh in the valley of Zephathah (Wâdy Safieh). In this case, No. 118, Houma, or Hum, may be Khûrbet el Kom, and not impossibly No. 119, Aktomes, might be the ruin of Makdum. The identifications of the preceding point to No. 117, Berkna, being the ruin Abrakah. This last group from Nos. 110 to 119 I have previously found difficult, and have only quite recently discovered the required names all in a group together in the Shephelah.

"I think both M. Maspero and Mr. Tomkins will agree with me in the following general rules :—

"1st. The site must be ancient, and must represent a town or village of some importance.

"2nd. The Arab name must be ancient. For this reason, any purely descriptive title is suspicious. So also is any name of a *Deir*, as the ruins so called are almost invariably monasteries of the fourth or twelfth century A.D., and not ruined towns at all.

"3rd. In many cases the sound intended is by no means certain. It is well known that \square stands for ϖ , as well as for υ , and that \circ is both γ and λ . There was great difficulty in distinguishing Semitic sounds in Egyptian, especially in representing the ϖ and the strong letters υ , ϑ , and other distinctions of the Semitic tongue.

"A reference to the Memoirs seems to me necessary, and to the name-lists of the Survey. The volume published by the Palestine Exploration Fund, giving the most recent results in identification of Old Testament towns, M. Maspero may also find useful.

"Finally, it cannot always be assumed that the name is Semitic, even in the south. It is certain that a large proportion of the

names in this list towards the north are non-Semitic, and I am now able to show very clearly that they are Turanian, representing the language of the Canaanites, akin to the tongues spoken in Chaldea and Media, and not very remote from Turkish. Even in Philistia such a name as Ascalon appears to be non-Semitic. In Turko-Tartar dialect it might mean 'The City of the Great Field'—a very appropriate term for a town in the Philistine plain. This introduces another element of uncertainty, in addition to those due to the decay of the original monument, and the uncertainties of transliteration and of comparison with modern names.

"While quite in accord with the general result of M. Maspero's and Mr. Tomkins's researches, I think it is not sufficient to look for sites on the great map of Palestine, unless the student ascertains from the Memoirs what those sites consist of, and how their names are spelt. With Mr. Tomkins's knowledge of Egyptian, and of the principles of comparing ancient and modern nomenclature, there can be no doubt that valuable results will in such case be obtained."

Rev. F. A. WALKER, D.D., F.L.S.—As the interesting paper, to which we have all listened with so much pleasure, is founded on the Karnak lists, I should like to say that these Karnak lists are now, if I recollect aright, all situated some hundred yards to the east of the Nile, on the Arabian side. I say "now" advisedly, because there are several reasons for supposing that the Nile of old did not take the same channel at that particular part as it now follows, but that it flowed to the westward. Probably to the fact that at a later date and for several centuries the Nile ran, and still runs, to the west, and not to the east, may be attributed the reason why these Karnak lists have been handed down to our time in so perfect a state of preservation, having thus been exempted from the periodical inundation of the river; for the Nile has inundated monuments situated at a still greater distance on the other side than Karnak, and still further removed from the west bank of the present channel of that river than Karnak is from the eastern. The said monuments are what are known as the two Colossi (of which the northernmost is the celebrated Vocal Memnon), and it is inconceivable to suppose that these monuments should have been originally erected in a situation in which they would have been exposed, as at present, to the yearly inundation of the Nile, which now covers them periodically to a considerable height. The Karnak lists consist of the records of three monarchs,—in the first place those of Shishak; secondly, those of Rameses II.; and lastly those of Thothmes III. The record of the first-named King is easy to

make out, because it is by itself on the outer side of the eastern wall of a large building which may be termed a vast metropolitan cathedral of Egyptian worship, thus occupying a position analogous to what we should term the exterior of the chancel, and is adjacent to a colossal figure of the warrior-monarch Shishak of Scripture (otherwise called Sheshonk I.), who is represented with upraised arm in the act of striking a group of captives at his feet. The record is not likely to be confused with those of any other monarch. But with regard to the Assyrian and Palestine names which immortalise the conflicts of Thothmes III. and Rameses II., I confess to there being a great deal of confusion and doubt. If I understood rightly, Mr. Tomkins spoke of Thothmes as the greatest of all Egyptian monarchs, and if this be so, I say there is a great deal of confusion between him and Rameses II., as the latter, that very Napoleon of ancient times, extended his conquests so far, that not only were his own famous deeds ascribed to him, but also the great and illustrious achievements of several Egyptian kings. The record of Thothmes III. was, to the best of my remembrance, attributed to Rameses II. on the interior of the northern wall of a little chapel outside the eastern end of the great building, which I have said might be likened to a metropolitan cathedral; and similarly, this little chapel, far inferior in height and much smaller in all its dimensions than the main edifice, may be compared to the cloisters or Lady-chapel of a Christian edifice. One reason why the deeds of Thothmes may have been attributed to Rameses is, that the acts of both include conquests over the Hittites; Kheta, in other words, the Hittites, being subdued, to a partial extent, by both of them,—but only partially and for a time in the days of Rameses, so that he was obliged, in inscribing his record, to pass very lightly over his successes against the Hittites, and he had to mend matters by wedding Nofretari, the daughter, as it is supposed, of the king of the Hittites, and to whom, as a favourite queen, he subsequently erected a colossal statue at Aboo Simbel. Another colossal statue on Mount Sipylus, Asia Minor, long supposed to represent the Niobe (and by Ovid, Homer, as well as others, and celebrated by those poets in verse as such), is now considered to represent this same Queen Nofretari, and to have been erected to her by the Hittites of Asia by way of national flattery on the part of the subjects of Rameses in that region.

Major T. A. FREEMAN, M.A., 70th (East Surrey) Regiment.—
May I ask Mr. Tomkins as to the letters R and L, whether it is meant that one character was used to represent the two?

The Rev. H. G. TOMKINS.—There are two characters ; one, a well-known character, represents the lips, while the other represents the lion ; and, although it may be deemed preferable to give the sign of L to the lion, yet both actually do duty, almost equally, for R and L. The Egyptians do not seem to have discriminated between those two letters, and, therefore, we are obliged to resort to side reasons to know whether an R or an L is meant. I will just reply to the remark of Dr. Walker that there may be some confusion between the monumental records of Thothmes III. and Rameses II. at Karnak. There is, doubtless, a sort of confusion arising from this. Rameses II. adopted, without remorse, a good many of the conquests of his predecessor, Thothmes, and had them simply copied on his own list, there being strong suspicion that his father did the same thing ; but, in the document before us, it is impossible that there should be any confusion at all. If you look at the first great publications on the subject, "Mariette's Karnak," and the "Geographical Lists of Karnak," you will see that the inscription here entirely precludes all doubt as to who the conqueror was. It was Thothmes III. Every separate name in each embattled oval representing a separate place or town is precisely the same in design as the similar representation in the Assyrian sculptures, giving the ground-plan, with the tent of the general inside, together with the buildings, and so on. The idea of an embattled oval enclosure, with the names put inside, was that by which the Egyptians usually represented a captured place. It is only one part of one inscription of Thothmes III. with which we are now concerned, and there can be no doubt as to the geographical names here given being those recorded by that monarch.

The meeting was then adjourned.

REMARKS BY PROFESSOR A. H. SAYCE.

OXFORD, *August*, 1888.

Mr. Le Page Renouf states that he is unable to agree with what I have said in my Hibbert Lectures on the local names Yaqob-el and Iseph-el. But on my side I also am unable to agree with what he writes on the subject.

1. That the last syllable in the names represents the Semitic *el* has been believed by Waldemar Schmidt, Groff, Renan, Nöldeke, Eduard Meyer, and others. Eduard Meyer has made a special study of this department of Oriental research, and I am therefore well content to be regarded along with him and the other eminent authorities I have named as "no true scholar."

2. Mr. Renouf says that on my principles of interpretation, "Israel, Ishmael, Nathaniel, Jezreel, Bethel, are evidence of the gods Isra, Ishma, Nathan, Jezre, Beth, and ever so many others."

Such a statement shows that he has himself forgotten the elementary principles of Hebrew composition. Nathaniel and Beth-el are examples of the construct genitive, and have nothing in common with the other forms he instances. The meaning of Jezreel is at present unknown, though it has been conjectured that the name contains that of an ancient Canaanitish god of sowing. Israel and Ishmael are alone in point, and they are no more examples of the third person of a verb, as Mr. Renouf supposes, than are names like Joel and that of the Hamathite king, mentioned in the Assyrian inscriptions, Irkhulena, "the moon-god is our god." Jezreel could not mean "God has planted," and common sense would protest against the idea that a place could ever have been called "God will sow." We might as well fall back upon the old explanation of the local name Jiphthah-el (Josh. xix. 14), senseless as it is. Here, fortunately, the name of Jephthah has been preserved to show us what is the real nature of the first element in the compound; and the same is the case with the names Yaqob-el and Iseph-el, to which I would now add that of Mash-al.

Ishmael, like Ismaiah (1 Chr. xii. 4), is related to Shemaiah, Shimei, and Simeon, which Dr. Robertson Smith, following Hitzig, would trace to the Arabic *sim*, "a beast begotten by the hyena or the wolf." The analogy of the Assyrian divine names of Semu and Tasmit, however, induces me rather to connect them with the root *Shâma*, "to hear."

The etymology of the word Israel offers greater difficulties. If we disregard tradition, we could connect the first part of the compound with the names Jasher and Jeshurun. Following, however, the traditional pronunciation of the word, we must associate it with the proper name Sarai, which has recently been cleared up by Lagarde. Inscriptions show that a god Du-sarâ, Dousarês in Greek, was worshipped throughout the Nabathean region from the Hauran to Petra and the Sinaitic Peninsula, and the name Du-Sarâ simply means "he who is of Sara."

It has long been a common-place among Semitic scholars that forms like Isaac (Yitskhâq) or Jacob (Ya'aqob) represent an early mode of forming a proper name, and consequently such names as Yaqob-el and Iseph-el are parallel to compounds like Ammiel or Hadad-Rimmon. We owe the explanation of the element 'Am or 'Ammi in names like Ammi-el, Ammi-nadab, Balaam, and Jeroboam, partly to the learned researches of Dr. Neubauer, partly to the Assyrian inscriptions, which inform us that a god Ammi or Emu was worshipped not only in Ammon but also among the Shuhites on the western bank of the Euphrates.

ORDINARY MEETING, JANUARY 2, 1888.

THE RIGHT HONOURABLE LORD GRIMTHORPE, IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following Elections were announced :—

ASSOCIATES :—Percival Frost, Esq., D.Sc., F.R.S., Cambridge ; R. G. Hobbes, Esq., F.R.S., London ; Lady Maxwell, of Calderwood ; Rev. F. Nimr, Cairo ; M. J. Sutton, Esq., F.L.S., F.R.G.S., Chevalier of the Legion of Honour, Reading ; The Princeton Theological Seminary.

The following paper was then read by Mr. H. Cadman Jones, the author, resident in Edinburgh, being unavoidably prevented being present.

ON THE THEORY OF NATURAL SELECTION AND
THE THEORY OF DESIGN. *The Point of View of
Christian Thought.* By PROFESSOR DUNS, D.D., F.R.S.E.

THE aim of the paper which I had the honour to submit to the Victoria Institute last year was to show that claims recently made in favour of Natural Selection as a substitute for the Theory of Design, both in biological research and inference, are not tenable. The rival theories of Special Creations and Organic Evolution were noticed. As, however, the subject was not the origin of species but the explanation of the structural and physiological fitness characteristic of these, no attempt was made to deal with the merits of either as a theory of origin. The discussion was throughout from the point of view of theism. In the able and kindly criticism of my paper, some things were said which suggested that several of my remarks would have had more weight had the *feeling* underlying them been more clearly indicated. The feeling, namely, that however important, in the present condition of scientific thought, the vindication of the warrant for the method of the purely theistic argument may be, it

does not go far enough to meet the exigencies of the times, while logically it ought. That theism alone is of highest value, and best fulfils its end, which is in conscious sympathy with Christianity, and, indeed, passes into it, by what we may call links of natural gradation. The seen and the unseen are not antagonistic spheres, they are only different aspects of the one sphere of possible knowledge. My former communication was strictly limited to a purely scientific examination of the data appealed to on behalf of natural selection as a substitute for the well-known theistic argument. No reference was made to the Bible, but it was, and always will be, impossible for any who have accepted it as The Word of God to forget that, but for its presence and influence, there could have been no discussion on the questions at issue. Why should not this be openly and freely acknowledged by Christian apologists, and the bias implied in this fairly estimated, seeing that the bias is not all on one side, and, especially, that the whole subject admits of full discussion as a scientific subject and not a theological doctrine? This is the point of view of the present contribution.

In my first paper it was remarked, "Since Mr. Darwin's death, we are in a position more favourable than before to form a just estimate of the nature, scientific value, and physico-theological scope of his work." But the liberty of criticism secured to his enthusiastic followers by the removal of the overawing presence of their great master, threatens to run to licence, and forebodes rupture in a hitherto compact band. Have those who hold *transformism* to be no longer an hypothesis but an established law begun to suspect the method by which they reached the explanation of the origin and nature of the facts alleged to give the law? The title of Darwin's great work is *On the Origin of Species by Natural Selection*, but within the last year (1886) a hitherto highly-pronounced Darwinian boldly tells us, that natural selection is not a theory of the origin of species, it is only a theory of adaptive structures in species.* He asserts that it fails to explain the mutual fertility among the same species, and the sterility among the offspring of different species; that it fails to explain the swamping effects of free intercrossing upon an individual variation; and that it fails to account for the fact that the variations which distinguish between species and species are often trivial differences of form or colour, or meaningless details of structure, whereas the only evidence

* *Nature*, Aug. 5, 1886, p. 314; Aug. 12, p. 336; Aug. 19, p. 362; Sept. 2, p. 407; Sept. 9, Sept. 16, Oct. 2, &c.

we have of natural selection as an operating cause is held to be derived from the utility of the results. "Physiological Selection, or Segregation of the Fit," is proposed as the rival and competing theory. The proposal has already originated a great controversy. Darwin's theory owes a good deal of its interest and popularity to the circumstance that its factors are, for the most part, open and demonstrable, and can be traced apart altogether from the speculations that accompany them. But the new-found factor lies far out of sight, and works among elements lurking in hidden conditions of the reproductive system. We may readily acknowledge the possibility, or even the likelihood, of changes in the "germ plasma," natural or spontaneous, abnormal or derived, as in any other system of organs, but to hold that in this we have the origin of the distinction between species and species is only "an idol of the den." What, however, most concerns us here is, that in the statement of the rival theory,* the scope of natural selection is much narrowed, and the claim on its behalf as a substitute for the theory of design is much more clearly defined,—it is not a theory of the origin of species, it is only a theory of the origin of adaptations. But, in view of all that has recently been urged to this intent, I repeat that its claims are not admissible. "It fails to give a satisfactory explanation of the differences among closely-related organisms, of the gradations and succession of organisms, of the complex phenomena of organs and functions and especially of sex, of the laws and limits of variation, of the law of reversion to type, or of the numberless adaptations implied in all these."

This reference to the recent attempt, on the part of an avowed Darwinian, to show that natural selection is not trustworthy as a theory of the origin of species, may be taken both as a note on my former communication and as an introduction to our present point of view. Looking at life and its manifestations, two theories hold the field of discussion, namely, the theory of organic evolution and the theory of special creations. We can notice only their general character and bearings. As regards the first, a number, chiefly of young biologists, when dealing with this subject are in the habit of prefacing their remarks with such strong statements as (I quote),—"The principle of evolution being now universally accepted," &c., or, "No one now questions that great law of the unity and continuity of life, the law of organic evolution," &c., or "the proof of transmutation by

* "Physiological Selection." See *Nature*, as before.

genetic descent is now complete; the question of special creations is no longer an open question, it has been definitely set aside by scientific demonstration!" Our opponents do not fail either in narrow dogmatism or cool assumption. But they forget that there are workers outside whose knowledge of the facts of science is quite equal to theirs, and who yet do not see their way to such strong statements; workers, moreover, who call no man master, and who refuse to relegate all creation and every organism to a force whose very existence is purely speculative. What is the use of urging the importance of the study of natural science, because of its value in opening the mind, disciplining the faculties, cultivating powers of observation, fostering right method in dealing with all sorts of subjects, if all this is ignored or set aside in obedience to the authority of one great name? But bowing to authority has not been favourable to clearness of intellectual vision. The question has been set in the midst of much confusion of thought. A consistent theory,* evolution implies the existence of a self-originated *something* in which all force,—chemical, vital, mental, moral,—is of its essence and ever potentially inherent. It refuses to recognise living, working personality in nature. It assumes that life lurking in matter, as a quality of matter, *somehow* became active and, outside of personality, realised organisms,—the specific rank of plant and animal being the expression and representation of the progressive steps, the animal series being represented by the links between the gelatinous speck of the protozoan and the body and mind of man. All this is held to be the fruit of the action of uncreated natural law, which, unliving, gave life; mindless, gave mind; indiscriminating, gave morality. It determines the history of nations. It has been the one influential factor in begetting the idea of a God, and in supplying man with a religion! And is this all we have to offer to an age worn to weariness by its heart-hunger after truth,—the theory of an ever-active, mindless, infinite force, and the denial of the existence of a loving, infinite Fatherhood? The question is, of intention, put in this sharp form, because, though this may not have been the evolution theory of Darwin, who acknowledged a creative starting-point, it is that of Darwinism. Yet there are men who, above all things, love truth and seek it, but who nevertheless, from lack of discrimination, attach their own meaning to the theory, and use its name for views out of all sympathy with it. Thus

* "Oscar Schmidt, Haeckel, and others, think that Darwin's reference to a Creator is the weakest part of his system."—*Trans. Vict. Inst.* vol. xx., p. 46.

many are misled. They mistake the theory for the fact of progressive divine Self Manifestation, a truth to which great prominence is given in the Word of God, and of which Nature furnishes innumerable proofs in the gradual building up of the earth, and in the ever-upward steps of the introduction of plants and animals, from their first appearance in geologic time till the opening of the present epoch. But this mode of revealing is not evolution, because it ascribes nature to God; it recognises the essential difference between spirit and matter; it subordinates the Law of Continuity to creative will, and it holds that the interactions and interdependencies of being are as suggestive of Omniscience in the Providence that guides them, as creation itself is of Omnipotence in the Personality by whom it was realised. That the bracketing of these two principles as identical in their origin and applications has begotten much perplexity in the department of Christian scientific thought, is not to be doubted. That it has not been more hurtful is to be ascribed to the fact that outside of these controversies there is an immense constituency,—the constituency of intelligent common-sense,—looking thoughtfully on, whose minds, trained and disciplined among and by the responsibilities, trials, and business of everyday life, are sharp enough to know that, as in morals the true test is, “by their fruits ye shall know them,” so, applying the ordinary rules of evidence to the assertions and speculations of science, the test is, by their facts ye shall value them.

We are indebted to the Bible for the other leading theory of being,—the theory of special creations. Till a very recent date this satisfied both the leaders of science and of Christian thought. It satisfied Newton and Brewster and Clerk Maxwell, Linnæus, Cuvier and Agassiz, Butler and Paley and Chalmers. No doubt, in the latter half of the eighteenth and the early part of the nineteenth centuries, the so-called advanced (*die aufklärung*) school of theologians began to influence popular thought against this, as against most other doctrines of Holy Scripture, but their influence was not great. Now, it is noteworthy that most who dissent from the present Christian point of view seem to forget that this theory of special creations has a history. For example, no notice is taken of the fact that the great men just named not only embraced it as a working principle, but ably defended it. It was attacked on grounds precisely the same as those pleaded by recent opponents. The only difference between the transformism of Lamarck and the transmutation of recent speculatists, lies in the method by which their synthesis is

reached. The current views regarding the unbroken and unbreakable continuity of natural law are only a revival of M. Bonnet's dictum,—*non datur saltum in natura*. And as to method, it would be easy to show even Darwin's indebtedness to Lamarck's speculations touching "*medium*," "*habit*," and "*need*," for some of the strong points in his natural selection theory. While, then, even a glance at the history of thought on this question will show us that much recent speculation is no more than a re-statement of olden forms, it will also show us the ignorance of those who are fond of repeating that at no time have naturalists of repute been found identifying themselves with the theory of special creations. In my former communication a passage was quoted from the last paper which Agassiz wrote, clearly indicating his sympathy with the theory. In a previous paper he as clearly and forcibly gave full expression to this. "As I grow old in the ranks of science," he said, "I feel more and more the danger of stretching inferences from a few observations to a wide field. I see that the younger generation of naturalists are at this moment falling into the mistake of making assertions and presenting views as scientific principles which are not based on real observation. I think it time that some positive remonstrance be made against that tendency. The manner in which the evolution theory is treated would lead those who are not special zoologists to suppose that observations have been made by which it can be inferred that there is in nature such a thing as change among organised beings actually taking place. *There is no such thing on record*. It is shifting the ground from one field of observation to another to make this statement, and when the assertions go so far as to exclude from the domain of science those who will not be dragged into the mire of mere assertion, then it is time to protest." Too much prominence cannot be given to the question suggested by Agassiz. Evolutionists reiterate statements which beguile those who are not special zoologists into the impression, if not belief, that genetic changes are going on among our present fauna and flora. But recent explorations in the remains of very early periods of Egyptian history, and recent discoveries in pre-glacial and earliest post-glacial deposits, have shed a flood of light on this question. There is proof that the ibis and ostrich of to-day are as species identical with the ibis and ostrich of three thousand years ago. Mr. Carruthers, in his peculiarly able and interesting address at the opening of the Biological Section of the British Association in September last (1886), pointed out that Dr. Schweinfurth had discovered in mummy-wrappings the remains of

plants which had been gathered four thousand years ago, many of them identical with species now living in the Nile Valley. He also showed that in the earliest post-tertiary deposits remains of plants occur precisely the same as present species.

The theory of special creations may then be thus stated:—Living beings were at first formed in a mature state, and, by creative gift, like produced like through natural processes of reproduction and growth. That which was full grown ever preceded the embryo. Even now the zoologist can have no true knowledge of the embryo except in its association with the mature form, and the botanist no true knowledge of the seed apart from the plant that produced it. But we are asked: "Do you really believe that every plant and animal is a special creation, the result of a special act of Divine interposition?" The question is not fair. The doctrine of special creations implies that the multiplication and persistence of organisms are to be traced to the continued action of second causes,—the natural laws which determine reproduction and growth. And in tracing species, as such, to creative act, we refuse to make our belief responsible to science for the elucidation of all the elements which distinguish between original species and permanent varieties. Nor do we feel called upon to say more in answer to "the waste of power plea" than that to predicate waste of power on the part of an Omnipotent Creator is absurd. Scientific knowledge is the knowledge of facts observational or inferential, whether they are the facts of consciousness, or sense, or revelation, whose claims have been tested by methods other than those referred to here—methods, however, equally in the line of man's rational and spiritual nature as are those of pure science. In the method of knowing lies chiefly the certainty of the thing known. This principle has a wide sweep. It reaches to all the sources of knowledge. It is applicable in the world of mind as in the world of matter. It may find highest expression in the mental habits of men who have no knowledge of the terminology of science, and stand outside of all the advantages of its special training. But when scientific questions are raised and problems stated whose solution depends on the application of the ordinary rules of evidence, I would place more confidence in the opinions of men of practical common-sense than in those of experts.

The subjects under notice occupy at present much of the time and attention of intelligent men. As the opportunities and means of education increase, and the discoveries of science and their fruits multiply the interest will widen and deepen.

Much will depend on the point of view, both of the students of science themselves, and also of the great constituency of sympathetic onlookers. Can the mental bent of the students be indicated? To group them as atheistic, agnostic, theistic, or Christian, might be taken as the concrete answer to this question. The differentiating process begins where observation becomes associated with philosophy, where effects are traced to causes, where phenomena suggest the idea of law, where fitnesses raise the question of intention, intention that of forethought, and forethought that of creative personality. And it is vain to hope to keep outside of all this by limiting scientific work to the bare knowledge of facts, and by attempts to separate things from the thoughts that underlie them. There is something so like human thought in the very forms of natural objects, and so like human skill in the proofs of adaptation in their constituent parts and in the inter-relations and inter-dependencies of most widely diverse species, as to awaken a kind of heart-hunger in sincere and honest observers after this *something* or *some one* to which, or to whom, all nature seems to point. Thus the vital importance of the point of view, whether of observation or of generalisation. The writer holds that the scientific interpretation of nature from the point of view of Christian thought is more in the line of true science than any other. Thus the Church is called to see that Christian thought and effort are ever kept in touch with the progress of science, welcoming its fruits, entering sympathetically into the intellectual difficulties of its workers, and ever according to them large liberty of honest speculation.

Little need be said of the atheistic standing-point. Where it is consciously held it seldom finds open expression. Men say it "in their heart." The intellectual condition underlying it finds rest in agnosticism, whose influence in the domains of natural and physical science is much more marked. Its rise and progress may be sketched in a few sentences. The discovery of fitnesses in organism, and between organisms and their environments, suggests purpose; purpose suggests personality which, in its turn, begets the desire to know something both of the purely psychical and moral attributes of personality—more light and fuller on the obligations as well as the objects of scientific research. These are not faced. Fitnesses are made barren by running them into a natural teleology from which design is excluded, on the plea that "the finite cannot comprehend the infinite." "We do not know that God is, and we do not know that He is not. We only know that if He is, He must be infinite, absolute, eternal, inconceivable, and unthinkable." The

difference between knowledge and omniscience is ignored. But, "we know in part," is as true in regard to our knowledge of the Creator as it is of our knowledge of creation. We can be in conscious fellowship with God, and influenced rationally by Him, within the range of our faculties; and to this extent a true and definite knowledge of God is within our reach. We know in part, but the part which we know is as true and real as it could be if we knew the whole.

There are some features of recent theism which indicate how much it is influenced by the science of the time. Seventeenth and eighteenth century deism implied that we have such a discovery of God in nature as renders any other revelation unnecessary. Its adherents openly rejected Christianity. They were, in the language of that time, "naturalists" or infidels, not atheists. Recent theism refuses to assume this attitude. Most of its adherents find in nature lavish materials to warrant the inference of creative personality, but they refuse to have any opinion of Christianity. They will not attack it; they simply ignore it. The conditions of public thought on this subject bear a striking resemblance to those that marked the first meeting between Christianity and the Alexandrian philosophy, though the circumstances of the times differ very widely. Christ's evangel began to pique the imagination, and even to touch the heart of the learned, and, as the forces of awakened thought in both departments mingled without organic union, attempts to harmonise them came in crowds, but the attempts only increased the perplexities. The lines of Christian evidence and doctrine became crossed and recrossed by philosophical speculation, until, in the long run, the speculatists themselves were bewildered. Every student of historical theology knows what the outcome was,—“apples of Sodom and clusters of Gomorrah.”

Ever advancing science multiplies facts, the worthy rendering of which compels the recognition of an intelligent creator and of ceaseless creative working and guidance. But as these appear to many to raise questions which conflict with Christian impressions, and even with some of the most characteristic doctrines of Christianity, they try to relegate theism to one department and Christianity to another, different and independent. They assign to the latter a place of isolation, with a history, no doubt, but a history which either rejects or suspects the ordinary principles of historical criticism, and with doctrines for whose acceptance no logical reason can be given. But this implies a divorce between reason and faith, which is alien to the whole spirit

of Christianity, whose service is a reasonable service, and whose faith even can be justified to reason itself. It implies the triumph of an evil tendency, which is growing with the growth of science, the tendency to shunt revelation into a siding; to push the Word of God into isolation from the secular knowledge, political movements, and social life of the time. Now a good deal of this may be traced to the unwillingness of recent theists to go even one step beyond the old standing point. Their studies constrain them to run effects up to causes, and causes, in their turn, up to omnipotent and omniscient personality, where they halt. But if they would profit by nature's highest service to the doctrine of creation, they are logically bound to go farther. The science of observation falls short of its end if it pass not into the science of inference. That a right and true knowledge of the things that are made is designed to lead up to the understanding of "the invisible things, even eternal power and Godhead," we have the belief of one of the greatest thinkers of his own or of any time. And these aspects of the invisible and supernatural link themselves, one might almost say, in a rational way to doctrines which lie at the very heart of Christianity,—the leading doctrines of that gospel which is "the power of God unto salvation." The foot of the ladder of "revealing" is on the earth and in it, the top is lost to view amidst the light inaccessible around the sapphire throne. I am far from affirming that this testimony of nature must be read by all; far less that by the steps of this ladder all men must climb into Christ's Kingdom. I only affirm that theism fails in its high calling when it accepts nature's witness to the being and immanent presence of God as its *terminus ad quem*; when, in a word, it refuses to look at the evidence in proof of the existence of, to say the least, a thinkable link between Creation and the Bible, the two parts of the one revelation which God has made of himself to man. This inference as to a thinkable link between the two is so important that I would like to look at the data which warrant it from yet another point of view. Comparative zoology deals not only with recent, but with the remains of extinct forms. The latter, not less than the former, are literally crowded with materials suggestive of the leading positions of theism—order, contrivance. And not the least interesting of the facts of palæontology are those which discredit, or flatly contradict, many of the assertions of present speculative science. For example, oldest organisms are not really the simplest; the disappearance of the oldest was not merely the last step of a struggle for existence, waged throughout ages, vaster

than even imagination can grasp; it was the result of interference, sharp and sudden, with animals whose specific features were as deeply, definitely, and broadly outlined as they were at their introduction. The new types which came at remote intervals in geologic time were not the fruit of trivial or slight modifications of structure and form by the living, active influences of natural selection, for in that case the gradations would be traceable in the forms that preceded them; whereas all palæontology witnesses to the fact that their introduction was sudden, that they continued throughout long geologic ages unaltered, and that when they ceased, their remains in the uppermost strata in which they occur, differ in nothing from those in the lowest. Identical conditions may be predicated of recent forms. Simplest organisms hold the field as tenaciously as most complex ones. Species that have dropped out of present faunæ have not fallen in the struggle for existence against healthier or incidentally better equipped individuals of the same species, or against closely related species, but in the struggle against man. If the great auk has passed from among birds, and if the American buffalo is passing from among mammals, it is because man found them convenient for food, and they have no chance against the snare, and the arrow, and the knife, and the rifle, in their struggle with man.

In his survey of the two great departments, palæontology and recent forms, man sees everywhere the past shedding light on the present, and the present on the past. Early simple forms become to him the promise and the prophecy of those that are highly complex. Composite types, as where fish and reptile occur in one genus, are seen differentiating, their rank as types being determined by concentration rather than by complexity of organs, and corresponding psychical advance keeping in line with physical development, till reason-endowed man appears, the head and crown of life. Man, the interpreter of nature (*"homo minister et interpretis natura"*), takes all the past and all the present worlds of life and vegetation into the presence of the Creator, as having found in them motives for worship, materials for praise: "O Lord, how manifold are Thy works! in wisdom hast Thou made them all. The earth is full of Thy riches. So is this great sea."

If, then, all through the great epochs of geologic time, and all through the long ages that have run since the forms that now surround man were introduced, the environments of animals have ever been adapted to their instincts and appetites, is it the least likely that man would be the single exception to this? Is it, in face of the fitnesses between

all other living forms and their surroundings, conceivable that man alone would be endowed with powers for whose exercise no provision had been made, and for whose satisfaction no objects had been provided? Is it credible that amplest means were put within reach for the gratification of his instincts and appetites, and yet that none were furnished for that of his moral faculties? There is only one sufficient answer to such questions,—an answer, however, which cannot be given without bringing into full view the steps which lead up to it. In our study of nature we meet with adaptations which imply forethought, contriving wisdom, creative personality, creative beneficence; moral elements come into play, conscience is active, there are conscious moral relations between man and the personality discovered in creation,—relations whose recognition bring with it a class of wants for which satisfaction is not to be found in nature, the scientific study of which has forced from observers the recognition of an all-pervading personality, the light of whose presence has quickened and intensified the very sense of evil and the desire after good, and the search after God, which yet nature can do nothing to gratify. God recognises the wants of “his own offspring,” and provides for their gratification. Thus the crowning adaptation,—the adaptation between the Gospel and the spiritual constitution of man. Theism slopes upward into Christianity, and lays its lavish testimony to the manifold wisdom of God at the feet of Him to whom the wise men of old brought their gifts, gold, frankincense, and myrrh: “He is Lord of all.” But are not Christian apologists apt to attach too great value to the mere acknowledgment of a God by some distinguished workers? What is wanted, even for their own sake, and the world’s sake, and the Church’s sake, is something that will put heart into their confession, set their high attainments all aglow with a light and warmth more than human, and lead to a personal consecration whose intensity and intellectual breadth would find fittest expression in the words, “for me to live is Christ.” This attitude far transcends that of theism, and the worker finds himself at home with a new doctrine, that of Christ’s creatorship. Nature has a Christology whose exposition and illustration depend on the same methods as those of scripture Christology. Faith leads the observer into a sphere outside of, yet concentric with, that in which the organs of sense have scope and exercise, and in which the great and pressing question of our age,—the question of the origin of all things,—finds an answer: “Through faith we understand that the worlds were framed by the word of God, so that the things

which are seen were not made of the things which do appear." The supernatural testimony of Revelation completes that of nature to creative personality. True, the facts of Revelation are not discoverable by reason. But, while the domains of thought are enlarged, and the objects of thought multiplied, the qualities of thought are identical in both spheres. The faith which finds opportunities innumerable of exercise among the works of nature, is precisely the same power as that by which we deal with the facts of revelation. And its exercise, in the latter department, is no more inconsistent or out of harmony with reason, than its exercise is in the former, while the new standing point is in complete accord with science. In the present conditions of thought, touching the borderland between science and scripture, the importance of this cannot be over-estimated. In scientific lines, and by the method of science, the *Christian* student may reach a knowledge of God as true and trustworthy as the knowledge he may have of his fellow men,—a knowledge which enters experience and becomes truly our own, and, as our own, is felt to be both rational and logical. Natural fitnesses, either between the individual parts of organisms, or in the relations of similar or different organisms to one another, are as good towards the inference of intelligent creative personality as corresponding fitnesses in the products of human skill are towards the inference of intelligent human personality,—a personality in both cases resembling our own. We can thus acknowledge the fairness of the charge of anthropomorphism. It is made as a term of reproach, we accept it as a testimony to man's origin,—“God created man in His own image.” By this, man is drawn to seek after God in His own works, and, when he finds in these proofs of thought and forethought and intention, the mental qualities which are his, as one of God's children, fit him for knowing the Father. Thus, indeed, the chief element of strength in the doctrine of final causes. [Now, when we change the point of view from theism to Christianity, and when faith accepts the *New Testament doctrine of Creatorship*, then, and not till then, in lines and by a method as trustworthy from the latter as from the former point of view, we may reach the inference that He who is King, eternal, immortal, and invisible, by whom “all things were created that are in heaven and that are in earth, visible and invisible,” “by whom all things consist,” and without whom “was not anything made that was made,” is none else than He on whose cross was written, “This is Jesus the King of the Jews.” But the steps of legitimate inference end not till we reach the words, “By

whom we have redemption and the forgiveness of sin." Now, would not much be gained were Christian apologists to insist that theism can only be of highest value as a starting point, a *terminus à quo*—a point from which to pass to the Bible views of Creator and Creation? Frankly avowing, however, that this is done to bring full in view the grand truths inseparably linked up with Christ's Creatorship, even His Incarnation, Atonement, and Resurrection.]

The CHAIRMAN (Right Honourable Lord Grimthorpe).—Our thanks are due to Professor Duns for his paper, which has been so admirably read by Mr. Cadman Jones. I need not say that the subject dealt with is a very important one. With regard to the paper itself, I hardly know what to say. To say that I agree with it in general would be to say nothing, and I am afraid I cannot say I agree with it in all its details. I agree with some of the general propositions, such as that which asserts that theism without Christianity is very imperfect, and a good deal more which I need not repeat. But the question which occurs to me on reading papers of this sort is, What good are they likely to do? What practical lesson is to be drawn from this paper, and what is to be carried away by those who have heard it? Do you believe any more or any less in either of the two propositions which Professor Duns has rightly stated as the only alternatives? I must say I was struck with this. In one part of the paper the author says:—"But we are asked, 'Do you really believe that every plant and animal is a special creation, the result of a special act of Divine interposition?'" and then he says "The question is not fair." I really do not see why it is not fair. The answer may be easy, or difficult, or there may be several answers; but the man who propounds any kind of scientific theory is bound to be prepared to answer any question which is not absurd or demonstrably unfair. A question is not made unfair by saying it is so. Dr. Whewell, one of the most distinguished men of his time, and opposed to Darwinism then, faced this very question, and said distinctly that he thought it was fair, because there were only two alternatives they must accept,—either transformation or creation. As Dr. Whewell answered the question, "transformation means what is commonly called evolution." There is another remark I would make on this paper, and that is that there is a good deal of unnecessary verbal criticism in it. What, I ask, can it signify whether

Darwin's book is properly called the *Origin of Species* or not? No doubt, if we had discussed the matter with Darwin himself, he,—the most candid of men,—might have said, "Whether it is the right term or not, what I mean is, 'the cause of the change of species or of the production of new species.'" But Darwin expressly disavowed the intention of tracing all species up to their origin; and so he said over and over again. Indeed, I cannot help thinking that a good many people do not, or will not, recollect what Darwin himself frequently said. Take the last sentence in his *Origin of Species*:—"There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms, or into one." Is anybody here prepared to deny that? People very often confound Darwin with such mischievous writers as Haeckel and Spencer, who assume everything they want, and whose logic is as illogical as possible. I am glad to see that Darwin had in his heart much the same opinion of Spencer's philosophy as I expressed in this room four years ago. He said he could not understand Spencer; which meant a great deal, from him. He suspected Spencer's "principles," by inventing a few of which he pretended to generate the world. You will see from that paper of mine what prodigious folly that leads to; and, as I have shown, Darwin did not believe in Spencer's so-called principles a bit. Haeckel and the atheists, and the persistent-force men, say the weak part of the Darwinian theory is that Darwin did not agree with them; that he recognised the necessity for a Creator. Therefore, when Professor Duns and others talk about Darwin and Darwinism, they should remember what Darwinism means. There may be people who are a great deal more Darwinian,—if one may use the term, though it is wrong,—than Darwin; or rather, who are more revolutionary or evolutionary than Darwin. People fancied that Darwin's views and theories led necessarily or logically to atheism; but Darwin said they did not; and this will be seen not only from the passage I have read to you, but from another which I take from a letter to Dr. Asa Gray, where he says:—"I am inclined to look at everything as resulting from DESIGNED LAWS, with the details, good or bad, left to the working out of what we may call chance,"—though elsewhere he explains that chance only means the necessary result of the laws in one direction or another, and he adds, "Let each man hope and believe what he can. Certainly I agree with you that my views are not at all necessarily atheistical." Nothing could be more decisive or clear than

this. Then he goes on to say, "I can see no reason why a man or any other animal may not have been aboriginally produced by laws which may have been expressly designed by an omniscient Creator, who foresaw every future event and consequence." You will see in various parts of Paley's *Natural Theology*,—a book which I never open without wonder at its logical and scientific power, considering how much has been learned since,—that he anticipated "the possibility of its being proved that things are produced with mechanical dispositions fixed beforehand by intelligent appointment," besides demonstrating the impossibility of their existing without it. Paley had a kind of instinct (and he was a great mathematician and natural, as well as moral, philosopher), which led him to think the time might come when it would be seen that there must be continual creation by changes going on from time to time, producing one animal of one species at one period and another at another, and all produced by mechanical laws made by the Creator whenever the world began, or rather, before it could begin. I see no difference between Paley and Darwin as to this. We know that Darwin gradually slid out of a belief in Christianity, because he would not believe in miracles,—not out of a belief in a Creator, but out of a belief in Revelation; but that has no relation to this question. Carrying on the same line of argument, I cannot help thinking that Dr. Duns has rather overlooked some necessary things in giving his catalogue of great men who are satisfied with the theory of special creation, taken in its common sense. He says, "It satisfied Newton and Brewster." How could it help satisfying them when no other theory was before the world? Darwin's theory was founded on an enormous collection of facts,—and not on facts alone, but on inferences from them. Some one must make the collection, and Darwin began it in reality during his voyage in the *Beagle*. Newton, Linnæus, and Cuvier had them not. I think Agassiz, who differed from Darwin, was by no means so great a philosopher as some who agreed with him. To talk of Butler and Chalmers is out of the question. Butler was the greatest reasoner of the day on the facts then known; while Chalmers was only a theologian and preacher, though a great one. Clerk Maxwell did not live to see a great deal that has been discovered since. This paper asserts that nothing has been discovered since Darwin confirming his views. For my part I have read enough to believe that every discovery made in the direction of Darwin is made in the direction of transformation of species under laws of

nature, which are laws of the Creator, though not in a direction pointing to a self-creation of species, or of anything at all without a primary cause. As far as I can find out, almost every discovery made in palæontology and other things has tended to fill up the gaps left in Darwin's discoveries; or rather, I should say, to reduce the size of the gaps. People are too apt to forget that a small gap requires a power to leap over it just as much as a great one, speaking philosophically and in looking for causes. Darwin not only knew there were gaps, but said so over and over again. There never was a more candid writer, and, as has often been said, he stated objections to his own theory stronger than any others that were put forward. He had faith in some of the gaps being filled up as time went on. I need hardly say I am not an evolutionist to the extent of believing that any evolutionary theory will account for everything. On the contrary, I argued in the paper I have referred to, that every change, however large or small, is a creative act, not necessarily made as an act of interference, but as the result of laws of nature going far deeper than we know anything about. I mentioned in that paper the case of "calculating boys," of whom I have known two or three in my life, and I said there was one of my own profession, a Q.C., who could work in his head in a moment questions that would take any of us at least ten minutes to solve. Now, how does that arise? How can such a thing be the result of chance? Darwin explained what he means by chance. Of course, he knew there is no such thing as chance strictly, and cannot be; that that which we call chance is the result of certain laws of nature which we partly understand and partly do not understand. I said in that same paper there is not a grain of dust that falls by what we call chance or that does not fall according to a law of nature; and that is an obvious truism. Darwin used the word "chance" as meaning the necessary result of some laws of nature. Whatever the laws of nature ordain must be accepted as a necessary and logical result of them, for we cannot conceive the Creator altering the multiplication-table or the laws of geometry; and therefore we say that, whatever logically and mathematically follows from any law of nature cannot be avoided. As Darwin said somewhere, the results may be good or bad, but if they come from a law of nature, although they may be called the results of chance, they are the results of a law of nature all the same. And so, when a new organ appears in a body in which it has never appeared before, it has been created not the less

because it is a small change than if it were a great one. The calculating boys had not calculating fathers; and nothing can of itself give a greater power than it has. An instance Darwin mentions is one of a comparatively great, though sudden, change. He says that nectarines sometimes grow spontaneously on the boughs of peach-trees. You may think that is not much; but a nectarine is not like a peach; the two are very much unlike in taste, in skin, in texture, or flesh. Something which we cannot explain, something which Darwin calls chance, brings, every now and then, a nectarine out of a peach-tree. And so, when this paper says "That which was full-grown ever preceded the embryo," that, I say, is a loose way of talking. Something that was full-grown preceded always the embryo; but what has to be accounted for, and what in reality can never be accounted for except by some creative theory, is, why the embryo ever grows up into something different from that which produced it. There is the preliminary difficulty, which the Haeckelites and Spencerites have never faced. Why did generation ever take place? I only mention these things as specimens, and I am giving them in both directions,—specimens, if you will allow me to say so, to prevent your confounding these matters with the mere physical question of the origin of species, *i.e.*, of variations, and indulging in loose reasoning. Another proof of the incompetence of the evolutionists to explain the origin of the world or its present state without a Creator,—and the more I reflect upon it the stronger it seems to me,—is that which I did my best to expound here last year in my paper on the Beauty of Nature. I cannot even see that any evolutionist has ever made a fairly honest attempt to account for it on their principles, or can honestly have persuaded himself that he has done so. Most of them are the merest evasions of difficulties which they cannot face. Darwin evidently perceived himself to be helpless about it. The little bits of beauty within a very small domain of nature, for which they have invented guesses, are worth nothing as a theory, whether those guesses are right or wrong; for a theory which only professes to account for a small, or even a large, proportion of the phenomena which it ought to account for, but not for all, is no theory worth attending to, according to all the rules of science. And so it seems to me that the real objection to Spontaneous Evolution as a theory of Cosmogony, and the true line to take about it, which would be equally true if every suspected missing link were found,

is, that it accounts neither for the origin of life, nor for any kind of generation, nor for the production or growth of animals or vegetables from seeds, nor for any offspring having more powers than their parents, nor for the beauty of nature generally, nor for the existence of any laws of nature; for the origin of which not even Mr. Spencer can find more to say than they are "unfathomable mysteries," and that the existence of matter without them is what he is pleased to call "unthinkable," whatever that may mean. It seems to me that this is far more than enough to say against any theory that professes to account for everything.

Rev. J. C. WALKER.—It is a very curious fact in nature that an animal if produced by one that has been frightened takes the colour of the animal that gave the fright.

The CHAIRMAN.—The question is,—Why do changes of this kind take place—when they do, which is very seldom? And why does any change take place? Variation only comes because a law of nature has been ordained which makes it come when it is needed?

Rev. J. C. WALKER.—Animals become quite different on different soils.

The CHAIRMAN.—Yes, and why do they? It is all very well to say they adapt themselves to circumstances, climate, and soil, but how do they so adapt themselves? You cannot account for that. Professor Duns' friends seem to think that his first paper was not theistic enough. I can hardly understand that; and when he says he cannot accept natural selection as a substitute for the well-known theistical argument, how much does he mean? The only theistical argument of rational men now is that everything must have proceeded somehow from the Creator. What has natural selection to do with that? Paley anticipated that it would be proved some day that the Creator produced all things in nature by a provision that they should change according to circumstances, and be able to adapt themselves to variations of soil and climate, and so forth. Dr. Duns says:—"The whole subject admits of full discussion as a scientific subject, and not a theological doctrine." What does that mean? Of course, it is true in a sense, but it contradicts what he said before. He previously said that he reads this paper because some people found fault with his former one as not being sufficiently theistic, and then he says, "The whole subject admits of full discussion as a scientific subject and not a theological doctrine." The question of transformation as a mere question of fact, does not admit of discussion as a theological question. Darwin says you

can discuss the transmutation of species without the slightest reference to theology. Huxley says, in one of his dexterous phrases which imply more than he ventures to express, "Materialism is a very good working theory." Yes, I reply, it is; and so is gravity a good working theory; but you are here to tell us, not why gravity comes out well as a working theory when it is set to work, but who set it to work? That is the point. But we are told that theism alone is not sufficient without Christianity, and that we are not to rejoice too much over "the mere acknowledgment of a God by some distinguished workers." Of course; but sufficient for what? I ask what has Christianity to do with the theory of the transmutation of species? Christianity, depend upon it, never will be proved by anything except that which proved it originally, and forced it on a hostile world, viz., evidence of its miracles. I read this afternoon a curious illustration of the danger of putting Christianity on new grounds. Professor St. George Mivart, a distinguished scientist, is a Roman Catholic, and he says he rests everything on the authority of the Church, *i.e.*, his Church; for we Protestants certainly do not. He says distinctly:—"I admit that I do not believe the things that are stated in the Old Testament, or even in the New, as visible manifestations; but I accept them on the authority of the Church": which is very like saying, "I say that I believe on the authority of the Church things that in fact I do not believe at all." He has been attacked for that by a very astute antagonist, Sir James Stephen; and if you wish to see a theory completely smashed and stamped upon you will read his article in the *Nineteenth Century*. I am sorry to say that Sir James Stephen does not hold our opinions on theology, and I only bring this forward as showing the danger of preferring to rest Christianity on other grounds than those which established it, and were always appealed to by its Author and His followers. The other day I was talking about this, and some one said, "You don't mean to say you rest Christianity on miracles." I said, "What else do you rest it on? How did it ever get into the world without?" and my interrogator was flooded. It is, *a fortiori*, dangerous to mix up Christianity with science. They have nothing to do with each other. They are each the work of God, and are therefore equally true; but if you attach Christianity to a particular scientific theory, you run this risk, that your particular scientific theory may get knocked on the head, and then your opponent tells you, "You chose to rest your Christianity on your scientific theory. I have refuted your

scientific theory: where is your Christianity?" That is the danger of such a mode of reasoning. It is with this, as with all things relating to the Bible and theology; and I say that if people run away from or give up the original grounds on which both were established they are sure to fall. On this point I venture to refer you to my little tract or book on *Huxley and Hume on Miracles* (S.P.C.K.), which has never been answered, so far as I know. For all these reasons, I say that, although I agree with the spirit of a good deal contained in Dr. Duns' paper, I cannot honestly say that I think it the best mode of writing for the purpose.

The HON. SECRETARY (Captain F. PETRIE, F.G.S.).—The following communications have been received in regard to Professor Duns' paper.

The Reverend Canon Saumarez Smith, B.D., Principal of St. Aidan's College, Birkenhead, writes:—

"The Professor's paper is a very useful and suggestive one. His object seems to be to *Christianize*, if I may so say, the study of Natural Science. In place of the late Mr. Darwin's assertion that 'Science has nothing to do with Christ, except so far as the habit of scientific research makes a man cautious in admitting evidence,' the writer of this paper in effect asserts that students ought not to be content with even the *theistic* inference from Nature, but, finding in Theism a testimony to 'creative personality,' should not shrink from further research into what that recognition involves. The Bible, with its proffered Revelations, should not be 'shunted into a siding,' as if it were a useless or dangerous block in the way of science. It should rather be used as another engine for real and rational progress in knowledge. Charles Darwin was an instance of a man who vacillated between an indefinite kind of theistic sentiment and an agnosticism which resulted from the refusal to entertain, or 'think deeply' on, religious subjects: for, as he acknowledges, he had 'never systematically thought much on religion in relation to science, or morals in relation to society.' In other words, he was a *mere* naturalist, and not a moralist."

"It is relevant to note that the theory of 'natural selection' is specially stated by Mr. Darwin to have driven him from the theistic inference to which 'the old argument of design from Nature' leads.

"The ambiguity of the terms 'Evolution,' or 'Darwinism,' leads, as Professor Duns points out, to great confusion in argument. An 'evolution' which is regarded as a portion of the divinely-ordered

processes whereby the Primal Providence of God acts in nature, is a very different conception from the 'Evolution' which is viewed as an operative, blind Force, that, without God, somehow, in an endless succession of ages, unrolls, from nothing at all, everything that exists, whether in the material or moral spheres of fact and observation.

"The Bible cannot fairly be ignored (though it ought to be criticised and tested) in relation to questions of natural science, wherever such questions are concerned with theories of origin. For this collection of ancient books, with a remarkably persistent consistency of statement, which runs through long and diverse periods, refers the origin of the universe to a Self-existent Being, who is 'the Former of all things,' and concerns Himself with the moral, as well as with the material, environment of mankind. This Bible teaches us that a theory of special creation (or creations) stands at the head of all attainable knowledge. Parallel with the statement of the theory in the paper that 'that which was full grown preceded the embryo,' the sublime and vast idea is present to the mind of the Christian student that *God precedes all*, and that from the Divine 'Fulness' goes forth a creative 'Word,' and a fertilising 'Life,' whereby the universe is constituted, ruled, and preserved. This, though a necessarily mysterious theory, is surely a more reasonable and satisfactory one than the unproved and unverified theory of a mere natural 'evolution.'

"Has the theory of special creations been disproved, or discredited? The great advance in knowledge of natural phenomena, and in consequent materials for inferential or speculative conclusions as to laws of Nature, or genetic processes in diversified vehicles of life, may lead men to alter and modify older definitions or dogmas; but it has done nothing to shake the fundamental position that in the beginning God created the heavens and the earth. This being so, 'the Bible views of Creator and creation' ought not only not to be scouted as unscientific, but ought to lead the students of Nature to prosecute the study of the Bible, and to endeavour to find the real connexion existing between the material and moral spheres of research; spheres which, although in many points distinct, are yet also in many points in contact, and may not be continuously treated as dissociated from each other.

"The scientist has no right to say, 'I have no need of Revelation,' any more than the Christian philosopher or theologian has a right to say, 'I have nothing to do with science.'

‘The genuine seeker after truth should not ‘be content to *remain* an agnostic,’ or wish to become what Mr. Darwin has said he himself became—‘colour-blind’ to religious conceptions. And the Christian student of science gains by the *Christology* of the Bible an insight into the sublimest views both of Nature and of the faculties and destiny of man.”

Mr. HASTINGS C. DENT, C.E., F.L.S., writes :—

“Professor Duns’ paper is a very valuable one indeed, and the author deserves not only our best thanks, but also our support by the hearty expression of our ideas as to matters of detail, for which there is a vast scope by corroborative evidence. Our watchword should be ‘Union is strength,’ and I fear this is perhaps scarcely enough considered by many who are endeavouring to express—according to their convictions—the true unity of the book of Revelation and the book of Nature. While I thoroughly agree with the author ‘that theism alone is of highest value . . . which is in conscious sympathy with Christianity,’ I must confess that in our conflict with agnosticism and atheism it seems to me that we lay ourselves open to be assailed on matters entirely beside the point we are arguing if we take our standpoint on Christianity as an axiom. Christianity is a purely metaphysical and religious question, and therefore I humbly submit that we should not bring the subject of our Holy Faith into the discussion. The great difference is this: that, while our belief as to the origin of things which are seen can be worked out reasonably on scientific lines to support our faith in God as the *Creator*, and *not* the *Evolver*; our faith in the transcendental mysteries of the Incarnation of our Blessed Redeemer and His Atonement cannot be thus laid down for logical acceptance by the unbeliever. But I agree so thoroughly with the author’s words (p. 120):—‘The Church is called to see that Christian thought and effort are ever kept in touch with the progress of science, welcoming its fruits, entering sympathetically into the intellectual difficulties of its workers, and even according to them large liberty of honest speculation.’ It is to this facet of the crystal of truth I feel drawn to direct my few remarks. I would not welcome as comrades in the fight any who do not uphold the Bible; but to assert to our opponents that our standpoint is the Catholic or Christian Faith is rather different. The bigotry and intolerance of some ecclesiastics have led some men, who are working in the domain of the physical and natural sciences, to

throw over as insupportable the bonds by which their predecessors had been held, or in which they had themselves been educated. The result has been equally disastrous both to the interests of Christianity and of science. I have referred to this in my book *A Year in Brazil*, in a chapter on the Theory of Evolution, where I say:—'Whereinsoever scientific men have attempted to disprove certain spiritual truths as doctrines, such as the efficacy of prayer, the possibility of miracles, &c., they have dealt with things outside their province. Mathematics, physics, biology, do not afford an explanation of the spiritual world. The finite mind cannot comprehend the Infinite, but it may apprehend it by accepting revealed truth. On the other hand, whereinsoever ecclesiastical dogmatism has decreed certain explanations of phenomena or conditions of the natural world, which explanations have been proved to be contrary to fact by scientific discoveries, therein such dogmas are manifestly erroneous, and are the results of human interpretations of the text of Scripture; which writings were inspired, not to teach man what he might find out for himself, not to instruct in natural science, but to reveal how the creature may approach the Creator. In each case, therefore, the apologists of party have argued from the known to the unknown, and the result has been a confusion of ideas—generally, if not invariably, the result of a warped and bigoted intellect. Life is too short, its duties are too momentous, for us to spend our few days in speculation. One thing is evident, man *has* a body, and *is* a spirit which will live for ever. Revelation tells him how to prepare for that future life. Meanwhile, there are thousands who, knowing, believing in, and loving this grand truth, can afford a few hours occasionally . . . to devote to the study of nature. If they approach it with the feelings of the psalmist: "Lord, how manifold are Thy works! in wisdom Thou hast made them all;" to them the study is not only of the deepest interest in itself, but, by increasing their knowledge and appreciation of the wonderfully intricate works of the Great Creator, it assures them that if He can so carefully arrange the complicated adjustments which are necessary for the well-being of the whole organic world, and can watch over all the smallest organisms that He has created, so much the more they who are formed in His image, after His likeness, are His special care. Thus . . . they may through nature be led up to nature's God, and acknowledge that He, the Omniscient, the Omnipresent, the Omnipotent, "hath done all things well."

"In conclusion, with regard to the interpretations offered by certain

writers on the first chapter of Genesis, I would quote the words of the Duke of Argyll:—‘the first chapter of Genesis stands alone among the traditions of mankind in the wonderful simplicity and grandeur of its words. Specially remarkable—miraculous it seems to me—is that character of reserve which leaves open to reason all that reason may be able to attain. The meaning of these words seems always to be a meaning ahead of science; not because it anticipates the results of science.’”

The meeting was then adjourned.

THE AUTHOR'S REPLY.

My reply deals only with the leading review and criticism of my paper. To discuss fully the topics, relevant and irrelevant, referred to would demand more space than the paper itself. But I wish to be brief:—(1) "What practical lesson is to be drawn from the paper?" One lesson is, that something to the point can be said in favour of the doctrine of special creations, in the face of attempts to discredit it by such assumptions as the critic condemns in Haeckel and Spencer, "who assume," he says, "everything they want, and whose logic is as illogical as possible." (2) "The question is not fair." "I really do not see why it is not fair." The two sentences which follow show well enough why it is not fair. It is "demonstrably unfair," because it is put with the view of committing the writer to the demonstrably unscientific opinion that numberless so-called permanent varieties, which go by the name of species, are the fruit of special creative acts. It is "demonstrably unfair," because those who put it, if we may credit them with ordinary intelligence, must know that the advocates of the doctrine of special creations ascribe to organisms great plasticity, even while they refuse to attribute change to mere mechanical cause. (3) "Every change, however large or small, is a creative act, not necessarily made as an interference, but as the result of laws of nature going far deeper than we know anything about." Clearly we attach different meanings to the terms "creative acts." But to confound the action of divinely-guided second causes with the act of special creations, seems to me to lead to the threshold at least of a department more congenial to "loose reasoning" than to scientific discussion. Final causes are not miracles. (4) "How could it help satisfying them when no other theory was before the world?" The querist ignores the whole history of thought on the subject—the Darwinism before Darwin—a copious literature which will force all who have a competent knowledge of it to refuse to Darwinism the interest of a new thing under the sun. I affirm that there are very few, if any, vital points in that system which may not be found in French literature of specu-

lative science, towards the end of the eighteenth and the beginning of the present century. Does the critic believe that either Newton or Brewster was ignorant of the *De Rerum Natura* of Lucretius? As to both, there is the fullest proof to the contrary. Then, as to most of the other names mentioned, is it the least likely that they were not familiar with the speculative views of Lamarck? But more, one of the most interesting of Chalmers's early papers was a review of the *Système de la Nature* of M. Mirabaud (Baron d'Holbach). "Chalmers was only a theologian and a preacher." The author of this remark has forgotten the St. Andrew's University mathematical and chemical lectures. (5) "What can it signify whether Darwin's book is properly called the Origin of Species or not?" Turn to the numbers of *Nature* referred to in my paper, and it will be abundantly evident that loyal and intelligent Darwinians would be slow to regard as "unnecessary verbal criticism" my allusion to the new factor alleged:—

To regulate the changes
Between Man and Tunicate,
In the Evolution process
And the Powers that on it wait!

(6) "As far as I can find out, almost every discovery made in palæontology and other things has tended to fill up the gaps left in Darwin's discoveries."* No weight can be attached to such assertions in the absence of illustrative instances. The author hopes he is acquainted with "almost every discovery in palæontology"; he cannot add "And other things," nor would he like to name all the "gaps" referred to. He is, however, sure that recent discoveries in palæontology do not warrant this statement. But as to, at least, another great gap recently made in Darwin's argument from palæon-

* A Member writes:—"Probably Lord Grimthorpe did not intend to refer to the origin of man when giving this opinion, as the evidence furnished in the new works of Sir J. W. Dawson, K.C.M.G., F.R.S., Professor W. Kitchin Parker, F.R.S., Professor Hartmann, and others is against any gaps between man and the lower animals having been bridged."—See also the *Journal of the Victoria Institute*, vol. xx. p. 87, et seq.—ED.

tology he takes the liberty in this connexion to refer to a paper *On some Darwinistic Heresies*, by Prof. Carl Vogt (*The Annals and Mag. of Nat. His.*, vol. xix., No. 109, Jan. 1887), a most suggestive paper from an unexpected quarter. (7) "The only theistical argument of rational men (!) now is that everything must have proceeded somehow from a Creator. What has natural selection to do with that?" It has to do with it simply because it is asserted to be the "somehow." But those who propose it go a little farther than the critic, and say that the Creator is unknowable. "I think," said Darwin, "that generally (and more and more as I grow older), but not always, an Agnostic would be the more correct description of my state of mind." "I for one must be content to remain an Agnostic" (*Life*, vol. i. pp. 304, 313). (8) "That which we call chance is the result of certain laws of Nature which we partly understand and partly do not understand." What has this vague remark to do with my last paper? I do not think the word "chance" occurs in it. But as it is made much of in the criticism, it may be well to notice the office assigned to it. "I am inclined," said Darwin, "to look at everything as resulting from designed laws, with the details, whether good or bad, left to the working out of what we may call chance. Not that this notion *at all* satisfies me. I feel most deeply that the whole subject is too profound for the human intellect" (*Life*, vol. iii. 312). The details of designed laws left to the working out of chance! Take an illustration: Man is the outcome of cycles of evolution by natural law! But what of sex? Oh, it is a mere "detail" worked out by "chance." Does my critic think this mechanical hap-hazard quite as much in the lines of common sense, and, as such, of true science, as the alternative explanation,—“He which made them at the beginning made them male and female”? But more, what becomes of the doctrine of special providence? What of the words, “My Father worketh hitherto and I work”? Is there no certain, no sure, knowledge anywhere on these great and vital questions? It will not do to refuse to look at the answer which Revelation gives to them, or to put the Word of God out of court in their trial.

I confess it would have been a disappointment had the other criticisms been in the lines of that which has been noticed. I am,

however, much gratified by the able and judicious critical remarks of the gentlemen whose contributions to the discussion were read by the Honorary Secretary.

NOTE

With regard to the question of nectarines growing on peach-trees referred to in this discussion and in Darwin's *Variation of Animals and Plants* under domestication, vol. i., pp. 357-365:—Being aware that Messrs. T. Rivers & Son, of Sawbridgeworth, were the greatest nectarine and peach growers in the United Kingdom, and that they would be able to speak from experience,—the firm having cultivated the fruit for over a hundred years,—the point was submitted to it. Mr. T. Francis Rivers has most courteously replied as follows:—"The nectarine is merely a form or variety of the peach, and there is no more special difference than between a rough and smooth terrier. I have heard it asserted that a peach-branch had produced nectarines, but this assertion has never been to my knowledge on actual observation, but has been merely hearsay. I have had thousands of trees under my notice and have never seen the fact; it may have happened, but I believe the cause of the variations may be very easily solved, that is, that a bud of a nectarine had been inserted in the peach-branch and forgotten. The variation from seed is frequent, and indiscriminate peaches from seed produce nectarines, and *vice versa*. I send an example by this post. The peach and nectarine are raised from stones of the Advain nectarine, a very early sort. One can see that the peach is late and the nectarine hard. I have raised hundreds of seedlings with the same result.—Aug. 22, 1888."*

* To those who examined the specimens sent, the skin of the peach appeared less woolly than usual, and with a slight blush of the nectarine in one part.—ED.

THE LATE PROFESSOR ASA GRAY.

Professor Asa Gray, who is referred to in the foregoing discussion, was regarded by men in both hemispheres as occupying a foremost, if not the foremost, place among American men of science. He died on the 30th of January, 1888, in his seventy-eighth year, and the following notice of such a man may well appear in these pages :—

“By the death of Professor Asa Gray, which occurred lately at Cambridge, Massachusetts, the scientific world loses not only one of its most eminent minds, but also one of its most pleasing personalities. Born in the State of New York, Asa Gray was a type of the New Englander in his character and in his peculiarities. The curious mixture of simplicity and shrewdness, with a strong undercurrent of humour ever ready to make its presence apparent, which distinguishes the old-fashioned New Englander, has seldom been better exemplified than in the personality of the deceased Professor of Natural History at Harvard. Nor was the strong religious tinge of the descendants of the English Puritans wanting to complete in him the picture of an American of the old school, which is in danger of being swallowed up in the flood of heterogeneous elements which is nowadays invading the States. The pioneer in America of the Darwinian doctrine of evolution, and the intimate friend, correspondent, and admirer of Darwin, Asa Gray nevertheless declined to carry his admiration so far as to give an unreserved assent to his friend's teaching. The sincerely religious strain in his character forbade a full acceptance of the logical conclusions on spiritual subjects which must have resulted from such acceptance. He formed, indeed, a sort of common ground, a *point d'appui*, both for science and religion, and it was in that capacity that he appeared at Lambeth Palace at a dinner given by the late Primate to eminent scientific personages in the year 1881. On such an occasion, when science was the guest of religion, Asa Gray was distinctly in his element. By those of his countrymen who knew him, and his many and various friends in England, the death of Professor Asa Gray will be sincerely regretted as much on personal as on scientific grounds.”

ORDINARY MEETING, FEBRUARY 6, 1888.

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

The Minutes of the last Meeting were read and confirmed, and the following Elections were announced:—

LIFE MEMBER:—J. Deacon, Esq., M.A., Oxon, Kent.

MEMBERS:—Rev. C. Clemance, B.A., Lond., D.D., London; Rev. D. MacEwan, D.D. (Glasgow), London; Surgeon-General A. Goodall, F.R.C.S., London; Rev. A. Irving, B.A., B.Sc., F.G.S., Wellington College, Wokingham; Rev. R. S. Tabor, M.A., Middlesex.

ASSOCIATES:—Rev. Brook Deedes, M.A., India; W. D. Glossop, Esq., London; Rev. B. G. Richardson, M.A., F.G.S., London; Rev. J. Ridley, Yorkshire; Rev. W. D. Ridley, M.A., Camb., Yorks.

CORRESPONDING MEMBER:—Colonel Philip Doyne Vigors, M.R.I.A., &c., late 11th and 19th Regiments, Ireland.

A paper, entitled "Genesis I and its Critics," by C. B. Warring, Esq., M.A., Ph.D., of Pough Keepsie, United States, was then read, and a brief discussion ensued. (The publication of this paper is delayed.)

ORDINARY MEETING, FEBRUARY 20, 1888.

THE PRESIDENT, PROFESSOR G. G. STOKES, D.C.L., P.R.S.,
IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following Elections were announced:—

MEMBERS:—Major-General R. P. Anderson, B.Sc., London; R. Holmes White, Esq., London.

ASSOCIATE:—Rev. J. Neil, M.A., Camb., London.

A lecture on "Babylonian Early History," illustrated by maps and drawings, was delivered by Mr. W. St. Chad Boscawen, F.R.Hist.Soc.

A discussion ensued, in which the Honorary Secretary, called attention to the fact that during the year 1881 the *firman* granted to England for the purpose of carrying out explorations and excavations on the sites of the buried cities of Babylonia, terminated. The discovery by Mr. Hormuzd Rassam in 1881 of the buried city of Sepharvaim, one of the first mentioned in Holy Writ, had thrown a fresh flood of light upon the history of early times. The inscriptions already discovered, however, specially indicated the immense value of what still lay buried. The knowledge obtained was essentially fragmentary; to make it perfect, and even to complete many an inscription now in the British Museum, one needed further excavations, and these excavations must be carried on by experienced men, accustomed to deal with the sun-baked inscriptions, which soon perish after being brought to the outward air. It was sad to think that seven years had now elapsed without another *firman* having been obtained to enable this great mine of ancient history to be further explored, the more so as England just now possessed the services of the original English discoverer of these buried monuments, and of men whose special training as decipherers placed us in a far better position than any other nation to continue the work we had begun.

ORDINARY MEETING, APRIL 9, 1888.

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

The Minutes of the last Meeting were read and confirmed, and the following Elections were announced:—

MEMBERS.—Rev. Principal J. Culross, M.A., D.D., Bristol; Rev. E. H. Hopkins, Richmond; R. Mountain, Esq., Harrogate; Professor J. H. Panton, M.A., F.G.S., Prof. Nat. History and Geology in the Agricultural College, Guelph, Canada; Vice-Principal, R. Weston, the Old Hall, Shropshire.

ASSOCIATES.—The Hon. T. F. Bayard, Minister of State, United States; W. W. Colborne, Esq., M.D., Margate; F. Hasluck, Esq., Birmingham.

A lecture on "The Diluvial Effects of Waves of Translation" illustrated by maps and drawings, was then delivered by Admiral Selwyn, R.N. A discussion ensued, in which Admiral Scott, R.N., Mr. W. St. C. Boscawen, the Rev. Dr. Syle, Herr Kamptrenvener, and the Chairman took part.



Ancient Human Footprint on Tufa, from Nicaragua.

NOTE.

ON ANCIENT HUMAN FOOTPRINTS IN NICARAGUA.

SOME time since it was reported that human footprints had been discovered on rocks in Nicaragua, and as the fact bore upon the question of the antiquity of man, considerable

inquiry took place with a view to ascertaining the particulars regarding such discovery, and it was found that the rocks in question were volcanic.

The following remarks upon the subject were laid before the American Philosophical Society during the past session, in a paper entitled "On an Ancient Human Footprint from Nicaragua," by Dr. D. G. Brinton.

The discovery of human footprints in volcanic rocks near the shore of Lake Managua, Nicaragua, under circumstances which seemed to assign them a remote antiquity, has been announced for several years.* We owe thanks especially to Dr. Earl Flint, of Rivas, Nicaragua, for information about this discovery, and for sending several specimens to the United States. Four of these are in the Peabody Museum of Archæology, Cambridge, and recently I have myself received one from Dr. Flint, together with several letters describing the locality. The possession of this material has induced me to present, along with its description, a general review of the subject.

The surface of the Republic of Nicaragua presents in nearly all parts the signs of enormous volcanic activity. It is broken by a complex series of mountain ranges whose sides are scored with vast lava streams. Frequent earthquakes attest the continued energy of the subterranean forces and prepare us for incidents of elevation and subsidence on an uncommon scale.

The great lakes of Nicaragua and Managua are divided by a low plain, through which flows the river Tipitapa, connecting these sheets of water. South of this lowland rises a mesa or table-land 400 or 500 feet above the level of the lakes, and upon this stand the volcanic cones of Mombacho (4,588) feet and Masaya (2,972 feet). Beyond these, the land still rising, reaches its height in the Sierras de Managua, presenting the craters of the extinct volcanoes of Tizcapa, Nezcapa (Nehapa), and Asososco; and further to the north-west immediately upon the shores of the Lake Managua, the still smoking peaks of Chiltepec (2,800 feet) and Momotombo (6,121 feet).

* The following are the principal references: Letter of Dr. Flint, dated Jan. 7, 1884, in the *American Antiquarian*, March, 1884; *17th Report of the Peabody Museum* for 1884, page 356; *18th Report of the same*, 1885, page 414; *Proceedings of the American Antiquarian Society*, 1884, p. 92. Letter of Dr. Flint in *American Antiquarian*, May, 1885.

The last named (Momotombo) was active in 1852, and Masaya in 1858 and 1872, while Mombacho, though quiet, so far as we know, since the conquest, according to tradition, destroyed an important town just before that epoch, and its sides still reveal signs of terrific outbursts at no distant date. In the eruption of March, 1872, Masaya vomited a lava stream two miles in width.*

I quote these facts to show the volcanic character of the country, and the powerful agencies at work there.

For our present purpose, we have to confine our attention to the extinct volcano of Tizcapa. Like its neighbours, the cones of Nezcapa and Asososco, it has long since burnt out its fires, and all three have changed their flaming craters into deep and still lakes, encircled by precipitous walls of congealed masses. Tizcapa is about two and a half miles from the shore of Lake Managua, and in ancient times its molten streams found their way into the waters of the lake. Its eruptions were irregular, and evidently long periods of quiescence intervened between those of violent action, periods extended enough to allow the earlier tufa beds and lava streams to become covered with vegetation, the relics of which we find imbedded beneath later overflows. How much time this would require is a vital question in deciding the age of the footprints. These are found on the surface of the *first* or lowest tufa bed, which itself rests upon a bed of yellow sand.

Before proceeding to a discussion of the antiquity we may fairly assign to the relic, I shall insert Dr. Flint's description of the locality, and add a vertical section of the cutting in the quarry on the lake shore, in which the footprints are found. Both of these he has kindly sent me in a recent letter.

"The Cordilleras east of Lake Nicaragua are a continuous succession of low mountains, spread out and gradually diminishing to the depression, where the outlet of Lake Nicaragua passes seaward by the San Juan River. In past ages the spur west of the lakes Nicaragua and Managua (formerly part of an ocean inlet) was the theatre of volcanic action seldom exceeded; and its latent fires, out of the axial line, at Ometepetec and Momotombo, still smoke. These magnificent cones may continue to burn for ages, until they disappear, like their neighbours, leaving like them an abyss to mark their location.

"Zapatero has its deep lake, whose surface is but slightly above

* See Pablo Levy, *Notas sobre la Republica de Nicaragua*, pp. 83, 84 (Paris, 1873), and A. Schiffman, *Una Idea sobre la Geologia de Nicaragua* p. 125 (Managua, 1873).

the waters of the one surrounding it; north-west and near Granada, we look down from the edge of the old crater on a placid lake, whose four square miles of water are seldom stirred by the wind, and whose depth has not yet been fathomed. When were the fires of this immense crater extinguished?

"Lake Masaya far exceeds that of Apoyo; as we descend the deep ravines cut through the tufas to its margin, we see the work of centuries carrying back this detritus to re-fill the abyss, and no perceptible diminution is noted. Passing on, we find the lakes Nehapa, Asososco, and Tizcapa, under similar conditions; the latter near Managua, furnished the material forming the tufas on which the footprints occur.

"These lakes at the time of the Spanish occupation, now nearly four centuries, presented nearly the same aspect as they do now; their rock-bound shores were covered with inscriptions, of which no tradition could be obtained of the tribes then occupying this region. The country was clothed with impenetrable forest that had sprung up on these arid wastes of tufa. We dig below this fertile soil, and after removing five well-marked beds of tufa, including a lower one of pure ash, we encounter a deposit of clay, a soil of other times, accumulated under circumstances similar to that now on the surface. It also had its plants and trees. Among the former we see long liriaceous leaves impressed on the friable deposit. We ask, is this the soil of the first inhabitants? Before deciding, we dig below, through four more deposits, with other accumulations in the seams, of pumice and volcanic sand. We reach a thin friable tufa, nearly black, about two inches thick; removing it, we find a heavy deposit of tufa lying on yellow sand. This is the last in the series; on its upper surface we find innumerable footprints of a people who had passed over it, at different times, when in a plastic state. Some sank deep in the mass, while others left superficial impressions. Now and then, a stray leaf of that horizon was trodden into the imprints; others are on the friable under-surface; they seem to differ from those above under the ash."

Dr. Flint sends me a vertical section of the quarry from which the present specimen was taken. The location is about 300 feet from the shore, and close to the town of Managua. At that point the overlying strata present a thickness of 21 feet beneath the surface-soil, the most of the mass being compact tufa, similar in general appearance to the block bearing the imprint.

Vertical section 21 feet in depth, of a Quarry on Lake Managua, showing strata overlying human footprints.

1	1. Surface soil, about 18 inches.
2	2. Compact tufa, 20 inches, separated from No. 3, by a sand seam.
3	3. Compact tufa, 20 inches, separated from No. 4 by a sand seam.
4	4. Compact tufa, 17 inches, separated from No. 5 by a sand seam.
5	5. Compact building tufa, 28 inches, resting on a seam of black sand.
6	6. Solid, dark-blue ash, 14 inches.
7	7. Hard clay, 12 or more inches, its surface presenting numerous leaves (impressions, fossils), and remains of the mastodon.
8	8. Pumice, about two inches, unequally distributed.
9	9. Sand drift, supporting the clay.
10	10. Compact building tufa, 47 inches, separated from No. 11 by a sand seam.
11	11. Compact tufa, 5 to 7 inches.
12	12. Black sand, 1 inch.
13	13. Dark, friable tufa, 2 inches.
14	14. Volcanic sand, containing fossil leaves, 1 inch.
15	15. The dotted line shows the horizon of the footprints impressed upon number.
6	16. Compact building tufa, 47 inches.
17	17. Yellow sand, believed to be Eocene (?) of undetermined thickness, containing numerous small shells.

Beginning with the lowest stratum, the yellow sand, the only clue offered to ascertain its age, believed by Dr. Flint to be Eocene, is the shells which it offers in abundance, but apparently only of one species. They are small and well preserved. Dr. Flint transmitted a number of them for examination to Prof. Newcombe, of Cornell University, who considered them a new species, and has called them provisionally *Pyrula nicaraguensis*, and adds that the genus is represented in North America by but one other species, *P. nevadensis* Stearn.

I submitted a number of them to my colleague at the Academy of Natural Sciences, Prof. Angelo Heilprin, who writes me:—"I should not like to pronounce positively upon the age of the deposit represented by the Nicaraguan shells, as by themselves they scarcely give direct evidence. But I should incline to the opinion that the deposit in question is more nearly Post-pliocene than Eocene, the specimens having a decidedly new look, and lacking the Eocene tertiary characters."

Dr. Flint sent to the Peabody Museum a number of leaves from the deposit marked 14 on the section; and I have recently inquired of the authorities of the Museum whether their age and character have been determined. They reply, that these characters have not yet been made out.

The hard clay deposit, No. 7 of the plan, increases in thickness in other localities to ten or twelve feet. It is considered by Dr. Flint to represent a period of repose of many centuries, and on its surface, bones of the mastodon have been found at other points along the lake. It is the only deposit in the section which seems to demand considerable time; and even here, the question will suggest itself whether a submergence of the lake shore for a few centuries or less might not be sufficient to produce this deposit. The presence of the mastodon bones is no evidence of great antiquity. That huge herbivore lived in tropical America almost in historic times. A complete skeleton of one was found not long since in an *artificial* salt pond, constructed by the Indians, near Concordia, Colombia. The pond, with its bottom of paved stones together with the animal, had been entombed by a sudden landslide.*

The deposit of ashes, No. 6 on the section, is held by Dr. Flint to

* See R. B. White, "Notes on the Aboriginal Races of the North-western Provinces of South America," in the *Journal of the Anthropological Institute of Great Britain*, February, 1884, p. 244.

mark a period of volcanic energy of wide extent and important consequences in modifying the physical geography of the region. It led to the elevation of the coast range and the separation of Lake Nicaragua, previously a bay of the ocean, from the sea. Dr. Flint's expressions are :

"West of Jinotepe a well was sunk one hundred and nineteen varas in search of water ; there this ash deposit is fifteen feet thick, at least twenty miles from the nearest crater.

"We see many proofs, that the cataclysm enclosing Lake Nicaragua (formerly salt water) was, at the time of this ash eruption ; while the tufas, *previously ejected*, pushed over the sea inlet at Tipitapa, enclosing that of Managua ; they were not broken up by the cataclysm, nor those at the quarry, nor all on the northern slope, nor the slip of coast north and south of San Rafael."

Passing to a study of the tracks themselves, they are described by Dr. Flint as quite numerous and passing in both directions, that is, to and from the lake shore, from which the average distance of those found is about 300 feet. The maximum stride was 18 inches, and the longest foot measured 10 inches.

The specimen which he has sent me, and which is figured on page 146, is the impression of a left foot. The total length of the impression is $9\frac{1}{2}$ inches, the breadth at the heel 3 inches, at the toes $4\frac{1}{2}$ inches. The apparent length of the foot itself was 8 inches. The instep was high, and the great toe large, prominent and exceeding in length the second toe. This last peculiarity has been by some considered of ethnic importance.* The greatest depth of the impression is at the ball of the foot, the weight being evidently thrown forward as in vigorous walking. At this part the maximal depression below the plane of the superficies is 2 inches.

The footprints on the tufas at Managua are not the only ones discovered in that Republic by Dr. Flint. Others were seen on the southern slope of the Sierra de Managua, near the town of San Rafael. The character of this horizon is thus described by Dr. Flint in a letter to me :

"Collateral evidence touching man's antiquity here, not less weighty, is found in the neighbourhood. The eruptions covering

* See J. Park Harrison, "On the Relative Length of the First Three Toes of the Human Foot," in the *Journal of the Anthropological Institute of Great Britain*, February, 1884. The general conclusion seems to be that a long second toe indicates a lower stage of development.

the south-west slope, and the disturbance caused by one, along the ocean beach, elevating the coast range, affords us indisputable evidence of Pliocene man. In descending the slope through immense ravines formed by the annual floods, we see enormous blocks of tufa, isolated by the removal of the material surrounding them, showing that they had been uplifted by some mighty force and re-embedded in the resultant débris.

“In 1875-8 and 1883, I spent over a month visiting the coast-hills to the south-west about San Rafael, seeking out the limits of the cataclysm.

“A strip of land, commencing at Bocano, extends along the coast about forty miles and widens out about San Rafael, terminating some eighteen miles above the latter place, at the base of the old primitive range. South-east of the town, a notable break in the upheaval shows that this strip was undisturbed, while the succession of hills to the east and south-east widens out and extends to the south at San Juan del Sur, and thence to Salinas bay. The force culminated against the south-west slope of the old primitive volcanoes mentioned, also shown north-west of San Rafael, where the tufa of the first eruption, on the slip of land mentioned, was unbroken, while in ravines near, the ocean sediment of the upheaval overrides it, forced over it as the rise occurred near by to the east.

“This sediment has been carried seaward by the rivers since formed. As they removed the *detritus* from the tufa, these were found covered with footprints of animals and man. One of these (sandal shod) was forwarded to the Peabody Museum.

“Where the rivers have cut through the old sea sediment down to the primitive rock, we see beds of shells of many species, among them enormous oysters of an oblong figure, perfect fossils, yet unnamed. They are *in situ*. Their contents resemble slaked lime. All this shows a sudden elevation. A few can be seen at the National Museum with the fossil leaves in the rock above them, similar to those on the Managua clay under the ash eruption. The latter eruption broke up the clay and elevated the coast range. On the neighbouring hills innumerable shells are adherent to the fractured limestone, and south to those west of Rivas; from there the limestone dips to south-east and is only about sixty mètres above the sea between San Juan and Virgin bay, while part of the Rivas plateau was undisturbed.”

It will be observed that one of these footprints indicates the use

of sandals or moccasins by the pedestrians of that day. None of this character have been reported from Managua. Undoubtedly a society which wears shoes cannot be assigned to the earliest stages of human culture. Many of the natives of Central America to this day never protect the feet in any manner.

In conclusion, I should say, there can be no doubt of these being genuine human footprints. They are not of that mythical origin which the fancy of savage nations delights to imagine (see Dr. Richard Andree, on "Fussspuren," in his *Ethnographische Parallelen und Vergleiche*, s. 94. Stuttgart, 1878), nor can there be the least doubt of their authenticity. Their antiquity remains uncertain. In regions at once tropical, fertile and volcanic, we may expect sudden upheavals and subsidences, and the ravages of the most violent outbursts are repaired by a luxuriant vegetation with surprising rapidity. My own opinion is, that there is not sufficient evidence to remove them beyond the present Post-pliocene or Quaternary period.

ORDINARY MEETING, JANUARY 16, 1888.

D. HOWARD, ESQ., F.C.S., IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following Elections were announced :—

LIFE MEMBER.—Principal T. G. Rooke, B.A., Rawdon College.

MEMBER.—Rev. J. Macarthur, M.A., London.

ASSOCIATES.—W. L. Courtney, Esq., M.A., LL.D., Fellow and Tutor New Coll., Oxford ; W. Keiller, Esq., Wimbledon Park ; W. I. Palmer, Esq., J.P., Reading ; Joseph John Murphy, Esq., Belfast.

The following paper was then read by Mr. H. Cadman Jones in the absence of the author, who is now resident in Australia.

THE ABORIGINES OF AUSTRALIA : THEIR ETHNIC POSITION AND RELATIONS. By JOHN FRASER, B.A., LL.D., F.R.S. of New South Wales.

THE aborigines of Australia present a wide and interesting field for ethnographical study. The field is as yet to a large extent unexamined and unexplored ; for, although there are some books specially written about our aborigines, their customs and language, and although many of our older colonists can tell much about their habits, yet the subject has scarcely attained to the dignity of a scientific study. I purpose to-night to confine myself to a single department of this subject,—the position and relation which our aborigines hold to the rest of mankind ; and to take my arguments only from what I may be permitted to call the common religiousness of nations. And as I am a colonist on a visit to this country, and have not here opportunities and facilities for a complete treatment of my theme, I shall ask your permission to refer to and quote a portion of my past labours in this field, as published in vol. xvi. of the Journal of the Transactions of the Royal Society of New South Wales.

I have said that I mean to build my argument on the religious ideas and ceremonies which exist among our Australian aborigines, and the resemblance of these to similar institutions found among nations and tribes elsewhere. Now, of all the definitions which have been thought of as distinguishing man from the rest of creation, the one that describes him as the "religious animal" is perhaps the best. Some will say that man is the mechanical, the social, the omnivorous, and so on. The philologist will tell us that etymology declares him to be the "thinker." I grant that the power of consecutive thought is a noble gift to man, but I am ready to deny that it is his noblest possession. The religious instinct, however debasing the forms which it now assumes, seems to me a diviner gift; for, while it stimulates, it also chastens and regulates the force and direction of thought, and lays hold of and moulds man's inner nature in a way which mere intellect can never approach. I am further prepared to deny that religiousness is a thing of man's own invention, that mere thinking will ever lead a man to acts of worship, or that the progress and development of thought alone will bring him to more enlightened forms of worship. The tendency, as registered by history and observation, is all in the other direction,—towards degradation, not towards elevation; and if man were solely mental and emotional, his attitude in viewing the vastness, the energy and the multitude of the objects of nature around and above him would be one of awe and fear, not of worship. I therefore believe the manifestations of the religious sentiment among uncivilised nations such as the Australian aborigines, to be like ruins of an edifice, which neither they nor their ancestors ever built, but yet its very stones may tell something of its origin. Now, since man does not invent religious beliefs and practices for himself, we may justly argue that the presence of the same or similar ceremonies in nations at present widely separated in place indicates a common origin. The traditions of a great deluge, so similar everywhere, the folk-lore stories among so many nations, all tell the same tale,—a common origin. And, further, it is not an unreasonable thing to say that, as the human race was long ago split up into four great divisions, which we now call the Aryan, the Shemite, the Turanian, and the Hamite or Ethiopian, and which became antagonistic and locally distinct, so the primitive religion, with its beliefs and practices, would tend in four diverging directions, each portion, however, being homogeneous in itself, although retaining some features of resemblance to its brethren. Now, in speaking to you about our aborigines, I

have to do with the Ethiopian or black race, and if I can show you that the Australian beliefs are closely like those of the black race in other parts of the world, and yet in some respects similar to those of all mankind, I think I can then, without presumption, ask you to agree with me in saying that Lenormant and others must be wrong when they cut off the Australians from the record in the tenth chapter of Genesis, and thus from all connection with the sons of Noah.

My present task, therefore, is to show that the black tribes of Australia are connected with the rest of mankind, and especially with the black race in Africa. But, before I attempt to do so, you may consider it my duty to establish an antecedent probability, or, at least, possibility, that the blacks of Africa and the blacks of Australia are akin; this will carry me back to some of the earliest periods of human history.

The Chaldæan tablets recently deciphered speak of a dark race as existing in the plains of Babylonia from the earliest times, and along with it a light-coloured race.* This dark race I take to be the Kushites; they seem to have been the first occupiers of these regions, and had become so powerful that their empire reached from the Mediterranean to the Ganges, and from the Indian Ocean northwards to the plateau of Ararat. Other races, however, came down upon them from Central Asia, and, like a wedge, split them in two. Hence the position of this race is, in Genesis x., indicated ethnically by the names of Cush, and Mizraim, and Phut, and Canaan, which, geographically, are the countries we call Ethiopia, and Egypt, and Nubia, and Palestine. Their dominion had thus been thrown much to the west of their original seats, and had lodged itself in Africa, now their stronghold; but the other half of their old empire existed still, although much broken, for the later Greek tradition, in the *Odyssey* i., 23, 24, speaks of an eastern as well as a western nation of Ethiopians. Leaving the western Kushites to increase and multiply, and spread themselves into Central Africa, let us follow the fortunes of their eastern brethren. They are the pure Hamites of the dispersion, and long occupied the northern shores of the Persian Gulf and the plains of India. Meanwhile, a composite empire, called on the inscriptions the *Kiprat Arbat*, "the four quarters," had formed itself in Lower Babylonia. This Chaldæan monarchy—the first of the five great monarchies of ancient history—was overthrown by

* Even Cyrus, the conqueror of Babylon, found them there, for, on a cylinder, he speaks of "the black-headed race" as conquered and governed by him.

an irruption of Arab (Shemite) tribes about 1500 B.C. And now, as I think, a second wave of population began to move towards the shores of Australia, for these Arabs were pure monotheists, and in their religious zeal must have dashed to pieces the polytheistic and sensual fabric which the Babylonian conquests had upreared. Those portions of the Chaldæo-Babylonian people that were unable to escape from the dominion of the Arabs, were absorbed in the new empire. But the rupture of the Babylonian state and the proscription of its worship must have been so complete as to drive forth from their native seats many thousands of the people of the "four quarters or zones" and force them westwards into Africa or eastwards through the mountain passes into the table land of the Punjâb and thence into the Gangetic plains. Here, I imagine, were already located the earlier and purer Hamites, but finding them to be guilty of a skin not exactly coloured like their own, and not understanding their language, these later Kushites of mixed extraction regarded them as enemies and drove them forth into the mountains of the Deccan, where to this hour the Dravidians, and Kolarians, whom I consider their representatives, are black-skinned and savage races. Ere long these Babylonian Kushites were themselves displaced and ejected from the Ganges valley by a fair-skinned race, the Aryans, another and the last ethnic stream of invaders from the north-west. These Aryans, in religion and habits irreconcilably opposed to the earlier races of India, waged on them a relentless war. Hemmed up in the triangle of Southern India, the Hamites could escape only by sea; the later Kushites, on the other hand, could not seek safety in the mountains of the Deccan, as these were already occupied; they must, therefore, have been pushed down the Ganges into Further India and the Malayan peninsula; thence to pass at a later time into Borneo and the Sunda Islands and Papua, and afterwards across the sea of Timor into Australia, or eastwards into Melanesia, driven onwards now by the Turanian tribes which had come down from Central Asia into China and the peninsula and the islands of the East Indies.

Many known facts favour the view which I have thus taken of the successive waves of population which flowed over Indian soil towards Australia. I will mention two or three of these: (1) Ethnologists recognise two pre-Aryan races in India. The earlier had not attained to the use of metals, and had only polished flint axes and implements of stone; the later had no written records, and made grave-mounds over their dead. The Vedas call them "noseless," "gross feeders on

flesh," "raw eaters," "not sacrificing," "without gods," "without rites." All this suits our aboriginals; for they use stone axes; in several districts they make grave-mounds; the typical natives are "noseless," for they have very flat and depressed noses as contrasted with the straight and prominent noses of the Vedic Aryans; they have no gods and no religious rites such as the Vedas demand. (2) The Kolarian and Dravidian languages have inclusive and exclusive forms for the plural of the first person. So also have many of the languages of Melanesia and Polynesia. (3) The aborigines in the south and west of Australia use the same words for I, thou, we, you, as the natives of the Madras coasts of India.

Having thus shown from history and from the migration of nations that the aborigines of Australia, as to their remote descent, *may* be the brothers of the negroes in Africa, I now proceed to my proper theme, a comparison of the religious ceremonies and beliefs on both continents. We cannot expect to find set modes of worship or a formulated creed such as the possession of sacred books might secure, but we shall rather seek for analogies in the experiences and practices of their social and tribal life, for it is there that ancestral beliefs often stamp themselves permanently; a custom is there maintained from age to age, while those who practise it know not what it means or whence it came.

At present I confine myself to one tribal custom; our black fellows have a ceremony called the Bora, through which the young men pass when admitted into the tribe. This Bora exists everywhere throughout Australia, and is carried out everywhere much in the same fashion. I therefore conclude that it belongs to the whole race, and is an essential attribute of its existence. Now, if I may trust the accuracy of Hurd's *Rites and Ceremonies*, the negroes of Upper Guinea had, seventy years ago—long before ethnography became a science—certain religious mysteries singularly like those of the Bora, and I suppose they have them still.* These, like the Bora, are ceremonies of

* From W. Winwood Reade's book on *Savage Africa* (London: Smith, Elder, & Co.) I learn that similar ceremonies still exist in Equatorial Africa. He says: "Before they are permitted to wear clothes, marry, and rank in society as men and women, the young have to be initiated into certain mysteries. I received some information on this head from Moongilomba, after he had made me promise that I would not put it in my book. He told me that he was taken into a Fetich-house, stripped, severely flogged, and plastered with goat-dung, this ceremony, like those of Masonry, being conducted to the sound of music. Afterwards there came from behind a kind of screen or shrine uncouth and terrible sounds, such as he had never heard before. These, he was told, emanated from a spirit called Ukuk. He afterwards brought to me the instrument with which the fetich-man makes this

initiation, and not only bring a youth to a knowledge of his country's gods, but qualify him to commune with spirits and to hold civil power and authority in the state; all the uninitiated are to him a "profanum vulgus," who, on the least transgression of orders, are hurried away into the woods, there to be destroyed by the evil spirits which the magical power of the initiated can command and control. As an assembly of this kind is convened but four or five times in a century, and occupies a period of five years, only a small portion of the male population can acquire the qualification necessary for power in the state. The king issues, when he pleases, an order for the holding of this assembly. The preparations are committed to the care of those old men that are known to be best acquainted with the mysteries. These choose suitable places in the woods, and make ready there every appliance which can produce surprise, awe, and chilling fear on the minds of the novices. All women, children, and strangers are warned from the spot during the ceremonies, and the novice believes that, if he reveals any of the secrets of the grove, the spirits, knowing his faithlessness and profanity, will in some way or other bring destruction upon him. The country for some three or four miles around is sacred and inviolable, and the evil spirits will carry off those who intrude.

The essential idea prominent in the negro ceremony of initiation is that of death and a new birth, a regeneration. Hence the catechumen before he proceeds to the groves gives away all his property and effects, as if about to die to the

noise. It is a whistle made of hollowed mangrove-wood, about two inches in length, and covered at one end with a scrap of bat's wing. For a period of five days after initiation the novice wears an apron of dried palm-leaves, which I have frequently seen. The initiation of the girls is performed by elderly females, who call themselves Ngembi. They go into the forest, clear a space, sweep the ground carefully, come back to the town, and build a sacred hut, which no male may enter. They return to the clearing in the forest, taking with them the Igonji, or novice. It is necessary that she should have never been to that place before, and that she fast during the whole of the ceremony, which lasts three days. All this time a fire is kept burning in the wood. From morning to night, and from night to morning, a Ngembi sits beside it and feeds it, singing, with a cracked voice, 'The fire will never die out.' The third night is passed in the sacred hut; the Igonji is rubbed with black, red, and white paints, and, as the men beat drums outside, she cries, 'Okanda, yo, yo, yo,' which reminds one of the *Evohe* of the ancient *Bacchantes*. The ceremonies performed in the hut and in the wood are kept secret from the men, and I can say but little about them. . . . During the novitiate which succeeds initiation the girls are taught religious dances; the men are instructed in the science of fetich. It is then that they are told that there are certain kinds of food which are forbidden to their clan. One clan may not eat crocodile, nor another hippopotamus, nor a third buffalo."

world, and on the completion of his novitiate, when he returns to his kindred, he pretends to forget all his past life and to know neither father nor mother, nor relations nor former friends,—his is a new life; his whole aspect is that of a new man, for he now carries on his head a cap made of the bark of a tree, he is adorned with feathers, and as a badge of his new rank he wears a collar of leopards' teeth round his neck. During the five years of his training the probationer is attended by some old and experienced devotees who act as his instructors; they teach him the ritual of their religion, various songs and pieces of poetry, mostly in praise of their chief god, and, in particular, he learns from them a dance of a frenzied kind. While this course of education is proceeding, the king frequently visits the groves and examines the candidates. When their training is sufficiently advanced, they receive each a new name, and, as a token of their regeneration, several long wounds, which afterwards become permanent scars, are made on their neck and shoulders. They are now conducted to some retired place at a distance where women may attend them. Here, their religious education being already complete, they are instructed in those principles of morals and politics which will make them useful as members of the state, and fit to act as judges in civil and criminal causes. This done, they leave the groves and their tutors, and, with their new badges of perfection upon them, they exhibit their magical powers in public by means of a stick driven into the ground, with a bundle of reeds at its top, or they repair to the public assembly, and join in the solemn dances of the wise men or in the duties of civic rulers.

The aboriginal races of India also have observances similar to those of the African negroes; for I learn from a lecture delivered last year in this hall that, among some of the Dravidian tribes of Central India, "persons desiring to enter the priesthood are required to retire for some days to the jungle and commune in solitude with the deity. Before they are confirmed in their office, they are expected to perform some marvellous act as evidence of their having acquired superhuman power." In another tribe, the novice "retires to the jungle, and there remains alone and without clothing for eight days, during which time he performs certain purificatory rites. On the eighth day he returns and enters upon the discharge of his duties."*

So far the negroes of Upper Guinea. I now turn to Australia; and there, when a boy approaches the age of puberty, a feeling of restless anticipation spreads over his

* *Transactions Victoria Institute*, vol. xix., pp. 103, 104.

mind, for he knows that his opening manhood has brought him to the threshold of ceremonies of mysterious import, through which he is to be formally received into the tribe and thereby to acquire the dignity of a man. The rites of initiation are important, numerous, and prolonged; and, as his admission does not concern himself or his family merely, but the whole tribe, these observances call together large assemblages, and are the occasion of general rejoicing.

This assembly,—the most solemn and unique in the tribal life,—is called the Bora. The whole proceedings are essentially the same everywhere in their general features and teachings, but the details vary among the different tribes. Therefore, instead of a separate narrative for each tribe, I will endeavour to present to you a full view of the Bora, taking one tribal mode as the basis of my description, but introducing from the other tribes such features as appear to me needed to complete the significance of the ceremonies.

The chiefs of the tribes know that some boys are ready for initiation; they accordingly summon their "marbull," or public messenger, and bid him inform the sections of the tribe that a Bora will be held at a certain time and place, the time being near full moon, and the place being usually a well-known Bora ground; they also send him away to invite the neighbouring tribes to attend; this invitation is readily accepted, for, although the tribes may be at variance with each other, universal brotherhood prevails among the blacks at such a time as this. The day appointed for the gathering is, perhaps, a week or two distant, and the intervening time is filled with busy preparations by the leading men of the novice's tribe. They select a suitable piece of ground, near water, if possible, and level for convenience in sitting or lying on; they then form and clear of all timber, and in most cases even of every blade of grass, two circular enclosures, a larger and a smaller, about a quarter of a mile from each other, with a straight track connecting them*; the trees that grow around the smaller circle they carve at about the height of a man, often much higher, with curious emblematical devices and figures; the circuit of each ring is defined by a slight mound of earth laid around, and in the centre of the larger one they fix a short pole with a bunch of emu feathers on the top of it. Everything is now ready for the rites of initiation, and there is a large concourse; the men stand by with their bodies painted in stripes of colour, chiefly red and white; the women,

* In the Bora grounds which I have examined this path leads due east and west by the compass.

who are permitted to be present at the opening ceremony only, are lying on the ground all round the larger ring with their faces covered. The boy, painted red all over (I speak of only one, but there are several boys initiated at once), is brought forward and made to lie down in the middle of it, and covered with an opossum rug. Such of the old men as have been appointed masters of the ceremonies now begin to throw him into a state of fear and awe by sounding an instrument called *tirricoty*, similar to what an English boy calls a "bull roarer." This same "bull roarer" is found in Central Africa, and is there also used as a sacred instrument. In Australia the men use it on all occasions when they wish to frighten the women and boys, who cower with fear whenever they hear it. It is made of a piece of thin wood or bark; it is about nine inches long, and is sometimes shaped and marked like a fish. The roaring sound is supposed to be the voice of a dreaded evil spirit who prowls about the black fellows' camp, especially at night, and carries off, tears, and devours those he can seize. When the performers think that the "boombat" (so they call the novice) has been sufficiently impressed, *tirricoty* ceases to speak; they then raise the boy from the ground and set him in the ring, so that his face is turned towards the cleared track which leads to the circle of imagery; then an old man comes forward, breathes strongly in his face, and makes him cast his eyes upon the ground, for in this humble attitude he must continue for some days.

Two other old men next take the boy by the arms and lead him along the track, and set him in the middle of the other enclosure. As soon as this is done, the women rise from their prostrate position and begin to dance and sing. The Murring tribe, on our S.E. coast, place along this track or path figures moulded in earth of various animals (the *totems*), and one of Daramulun, a spirit god whom they fear. Before each of these figures the devotees have a dance, and a "Koradjie" (that is, doctor or medicine man) brings up out of his inside by his mouth, the "jo-e-a" or magic of the *totem* before which he stands; for the porcupine he shows stuff like chalk, for the kangaroo stuff like glass, and so on. Meanwhile the boy has been sitting in the smaller circle with downcast eyes; he is told to rise, and is led in succession to each of the carved trees around it, and is made to look up for a moment at the carvings on them, and while he does so the old men raise a shout.* When he has come to know all the

* A fire is kept constantly burning in the centre of this ring; with this compare the Vestal fire at Rome. The boy is made to lie within the ring prone

carvings sufficiently, the men give him a new name, which *must not* be revealed to the uninitiated, and they hand to him a little bag containing one or more small stones of crystal quartz; this bag he will always carry about his person, and the stones must not be shown to the uninitiated on pain of death. This concludes the first part of the performance.

The "boombat" is next conveyed, blindfolded, to a large camp at a distance of several miles, no woman being near, and food is given to him, which he eats still with his eyes cast down; here they keep him for eight or ten days, and teach him their tribal lore by showing him their dances and their songs; these he learns, especially one song of which I can tell nothing further than that it is important for the boy to know it. These songs, they say, were given them by Baiamai, the great Creator. At night, during this period, the "boombat" is set by himself in secluded and darksome places, and all around the men make hideous noises, at which he must not betray the least sign of fear. At some part of the ceremony a sacred wand is shown him; of this Ridley says:—"This old man, Billy, told me, as a great favour, what other blacks had withheld as a mystery too sacred to be disclosed to a white man, that "dhurumbulum," a stick or wand, is exhibited at the Bora, and that the sight of it inspires the initiated with manhood. This sacred wand was the gift of Baiamai. The ground on which the Bora is celebrated is Baiamai's ground. Billy believes the Bora will be kept up always all over the country; such was the command of Baiamai."

Another conspicuous part of the inner Bora customs is the knocking out of one of the upper front teeth of the "boombat." The tooth is then conveyed from one sub-tribe to another until it has made the circuit of the whole tribe; on its return it is given to the owner or kept by the head man. It is said that an ancient shield (*cf.* the sacred Ancilia of Rome), handed down from past ages, and regarded as almost equal to Daramulun himself, accompanied the tooth. This tooth-breaking, however, is not practised by some of the larger tribes; but instead of it there is circumcision, cutting of the hair, &c.

on the ground for weeks, it may be, getting only a very little food and water now and then. When he wishes to go outside, the old men *carry* him over the circle-mound. With this compare the sacredness of the *pomerium* circuit of ancient Rome. One black boy told me that when he was initiated, he joined the Bora in the month of August, and did not get away till about Christmas. When the blacks in charge of the sacred circle at last bade him rise from his recumbent position, he said he was so weak that he staggered and fell.

All these formalities being now completed, the "boombat's" probation is at an end. They now proceed, all of them together, to some large water-hole, and, jumping in, men and boys, they wash off the colouring matter from their bodies, amid much glee, and noise, and merriment, and, when they have come out of the water, they paint themselves white.

Meanwhile, the women, who have been called to resume their attendance, have kindled a large fire not far off, and are lying around it, with their faces covered as at the first; the two old men, who were the original initiators, bring the boy at a run towards the fire, followed by all the others, with voices indeed silent, but making a noise by beating their *boomerangs* together; the men join hands and form a ring round the fire, and one old man runs round the inside of the ring beating a *heelaman* or shield. A woman, usually the boy's own mother, then steps within the ring, and, catching him under the arms, lifts him from the ground once, sets him down, and then retires; everybody, the boy included, now jumps upon the decaying red embers, until the fire is extinguished.

Thus ends the Bora; the youth is now a man, for his initiation and his instruction are over. But, although these are formalities observed in admitting a youth into the tribe, yet in the Bora, as in Freemasonry, the novice does not become a full member all at once, but must pass through several grades, and these are obtained by attending a certain number of Boras; here also, as in Africa, restrictions as to food are imposed, which are relaxed from time to time, until at last the youth is permitted to eat anything he may find: thus the process of qualifying for full membership may extend over two or three years. Then he becomes an acknowledged member of the tribe, undertakes all the duties of membership, and has a right to all its privileges.

I have thus finished my description of the Bora ceremonies, and, as a sort of introduction to that description, I gave at the outset a condensed account of similar observances both in Africa and in India.

Now, when I cast my eye over the Bora and its regulated forms, I feel myself constrained to ask, "What does all this mean?" I, for one, cannot believe that the Bora, with all its solemnities (for the rites were sacred, and the initiated were bound not to divulge what they had seen and done), is a meaningless, self-developed thing; still less that the same thing can have developed spontaneously in Australia and in farthest Africa; I prefer to see in it a symbolism covering ancestral beliefs,—a symbolism intelligible enough to the

Kushite race at first, but now little understood, but yet superstitiously observed, by their Australian descendants.

Accordingly I now proceed to what I regard as the most important part of this inquiry, for I shall attempt to show that in many respects the Bora corresponds with the religious beliefs and practices of the ancient world. If we can prove that the germ ideas which underlie the Australian Bora as it has always been celebrated among the aborigines are the same as those in many religions of antiquity, and that these same ideas present themselves in ceremonies of similar import among nations now widely separated in place, I think we have established a strong presumption that there is a common source from which all these things have sprung, and that there is a community of origin on which this community of belief is founded.

And here I wish to enlist the sympathy and assistance of this intelligent audience. There are among you many who have a full and accurate knowledge of the religious systems of Africa and India, and who can therefore give valuable aid in tracing analogies sufficient to build up my argument to the dimensions of substantial proof. I ask these gentlemen to assist me, either now by oral remarks, or afterwards in any form which they may prefer. My present theme is a small contribution to an argument for the unity of the human race as to its origin, and while I work in the Australian field, which is as yet little known, I shall gratefully receive any help which may come from fields that have been long explored.

I now offer to you such analogies as my limited knowledge permits me to refer to:—

(A.) In the Bora there are two circles, the one is less sacred, for the women may be present there, although only on the outskirts; in it certain preparatory things are done in order to bring the “boombat’s” mind into a fit state of reverential awe for the reception of the teaching in the other circle,—the *adytum*, the *penetralia*,—where the images of the gods are to be seen; the women and the uninitiated must not approach this inner circle, for it is thrice holy; “*Procul este, profani.*”

(a.) In the earliest religions, the circle is the invariable symbol of the sun,—the bright and pure one, from whose presence darkness and every evil thing must flee away. Thus we have the disc as the symbol of the sun-god in Egypt, Chaldæa, Assyria, Persia, India, China. This fact is so well known that it is needless to multiply examples. Those who are within the circle are safe from the powers of evil. The

sacredness of the circle in those early ages is seen from the Chaldæan name (Genesis xxxi. 47), "the circle of witness,"—a name given to a solemn compact of friendship witnessed by that celestial orb which looks down on and observes all the deeds of men. In Persia, to this day, in the southern parts of it, which were originally inhabited by a Hamite race of an almost purely negroid type, there are to be seen on the roadsides large circles of stones which the tradition of the country regards as set there by the Caous, a race of giants, that is, of aboriginals. Their name closely resembles the name Kush, as does also Cutch at the north of the Indus, and other geographical names along the Arabian seas. Then in the classic nations, both in Greece and Italy, some of the most famous temples were circular in form, especially the Pantheon at Athens; and, at Rome, the temple of Vesta, the goddess of the sun-given, eternal fire. At Rome also, for 100 years from the foundation of the city, the worship of the gods was celebrated in the open air (*cf.* the Bora), often in sacred groves; and there also the temple of Janus, the oldest and most venerated of the Roman gods, was merely a sacred enclosure upon which no building stood till the time of the First Punic War. The *pomærium*, or circuit of the walls of Rome, was a sacred ring, and the Circus was consecrated to the sun, and was open to the sky. In Britain, too, the fire worship of the Druids led them to construct ring temples in various places, and especially at Stonehenge, where there are two rings as in the Bora, but concentric. Even the rude Laplanders, who are sprung from the same Turanian race which was one of the earliest elements in the population of Babylonia, make two circles when they sacrifice to the sun, and surround them with willows; they also draw a white thread through the ear of the animal to be sacrificed, and white, as we shall presently see, is the sun's livery.

(B.) In the Bora, the two rings, both of them sacred, communicate with each other by means of a narrow passage, in which are earthen representations of certain objects of worship; the inner contains the images or symbols of the gods carved on trees, and the novice is so placed in the outer ring that he faces the passage and the shrine of the gods; he is turned to the east (see note, page 162).

(b.) The inner shrine is an arrangement common to all religions. At Babylon in the temple of Belus, which was built in stages, the worshipper had to pass through these seven stages of Sabæism before he reached the shrine; this was the topmost of all, and contained a golden image of the god; each of these stages was devoted to the worship of one

of the Babylonian gods. So also, in the Bora, the worshipper advances by stages along the passage leading from the one circle to the other, and pays his devotions to each of the images in succession. In Greece and in Rome the roofed temples were commonly arranged in two parts, an inner and an outer, and the statue of the god was so placed that a worshipper, entering by the external door, saw it right before him. At the very ancient temple of Dodonæan Zeus, in Greece, the god was supposed to reside in an oak tree, and it is quite possible that the *Xoanon*, or wooden image of the god, was here, as in other grove worship, merely a carved piece of oak as in the Bora. In this sense Festus gives *Fustis decorticatus* as an equivalent for *delubrum*. The student of Biblical archæology will also remember the Asherah of the Israelite idolaters, the consort of the sun-god Baal; this was a wooden pillar or statue of the goddess which could be cut down and burned. Such a pillar our black fellows also have been known to erect; for on one occasion several men of a tribe which is well known to me were seen to cut down a soft cedar tree; they dressed it with their hatchets, and cut the end of it into the rude figure of a head and face; they then carried it some distance down the river to a sandy spot, and, setting it up there like a pillar, they danced in a circle around it. This was certainly an act of worship, the same as many other acts of worship in the heathen world. Was it merely a happy thought on the part of these black fellows, or undesigned coincidence, which led them to do so; or was it a portion of an ancestral form of worship brought from other lands?

(C.) In the Bora, the novice in the outer circle has his body all painted over with red, but at the close of his novitiate he washes in a pool, is thereby cleansed, and then paints himself all white. The other members of the tribe paint themselves red and white for the ceremony; they, too, at the close, wash in the pool and retire white like the "boombat." This transformation is to them a source of much rejoicing.

(c.) Among the black races the colour red was the symbol of evil; and so Plutarch tells us that the Egyptians sacrificed only red bullocks to Typhon, and that the animal was reckoned unfit for this sacrifice if a single white or black hair could be found on it; in certain of their festivals the Egyptians assailed with insults and revilings any among them who happened to have red hair, and the people of Coptos had a custom of throwing an ass down a precipice because of its red colour. The god Typhon was to the Egyptians the embodied cause of everything evil, malignant, destructive, man-hating in the economy of nature, just as Osiris, the bright

and beneficent sun, was an emblem of all that was good. In the Levitical economy, the red heifer was a sin-offering for the Israelites, probably with some reference to the Egyptian ideas about this colour. In India, Ganesa, the lord of all mischievous and malignant spirits, is symbolised by red stones, and the Cingalese, when they are sick, offer a red cock to the evil spirit that has caused the sickness. The blacks of Congo wash and anoint a corpse and then paint it red, and their black brethren of Madagascar, when they are celebrating the rite of circumcision, never wear anything red about them lest the child should bleed to death. The negroes of Upper Guinea, far enough removed from Australian Boras to prevent even a suspicion of borrowing, make a similar use of the colours red and white; for in Benin, when a woman is first initiated into the rites which the Babylonians sanctioned in honour of their goddess Mulitta, she seats herself on a mat in a public place, and covers her head, shoulders, and arms with the blood of a fowl; she then retires for her devotions, and, these being finished, she washes herself, returns, and is rubbed all over with white chalk where the blood had been. The young ladies of Congo, also a black country, have a similar custom, but they besmear their faces and necks with red paint.

In Australia, those who pass through the Bora paint themselves white at its close. Everywhere in Australia there is the belief that the black man when he is dead and buried still lives, but he is then white; the aborigines say "black fellow jumps up a white fellow"; hence their name for white man is "wunda," a word which originally described only the black man in his spirit state after death. The father of a friend of mine was the first white man to enter, some fifty years ago, the territory of a black tribe near to where I lived; it so happened that the tribe had just lost their chief by death, and, as the white man whom they saw coming over the crest of the hill towards their camp bore some physical resemblance to the deceased, they soon got to hail him as their chief in the "wunda" state, and to this hour they claim that white man's son as one of themselves, a brother!

Now, in the ancient rituals, white was the colour sacred to the sun, the benign god, before whom darkness flies away. In India, white agates represent Siva, the eternal cause of all blessings; in Persia, white horses were sacred to the sun; in Celtic Britain, some of the Welsh people even now whiten their houses to keep away devils; and so with many other examples.

In these senses the "boombat" enters the Bora with the

brand of Typhon upon him, exposed to all evil influences, to disease and death from animals, men, and spirits; but after he has made the acquaintance of his fathers' gods, and has learned the sacred songs and dances of his tribe, he comes forth another man; he washes away the badge of darkness and evil, and assumes the livery of the children of light. The other men, whose mottled colour is a confession of mingled good and evil in their lives, also emerge new men once more, purified and devoted anew to the service of the good, and freed from the power of the evil.

This felt subjection to unseen evil and aspiration for deliverance from it in the minds of our native races, is not only natural to man everywhere, but was a marked feature in the whole system of Akkadian magic; for these old Chaldæans believed that innumerable spirits, each with a personality, were distributed throughout nature, sometimes in union with animate objects, sometimes separately. Existing everywhere, they had each both an evil and a good aspect, at one time favourable, at another unfavourable, controlling both life and death, regulating all the phenomena, beneficial or destructive, of air, earth, fire, or water. A dual spirit, bad and good, was attached to each of the celestial bodies, and each living being; a constant warfare existed and was keenly maintained between the bad and the good, and, according as the one principle or the other held sway, so did blessings or disasters descend upon nature and upon man. Hence the value of religious rites, such as the Bora; for the due observance of these, repeated from time to time, gave for a while, at least, the victory to the good spirits, and brought blessings to the faithful. Thus, then, I explain the red colour of the novice at the Bora; the red and white of the celebrants, and the white colour of the whole when the service was completed.

(D.) Ridley says that the Bora is Baiamai's ground. He adds: "Baiamai sees all; he knows all, if not directly, yet through Turrāmūlan, a subordinate deity. Turrāmūlan is mediator for all the operations of Baiamai to man, and from man to Baiamai." "Women must not see Turrāmūlan on pain of death. And even when mention is made of Turrāmūlan, or of the Bora at which he presides, the women slink away, knowing that it is unlawful for them so much as to hear anything about such matters."

(d.) We have seen that in some places an image of Daramūlan is set up at the Bora. In another place, the bull-roaring instrument, whose voice begins the ceremony of the Bora and warns the women not to look, is called *tirricoty*, and is sometimes made in the shape of a fish; the magic

wand that Ridley mentions is called *dhūrumbulum*; and the great ancestral Bora ground of the Kamilaroi tribe in New South Wales is at *Tirri-hai-hai*. In Victoria this same roaring instrument is called *turndun*, which I think should be written *dhurru-dun*. All these names are identical, and only modifications of *dara-mūlun*; thus, with a slight alteration of the spelling, we have *turra-mul-un durru-m-dun*, *durru-m-bulun*, *tirri-coty*, *tirri-hai-hai*. The root of all these forms I take to be *dara*, *dar*, Sanskrit *dri*, meaning to protect, a root found in all the great branches of human speech, and furnishing derivatives which mean "a prince," "a governor," "a lord," "a supreme ruler." I therefore take *Daramūlun* to mean something like "Lord of the mysteries," for it is evident that he presides at the Bora, and is the source of the blessings therein communicated. The use of a fish-shaped roarer to indicate his presence leads me to compare him with the Chaldæan god, *Hoā*, *Hea*, half man, half fish, who, in the Chaldæo-Babylonian religion, was revered as the revealer of all religious and social knowledge. His abode was the sea, the Persian Gulf, where he passed the night, but by day he remained among men to instruct them; thus he became a legislator and protector. *Hea*, as a god, "seesthat all is in order," and, being acquainted with all sciences, he can baffle the powers of evil by his magic arts. With this I compare the "magic" shown by the Koradjie in the Bora in the presence of *Daramūlun*'s image. The Akkadians, and from them the Babylonians, invoked the aid of *Hea*, when spells and enchantments were found unavailing against the power of demons. So in the Bora passage, when *Daramūlun* had been duly honoured and magic influence conjured up for the driving away of all adverse spirits, the lad is taken into the inner circle and sees the gods of his fathers, and learns to know them and their attributes, just as in the greater Eleusinia of Greece the duly qualified were, after a course of previous preparation, led into the inner sanctuary in the darkness of night, and there, by a dim light, allowed to see and know the holy things.

(E.) The next step in the process of initiation is interesting: (1) a sacred wand is shown to the "boombat;" (2) he gets a new name; and (3) certain white stones are given to him.

(e.) (1) The wand. In this there is the notion of consecration and sacredness; for, on the Egyptian monuments, the deities are constantly represented as holding in one hand a long rod or wand, with a crook on the upper end of it. The king also, and some of the higher officers of state, carry this

“crook.” In India we find that Yama, the regent of the South, has a name from a sacred staff or rod, and some religious impostors wear as badges of sanctity a “staff” and a deer’s skin. The Magi of Persia carried the *Bareçma* or *barsom*, a divining wand as one of the badges of their ministry and the magicians of Egypt similarly had rods in their hands when they stood in the presence of Pharaoh. The traditions of Peru speak of a sacred golden wand borne by the son and daughter of the Sun. These are analogies; but the nearest approach to the use of the wand in the Bora is, I think, to be found in the Finnish Kalevala, where there is a reference to a “celebrated wand” (evidently as in Peru a sun wand) which protects its possessor from all spells and enchantments; even the gods are glad to use it against the powers of evil. (2) A new name. Having now acquired a knowledge of sacred things, the initiated is henceforth a new man, he is “twice born,” and like his kinsman in Upper Guinea, already described, he will come out to the world in a new character, renouncing his former state. In India, a youth becomes one of the “twice born,” by investiture with the sacred cord, receiving thus a spiritual birth; thereafter, like our “boombat,” he passes into the hands of religious preceptors, who teach him the sacred prayers, mystic words, and devotional ceremonies. In more modern times, when a monastic house or a nunnery receives, from the world without, one more recluse, a new name is given by which he or she may thenceforward be known in religion. The underlying idea in all these instances is that a religious profession gives one a new character and a new relation to the rest of the world. And who will deny that this is true, whether the professor be black or white? (3) The white stones. I am inclined to think that the “boombat” receives only one of these at a time, and that the number of them increases according to the number of Boras he attends until he becomes a full and accepted master of the craft. In any case they are used as talismans, and are carried in the belt during the whole of the man’s life. They are merely small pieces of quartz crystals, but are so sacred that they must not be shown to the women.* The negroes of Guinea use small stones as fetishes, which they carry about their necks or under their armpits. These the priests sell after a formal consecration. The white colour is a sun colour. It is beneficent

* *Moorl* is the name for the white crystals. A Koradjie, in the presence of a friend of mine, swallowed three or four small ones, saying, “That fellow stick there.” He believed that the crystals would give him more power as a medicine-man.

and preservative against evil, as already shown ; hence the Hindoos dedicate white stones to Siva, the eternally blessed one.

Under this head I venture to refer to the promise given to the Church in Pergamos (Revelation ii. 17) in these words : " I will give him a white stone, and in the stone a new name written which no man knoweth saving he that receiveth it." On this passage commentators have given the most diverse opinions in explanation of the white stone and the new name. The very diversity of their opinions leads me to think that in this passage there is a reference to some heathen and idolatrous rites well known to the Pergamenes, part, it may be, of the religion of their ancestors, as in the Bora ceremonies; for in the Bora there is the white stone and the new name which must not be divulged. I cannot stay to examine this curious analogy, but I think that some light might be got to illustrate the passage if one were to explore the source of the early population of Pergamos and its forms of worship. It will probably be found that both were in some way Chaldæan, and that the worship was very sensual and degrading, such as was the worship of Mulitta in Babylon. This would explain how it is that in the message to the Church in Pergamos the expression occurs, " I know where thou dwellest, even where Satan's throne is " ; and again, " Among you where Satan dwelleth," the city being thus twice in one short message described as a stronghold of Satan ; it would also explain the reference to " fornication," and " things sacrificed to idols," and " the teaching of Balaam." If I were for a moment to assume the garb of a commentator, I would paraphrase the promise to the Pergamene Church somewhat in this manner :—" To him that overcometh, that is, to him that rises above the abounding evil and remains faithful in his new profession, will I give . . . a white stone, a pledge of purity and a safeguard against the wicked practices so common among you where Satan dwelleth, and a new name to show that he has put off his former state of slavery to sin, and has become a new man in the service of a new master, who is pure, and holy, and undefiled."

(F.) The initiated lad is next led to a camp at a distance ; he is kept there for eight or ten days receiving instruction, specially in songs and dances ; he also eats here, and his confidence in divine protection is tested by hideous noises during the darkness of the night.

(f.) It is rather singular, as a coincidence, that Festus speaks of Roman ceremonies as lasting ten days, and that the Dionysia and the greater Eleusinia of Greece also lasted

nine or ten days, and that part of them was a solemn meal and a solemn bathing, or purification by water; thereafter instruction was given. So, also, a young Brahman must reside with his preceptor for some time, until he has gained a thorough knowledge of the holy books; he must pass through certain purificatory rites, which remove the taint of former sin; one of these is the cutting off of the hair, and with this seems to correspond the knocking out of a front tooth practised by some of our tribes in Australia.* The singing and the dancing are everywhere essential parts of the heathen worship, and the dance is in its origin religious.

(G.) Then come the washing and the purification which I have just spoken of, but after that they join hands all round, dance round the fire, and then jump into it and through it.

(g.) Analogies to this purification and protection by fire are abundant. In Bretagne, at this hour, the farmers protect their horses from evil influences by the service of fire. They kindle fires at nightfall; then, at dawn of day, the horses are led thrice round the fires, and a particular prayer, known only to a few, is said before the dying flame; as the last words are pronounced, they all leap on the embers with their feet joined. The ancient British Kelts, to which stock the modern Bretons belong, did much the same thing. On May Day the Druids used to light large fires on the summits of the highest hills, into which they drove their four-footed beasts, using certain ceremonies to expiate the sins of the people. Until very lately, in different parts of Ireland, it was the common practice to kindle fires in milking yards on the first day of May, and then many women and children leaped through them, and the cattle were driven through in order to avert evil influences. In ancient Rome, on the feast of Pales, in April, the same forms of purification and dedication were observed. The Hottentots of the present day retain the old customs, for they make their cattle pass through the fire as a preservative against the attacks of wild dogs. In India, the youth, when about to be invested with the sacred thread, stands opposite the sun and walks thrice round the fire; and in the marriage ceremony the bride is led thrice round the sacred fire. An incantation used by the oldest Chaldean sorcerers has these words: "May the god Fire, the hero, dispel their enchantments or spells for the injury of others." An Australian *gin*, going to the river to fetch water after nightfall, carries for protection a burning stick; and the men

* In some parts of Australia the hair is cut off or singed off in the Bora.

in the camp, when they think an evil spirit is near, throw firebrands at him to drive him away. We may not wonder, then, that our Australian black fellows, if, as I believe, their ancestors came from Babylonian lands, have not forgotten the fire observances, and still trust in the protection of the fire-god.

So far the Bora and its analogies. I have thus considered at some length the institution of the Bora, both because it is the most important of all the social regulations of our aboriginal tribes, and because its universal distribution among them, although with slight local differences in the manner of its celebration, seems to me a strong proof that our black tribes are all brethren of the same race, and that they are of the same common origin as the rest of mankind, their nearest kin being the blacks of Africa. Is it possible that so many tribes, differing in language and confined by their laws and habits each to its own hunting ground, should have evolved from their own consciousness ceremonies so similar, and which, when examined, correspond in so many points with the religiousness of the ancient world? How is it that the blacks of Australia and the blacks of Guinea have similar ceremonies of initiation? Is it not because they have come from the same ethnic source and have a common ancestry and common traditions?

And now to complete the task which I proposed to myself, I would add a few words of aboriginal mythology, as another point in the argument for the unity of the human family.

Our native races are attentive observers of the stars; as they sit or lie around the camp fire after nightfall, their gaze naturally turns to the starry vault above, and there they see the likenesses of many things with which they are conversant in their daily life; young men dancing a corroboree (Orion) and a group of damsels looking at them (the Pleiades) making music to their dance; the opossum, the emu, the crow, and so on. But the old men say that the regions "above the sky" are the home of the spirits of the dead, and that there are fig-trees there, and many other pleasant things, and that the head of them is a great man *Miny*; he is not visible, but they all agree that he is in the sky. A greater than he is the great Garabooung, who, while in earth, was always attended by a small man, but now the two shine as comrades in the sky—the "Heavenly Twins." Both Garabooung and *Miny* are "skeletons." In his mortal state, Garabooung was a man of great rank and power; he was so tall that his feet could touch the bottom of the deepest rivers; his only food was snakes and eels. One day, not being hungry, he buried

a snake and an eel; when he came back to eat them he saw fire issuing from the ground where they were; he was warned by his companion, the little man, not to approach, but he declared he did not fear, and boldly came near; then a whirlwind seized them and carried them up "above the sky," where he and his companion still are, and "can be seen any starlit night."

These two legends are interesting. Minny is to them the father and king of the black races, whom he now rules and will rule in spirit-land; he was once a mortal, but now he is a "skeleton,"—a spiritualised being without flesh and blood; and so our black fellows retain the simple primitive beliefs of mankind; they have heard nothing of annihilation or absorption into the infinite. I observe also that the name of their great father is the same as that given on the hieroglyphic inscriptions to the first king of Egypt, Menee—by Herodotus called Menes—the head of the First Dynasty of mortals. He was a public benefactor, for he executed several important works, and taught his people the worship of Phtah, the great artificer-god of Egypt. He must have some mythical relation to the human race, for in Greece he is Minos, king of Crete, "Minoia regna," author of many useful laws, and afterwards a judge of the shades of the dead; in another part of Greece he is Minyas, the founder of a race of heroes; in India he is Menu, and in Old Germany Mannus; for I take all these to be the same name.

The story of Garabooung seems to correspond with that of the Dioscouroi—Castor and Pollux,—who were also mighty heroes and benefactors of mankind. The ancient Germans worshipped them in a sacred grove, and called them Alcis.

How have our black fellows got hold of the name Minny, and such a myth about him? Were the name and the myth invented by them? Are they not rather a survival—derived from a common origin—of traditions which belong to the once undivided human family?

In conclusion, let any one ask me how it is that our aborigines, if they are of such an origin as I assign to them, have sunk so low in the scale of humanity as to be regarded among the most degraded of the races of men. I deny that this estimate of them is well founded; on the contrary, I assert that it was formed long ago by those who imperfectly understood the habits and social organisation of our native tribes, and has been ignorantly passed from mouth to mouth ever since; that, when they are thoroughly understood, our black fellows are not the despicable savages that they are too often represented to be. They have, or had, virtues which

we might profitably imitate ; for they are faithful and affectionate to those who treat them kindly ; they have rules of family morality which are enforced by severe penalties ; they show the greatest respect to age ; they carefully tend and never desert the sick and infirm ; their boys are compelled to content themselves with meagre fare, and to bring the best of the food which they have found and present it to the aged members of the tribe and to those who have large families. I am assured by one who has had much intercourse with them for thirty years that he never knew them to tell a lie, and that his property was always safe in their hands ; another who has been familiar with them since he was a child says :—“ Naturally they are an affectionate, peaceful people, and, considering that they have never been taught to know right from wrong, their behaviour is wonderful ; I leave my house open, the camp close by, and feel the greatest confidence in them.”

Then, again, although the material civilisation of the world was commenced by the race of Ham, yet the task soon fell from their hands, for morally they were unfit for it ; for the conservation and first dissemination of a pure and ennobling religion we are indebted to the race of Shem ; while the sons of Japheth have gone forth to rule the earth and the sea—“ *audax Iapeti genus* ”—and to spread abroad the blessings of good government and the arts and inventions of an enlightened age to the remotest lands. The Hamites, on the other hand, have continued to sink in the social scale, have been persecuted and oppressed by the other races and thus debased ; and whenever, as in Australia, the sky above and the earth beneath have conspired to render the means of life to them meagre and precarious, there the process of decay has been accelerated, and physically their condition has been very low ; but still, among their social institutions, we have this evening, I trust, seen traces of their having once enjoyed a better state of things. Would that we had a full record of what they really are before they pass entirely away from among us !

THE CHAIRMAN (D. Howard, Esq., F.C.S., &c.).—I am sure that all present would have been glad if the author of the paper could have been here to receive our thanks for the very interesting and valuable information he has been the means of placing before us on

a subject of so much importance. Such records as these of what is to be learned of the far distant races of the world are indeed of great value. It is true that the idea has gained ground, in not few quarters, that the aborigines of Australia are so utterly degraded and so devoid of the ordinary distinguishing marks of humanity that they can hardly be said to be men at all, or, at any rate, men of the same species as ourselves. But the testimony we have had to-night from one who has long lived among them, and who, therefore, speaks of his own knowledge, is extremely valuable, inasmuch as it presents a very different view, and makes it clear that those who take the trouble to become acquainted with these races, and by treating them with kindness come to know them intimately, are able to tell a very different story from that which is told by those who have only come in contact with them to tyrannise over and ill-treat them. It has been frequently and boldly stated that the aborigines of Australia have no religious customs. I am afraid that a great many ignorant people are too apt to be shy of making their religion public, so that others may conclude they have none at all; why, therefore, should we suppose that the habit of reticence which induces so many to keep their religious feelings in the background is not to be met with in other races than our own? Is it not a rule that, what men care most about, they talk least about, especially before strangers? And, if this be so, ought we not, when we find it stated that such and such a race is entirely devoid of any religious feeling or sentiment, to assume that the assertion is made from want of knowledge, and that in all probability the contrary is the fact. We know it is being brought out more and more clearly that the negro race, whose fetish worship we have heard so much about, know nothing about fetish worship, such as is frequently described; and, therefore, if most of the statements that have been made about them are unreliable, so also may be those that have been put forward with regard to the Australian aborigines, whose very remarkable religious customs have been traced out by the author of this paper, as well as the extraordinary connexion that exists between their religious customs and those practised by the black race in Africa. It is, consequently, for those who say that these natives of Australia are not of the same race or nature as our own, to explain how the religious ideas, of which we have now heard, can have sprung up independently, especially the idea of that dim, shadowy kind of

regeneration, or second life, which would seem to be a part of their religious system. It is very interesting to trace the customs that are so strongly developed in this,—ethnologically,—out-of-the-way corner of the earth, and to find expressed, in the manner related by the author of the paper, the idea of the mysteries of initiation, as well as other ideas that have been rendered familiar to us through the classical literature which describes the Eleusinian and other mysteries, derived no doubt from Egypt, which were from a Hamite source; and these we find, in almost every feature of the familiar type, developed in the far-away portion of the earth with which we have been dealing. I hope that those present who may have something to say on this subject will now give us the benefit of their views.

Rev. F. A. WALKER, D.D., F.L.S.—On page 167 it is stated that “the *pomerium*, or circuit of the walls of Rome, was a sacred ring, and the circus was consecrated to the sun and was open to the sky.” I should like to say that there is much in the nature of a counterpart of this, on a small scale, still extant in the ruins of Ephesus. There is a circular platform evidently, at one time, part of the shrine of the sun, and having a circular base; in the middle there is the corolla of a flower and around it the remains of what would exactly have resembled the petals of the sunflower. It is not part of the circus, and it may be as well to mention that it is very near the *stadium* or racecourse which still exists there.

Rev. J. B. STEPHENSON.—I have lived for a while in Australia, and as regards the native belief in a God I may state that I have, in the course of my travels, come across a great many cases in which men of the very lowest type have shown that they all had some idea of religious worship, and my conclusion is that the reason for this is to be found in the fact that God has put into their minds faculties which compel them, as a matter of necessity,—of absolute necessity,—to worship Him, and the more we analyse the minds of men the more, I think, shall we be inclined to come to this conclusion.

Rev. H. WALKER-TAYLOR.—As an Australian clergyman I venture to say just a few words on what the writer of the paper has brought before us. I am sure we are all very much indebted to the author for having dealt so ably with a subject which, in many of its aspects, is comparatively unknown. I certainly do object to the idea that has been getting abroad for many years that the aborigines of Australia are a degraded people. Any one coming in contact with

them, and knowing their religious traditions, must see that those traditions are based on something more ancient and something which shows that they hold the idea of a spiritual being, and that they look on the curious life of this world as a life of work and thought, having relation towards a life of action and thought to come. One who knows a great deal of Australia and the Australians, says that the ordinary idea of omnipotence, goodness, and eternity is distinctly characterised in the religious ideas of the Australian natives. As to the proposition which has been advanced that these people came from India, there would appear to be good grounds for that supposition, as shown by certain similarities of phrases and the resemblances which point to a migration through New Guinea, the people who established themselves in the northern part of Australia having evidently penetrated that country from the southern part of New Guinea, going afterwards south-west, and thus overspreading the continent of Australia. This, at any rate, is the idea of those who have looked into the question. Tradition certainly seems to point to the Australian aborigines coming from the north. Ridley (perhaps the chief authority amongst the many devoted missionaries and laymen who have lived amongst them and investigated the history and customs of the race) speaks of a tradition about the first landing of man on the north-west coast of Australia from Java. He says, moreover, "it has been shown out of their own mouths, from their songs and their cherished traditions, that they are by no means destitute of some qualities in which civilised men glory; such as the power of inventing tragic and sarcastic fiction, the thirst for religious mystery, stoical contempt of pain, and reverence for departed friends and ancestors. It may be affirmed, with some reason, that they have handed down with reverential care through many generations, a fragment of primeval revelation. The manner in which they have displayed these characteristics presents to us such a strange mixture of wisdom and folly, of elevating and degrading thoughts, of interesting and repulsive traditions, of pathetic and grotesque observances, that in order to account for the apparent contradictions we must have recourse to *the supposition of an ancient civilisation from which this race has fallen*, but of which it has *retained some memorials*." I need not now say more than to express my sincere pleasure at the full and careful treatment of this most important subject exhibited in the paper of Dr. Fraser. The poor aborigines have been for well-nigh a century hardly the better

for English civilisation. They have been despoiled, degraded, and neglected by the Anglo-Saxon race who occupy their lands. It is well that this paper has been introduced to the notice of the members of this Institute, if only to give new impetus and a new motive to the movement at the antipodes for more righteous and brotherly attention to the material and spiritual wants of our fellow-subjects, the aborigines of Australia.

The meeting was then adjourned.

REMARKS ON THE FOREGOING PAPER.

BY THE REV. MYRON EELLS

(Of Pacific University, United States).

I have been very much interested in this paper, because it bears strongly on a subject on which I prepared a paper, which was read in 1885 (see *Transactions*, vol. xix.),—the bearing of the religious ideas of the natives on the unity of the race, and other principles of the Bible, —my paper having had reference to the natives of America, while this one refers to those of Australia. It seems evident from their geographical position, that, next to America, the islands of the Pacific Ocean are the most difficult of access by immigrants from that part of Asia where it is believed that Adam was created, and hence the most likely to be the centres of other human creations, if there were such. Hence, everything which tends to show that the inhabitants of these islands were formerly connected with that part of the human race which inhabits the Eastern continent is specially valuable. Realising this, and my interest in the subject having grown since I wrote that paper, I have, as opportunity offered, examined some works on several of those islands, in order to see how much their religion agrees with that of the Bible. Mr. A. W. Howitt, F.L.S., F.G.S., in a paper in the Smithsonian Report for 1883, on the Australian group relations, speaks of their belief in a Supreme Being, and their very great reverence for Him, even in pronouncing His name, and he gives this name in the languages of several of the tribes. W. B. Wildy, in a work on Australasia and the Oceanic region (p. 116), says that the Larrakeyahs and Woolnahs do not practise circumcision, but all the other tribes do; and that the custom is purely traditional. He adds that they are afraid of an evil spirit called Brawl; and that under the trees, up which they bury their dead, they will smooth down the grass in order to detect

any visitation of Brawl; also that before retiring at night, they take a light and hunt around, calling out "Brawl! Brawl!" as if to bring him from his hiding-place. These are the Northern Australians, very low in the scale of civilisation, wearing almost no clothes, eating roots, grubs, worms, the larvæ of ants, lizards and snakes, and practising cannibalism to some extent. Sir John Lubbock, in the Smithsonian Report for 1869, in a paper on the social and religious condition of the lower races of man, also speaks of the belief of the inhabitants of Australia in spirits and a kind of devil, who is spiteful and malevolent, but weak, and dangerous only in the dark. But the paper just read is a most valuable one, and I hope the author will follow up his studies on the subject much farther. There are some things spoken of in this paper which remind me of practices among some of the natives of America. In regard to the ideas of the natives of America about a mediator, and dancing as a mode of worship, I would refer to my paper (*Transactions*, vol. xix., pp. 313, 319). There are among the Indians in Washington Territory, in the north-western part of the United States, two sacred styles of worship practised, called respectively the Red Ta-mah-no-us and Black Ta-mah-no-us, or religious ceremonies. The former derives its name from the red paint with which they paint themselves during its ceremonies. It is by far the most common of the two kinds, is open to the public, and is the usual way which many of them have of occupying the stormy winter days and long evenings. It is often practised by a few persons, and at any time and place, though sometimes considerable preparation is made for it. Any person may engage in its ceremonies, who has obtained his ta-mah-no-us, or guardian spirit. In order to get this, a young man (or woman) goes into the woods alone, where he remains eight, ten, or twelve days, with little or nothing to eat, but during which time he washes himself constantly. While there his ta-mah-no-us is revealed to him in the shape of some animal, which ever after is sacred to him: that is, his guardian spirit dwells in this animal. The latter, or black ta-mah-no-us, takes its name from the black paint which is used, especially on the face, during its ceremonies. This is a secret society, with certain ceremonies, which are public, but the meaning of which they do not tell. The ceremonies of initiation and observance afterwards are only practised at some of the large gatherings. I have seen them but once, when they occupied six or eight days, but I have heard of their lasting two months. Their faces were painted black in various ways, in stripes or spots, or with a part or the whole

of it completely black. About the close of it, the candidates were washed for a long time. In fact, washing and purification constitute an important part of the initiatory ceremonies of both of these modes of worship, and also when a person becomes a medicine man. In both of these we see the period of eight or ten days mentioned in the paper just read, but more especially in the red ta-mah-no-us, whose object is to enable the candidate "to commune with the spirits," as the paper says (p. 159). In the latter, the secret society is plain, and the ceremonies are performed in great state, as in the Bora. Tradition says that this latter originated in British Columbia, in a mythological way. In the practice of the ceremonies of the red ta-mah-no-us, I have seen persons dance around a large fire, clothed with a red blanket, holding a stick in the hand, with face and eyes askance, so that I was forcibly reminded of an old witch with a wand in her hand. This stick was sacred, and the object of the performance was to purify the persons from sin. Singularly enough, however, the red paint is not considered as the symbol of evil, but of good. The tradition of the Skokomish Indians is that, long ago, when a previous race, the progenitors of the present one, dwelt here, the Klik-i-tat Indians of Central Washington came to Skokomish and engaged with those of Skokomish in a great game of gambling. The Klikitats who were painted red, won the game. In process of time, Dokibatl, a kind of deity, incarnate, came and changed the people into earth, the Skokomish Indians being changed into the hills on the west side of Hood's canal, which are of common clay colour, and the Klikitats being changed into hills on the east side, where is a bank of red clay, the remains of the red paint, which was on the Klikitats. To that place the Skokomish Indians go for the red paint, which they use in gambling and religious ceremonies, as they believe it to be an omen of good. The circle and sun mentioned in this paper also have their counterpart in America. The ancient civilised nations of Mexico and Peru, and also less civilised tribes, as the Natchez Indians of Louisiana, the Dakotas, whose sun dance is one of the most savage of their religious ceremonies, the Blackfeet, Clallams and Makahs of the northern part of the United States, and the Pueblos of New Mexico and Arizona, all worshipped the sun. Many of these people built temples to it, and there are remains of sacred places in the south-western part of the United States in circles, which are believed to be the ruins of ancient temples, and which have reminded me of

the circles mentioned in this paper. There is evidence also to believe that the Ancient Mound builders worshipped the sun.

BY MR. HASTINGS C. DENT, C.E., F.L.S.

There are many points in this important paper upon which I should like to write, but my stay in Australia was so short that though I ascertained a good deal, I must not do more than say that all I heard there is confirmed by the author. To study the links between distant nations or people as proved by any similar religious traditions as practices which they respectively hold, is a most valuable sphere of work. May I mention one point upon which the author seems to contradict himself, viz., the two passages on the second page of the paper where he denies "that religiousness is a thing of man's own invention," &c., and the allusion to the "red heifer" of the Israelites, offered "probably with some reference to the Egyptian ideas about this colour." There appears to be in this a tendency to state that the Hebrew records which we hold to be the inspired Word of God, adopted heathen customs. Is it not a much more reasonable—as well as a more lofty—view, to hold that the oral inspiration given to the primeval nations was the *true* origin of the degraded mythologies which we meet with in the most ancient religions? And that this oral inspiration was the preparation for the elaborate system of type and ritual revealed eventually to Moses, and by him reduced to writing. I would have liked the author, as he was dealing with the "religiousness of nations," to say something as to the capability of the Australian aborigines to understand and accept the Christian religion, and their receptivity as to civilisation, &c. I venture to suggest that had the author, with his wide experience, given us some information on this subject, the practical value of the paper would have been very considerably enhanced. I heard and have read much as to the great success of mission work among the natives, both by Roman Catholic and Anglican Missionaries, but had no opportunity of seeing it. But as regards capacity for civilisation, I met some black boys from Western Australia and the Northern Territory, ages from ten to thirteen years; they were travelling on board my steamer from Port Darwin to Brisbane and other parts of Queensland, so I had an opportunity of gauging their powers, &c. They were returning as servants to some miners who were going home after an unsuccessful hunt for gold.

The boys had been taken from the wild tribes, had had no more than a few months' intercourse with white men, yet could talk English well, were very intelligent, and sang English songs very prettily. From all I gathered in Australia (and I visited every part between Port Darwin, along Queensland, down to Adelaide) these aborigines,—reputed to be one of the lowest races of mankind,—appear to have in them all the powers with which man is endowed, and the rising generation is capable of being formed into respectable civilised and religious communities. Of course, from Port Darwin to Brisbane was the most available field for inquiry, as the natives there have not been so entirely “wiped out,” or, at least, are more easily reached than in New South Wales, Victoria, or South Australia. In fact, from all I gathered, this appears to offer the greatest opportunities for success of all the foreign fields of mission work that I have seen.

Analogy (*d*), “the fish-shaped roarer,” which the author compares with the Chaldaean god, half man half fish, requires notice, as to the wide-spread relics of fish-worship. The god Vishnu (of India) is described as “incarnate, in the form of a *fish*, to recover the sacred books lost in the Deluge.” The fish was worshipped by the Cuthites or Phœnicians, and relics thereof appear abundantly in Ireland (in which country the round towers are perhaps the best known remains of this very early race). On one of the ancient and beautiful pre-Christian crosses at Kells, county Meath, I have lately seen a carving of six men on their knees worshipping a huge fish as big as themselves. When I was at Fuchau, on the Min river, in China, in October, 1886, I visited the Kushan (Buddhist) monastery, situated aloft in the seclusion of a mountain dell; there is here a huge tank or pond full of sacred fish, mostly perch, some of which are an enormous size. The worshippers at these shrines can, for a few “cash” (a cash is about 1-25th of a penny), buy a lot of biscuits, which they throw into the pond, and immediately the holy fish rise in hundreds to the surface and devour the offerings of the devotees.

The mention of fire worship in Analogy (*g*) is rather too brief. The author might at least have said that this is none other than the worship of Baal. Abundant traces thereof are preserved to this day in Ireland, in names of places or dedications of ancient temples to Cuthite demigods transformed into Christian saints, all of whom are now represented as having lived about the time of St. Patrick, but there yet remains a tradition at Glenda-

lough, co. Wicklow, that in ancient times the heathen priest used to ascend the fine round tower (which has been lately restored) and at sunrise called aloud the name of Baal four times, once from each of the four openings or windows at the summit of the tower, which face the cardinal points of the compass. (Cf. 1 Kings xviii. 26, &c., as to Baal among the Israelites.) Apart from the religious links of affinity between nations, and quite outside the limits of discussion of Mr. Fraser's paper, is the last word I would like to add, but it may perhaps be ruled "out of order." It is, however, an instance of how a link may be traced which has never been thought of. The case in point is the affinity of the Indians of Alaska with the Botocudos of Eastern Brazil. I had the opportunity of attending a recent meeting of the Royal Geographical Society, when a paper was read by Mr. Stearn on his explorations of the Rio Dôce in Brazil, and his sojourn among the Botocudos for a month. In the discussion, Mr. Colin Mackenzie (whom I met in Brazil in 1884) stated that he had traced the custom of the monstrous lip-disc worn by the Botocudos, from the eastern coast of Central Brazil, through the interior, by Central America, to the West Coast in California and thence up to Alaska, where the custom is also found to-day.

REPLY BY THE AUTHOR.

I have to thank the Chairman and those who have taken part in the discussion for their kind approbation of my paper. I may be allowed to state that it was written to combat the theory held by some ethnologists that our Australian blacks are a race distinct from the rest of mankind. Against this theory my argument is briefly this:—The blacks of Western Africa have certain rites and ceremonies, evidently of a religious and sacred character, through which young men have to pass at their opening manhood. The blacks of Australia have similar ceremonies, of a similar import, and in some particulars, identical with those of Africa; therefore these two races must have drawn their rites of initiation from a common origin and a common source, for it is impossible to believe that two races of mankind, now located so far from each other, and with no opportunities of contact for thousands of years bygone, should have, apart and of themselves, worked out the same beliefs by mere thinking.* My introductory remarks, to which Mr. Stephenson refers, were meant to say that man is found to have everywhere a share in the common religious instinct planted in him by God, and, it may be, in a common primitive revelation given by God. All mankind are therefore in this respect homogeneous; but if men were found anywhere who were void of this instinct, the mere use of the thinking faculty would not lead them to religious beliefs and acts of worship.

As to the "red heifer," I should have expressed my meaning more accurately if I had said the red colour of the heifer in the Mosaic ordinance had probably some reference to the notions about that colour which we find among the Hamite races, of which the early Egyptians were a part. I did not intend to say that any portion of the Mosaic ritual was borrowed from the Egyptians. To the white race black is the evil colour; to the black race white is the spirit-colour, and red is evil.

As to the analogies which may be drawn from Baal worship, I spoke of them as briefly as possible, because they are so well known in Britain.

* A valuable paper on "The Ethnology of the Pacific," by the Rev. S. J. Whitmee, F.R.G.S., vol. xiv., p. 16, tends to support this view.—Ed.

I may here be asked how I came to possess a full account of the Bora ceremonies, when the blacks hold them as sacred, and will not divulge them. So silent are they on this point that, so far as I know, no one had previously obtained, or at least published, full information about these ceremonies. Well, about sixty years ago it was the custom in this colony for the Government to give grants of Crown land of considerable extent to immigrant gentlemen who were in a position to occupy and improve the land. The father of a friend of mine got a grant in this way, and went to take possession. As I have explained in the paper itself, he was coming down the hill towards the spot where he intended to build his house, when a tribe of blacks camped there rushed off in alarm, taking him to be "Wunda," a spirit; but, reassured by his gestures, they came near, and finding him to resemble a chief of theirs, who had just died, they claimed him as one of themselves! His son, as might be expected, grew up on terms of intimacy with the blacks on the estate, and has always treated them with kindness; they will tell him anything. At my request he got a young black, who had just been initiated, to tell him all about the Bora. I have in various ways tested information thus given, and I am convinced that it is full and accurate.

In the month of September, 1888, there was some correspondence in the *Times* on the subject of Australian arithmetic. A distinguished authority there says, "One of the clearest indications of the low mental power of savages is that afforded by arithmetic." It seems to me that this statement is too general; for even, although the power of counting up to high numbers were wanting in a savage, it does not follow that his mental powers in general are low. Perception, cognition, and memory are mental powers; but if Sir John Lubbock's memory were weak and yet the cognitive and perceptive faculties remained strong and vigorous, it would be unjust to say that he is a man "of low mental power." Colonists who have been long familiar with the blacks of Australia, with one voice cry out against the assertion that they are of low mental power, and could give hundreds of instances to the contrary. A friend of mine who, in his boyhood, fifty years ago, was much in contact with the tribe in the midst of which his father had settled, has told me that two black boys, his companions, were "out-and-out good chess-players, taking plenty of time to study the moves, and showing great patience and calmness; these boys never went to school, and yet they could count up to a thousand." It is very clear that mental power was there, in these boys, but unseen and

dormant, like seed in the ground, until circumstances led to its being developed.*

Sir John Lubbock also says, "In no Australian language is there any word for 'five.'" This is not quite correct, for I know at least two large tribes (and there may be others that I do not know of), the one in Queensland and the other in the south-east of New South Wales, which have single words for "five," and in each case the word "five" is formed from the native word meaning "hand." As to the general question—the counting of numbers—I believe that a careful analysis of the numerals used by the Aryan family of languages will show that the base of them is *one, two, three*, and no more, *three* being in many religions a sacred and complete number; and that the other digits are expressed by words equivalent to one-three, hand, hand-and-one, hand-and-two, two-four, one-wanting two hands. If it should be proved that the Aryans, now the most civilized of races, originally said *one-three* for four, why should our Australians be considered "of low mental power" because they say *two-two* for four? Indeed, I am inclined to think that our Australians count in the more natural way, for they see nothing in or around them arranged in threes; the birds and beasts go in pairs; they themselves have two feet, two hands, two eyes, and so they count by twos. If the Australian blacks separated from the parent stock of mankind at a time when the common numeral system was still limited to *one, two*, or *one, two, three*, then their case is merely one of arrested development, their environment being unfavourable after separation; or if they ever had a developed system of composite numbers, these have fallen into disuse through the operation of a law of nature, for their wants are few and they live so much from hand to mouth that they had no need for high numbers. Their neighbours in Polynesia, who have plenty of fish to count, and bunches of bananas, and yams, and taro and cocoa-nuts, have developed many peculiar expressions to indicate the number of these, but our black fellow, who is well pleased when he is able to sing of the capture of "*wakulá, boolará bundarrá*" (one, two kangaroos), and whose only property is two

* On this point, Mr. Charles Wilson writes in the *Times*, Sept. 28, 1888: "The mental capacity of the aborigines is generally very much underrated. There are two schools at Moravian mission stations in Victoria, and the scholars are mostly aborigines; but the schools have passed their examinations as well as any other school in that colony, and the education given there is not inferior to that of our Board schools."—Ed.

or three spears, clubs, and boomerangs, does not require to use high numbers in his daily speech. Nevertheless, when it is necessary, he counts 10, 20, 30, 40, by closing and opening his hands, and then for higher numbers he contents himself with saying "Many, many."

For these and other reasons it is desirable that men of science in Britain should be careful in building theories upon what is said about our Australian aborigines; much of the information they have about them is unreliable, for it has not been gathered by competent observers or tested on scientific principles.

NOTE.

Professor Max-Müller, in his "Selected Essays" (volume ii., p. 27), makes the following interesting remarks:—

"Looking at a report sent home lately by the indefatigable Governor of New South Wales, Sir Hercules Robinson, I find the following description of the religious ideas of the Kamilarois, one of the most degraded tribes in the North-Western district of the colony:—

"'Bhaiami is regarded by them as the maker of all things. The name signifies "maker," or "cutter-out," from the verb *bhai*, *baialli*, *baia*. He is regarded as the rewarder and punisher of men according to their conduct. He sees all, and knows all, if not directly, through the subordinate deity *Turramûlan*, who presides at the *Bora*. *Bhaiami* is said to have been once on the earth. *Turramûlan* is mediator in all operations of *Bhaiami* upon man, and in all man's transactions with *Bhaiami*. *Turramûlan* means "leg on one side only," "one-legged."

"This description is given by the Rev. C. Greenway, and if there is any theological bias in it, let us make allowance for it. But there remains the fact that *Bhaiami*, their name for deity, comes from a root 'bhai,' to 'make,' to 'cut out,' and if we remember that hardly any of the names for deity, either among the Aryan or Semitic nations, comes from a root with so abstract a meaning, we shall admit, I think, that such reports as these should not be allowed to lie forgotten in the pigeon-holes of the Colonial Office or in the pages of a monthly journal."—ED.

ORDINARY MEETING, MARCH 5, 1888.

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

The Minutes of the last Meeting were read and confirmed, and the following Elections were announced :—

MEMBERS.—The Right Hon. Lord Halsbury, Lord Chancellor ; Major-General Sir F. W. Grenfell, K.C.B., Sirdar of the Egyptian Army.

ASSOCIATES.—Major-General R. A. Cole, Surrey ; Rev. H. Latham, M.A., Cambridge ; H. L. Mulholland, Esq., M.P., Derry ; Rev. G. B. Richards, F.R.S. (Tasmania), S. Devon ; Rev. J. S. H. Royce, Australia ; W. J. Smellie, Esq., Willesden ; Major T. Varty, Penrith ; The Worshipful T. Wright, Esq., Mayor of Leicester.

Also the presentation to the Library of "Victories and Defeats," by Major-General Anderson, B.S.C.

The following paper was then read by the author :—

ORIENTAL ENTOMOLOGY.

By the Rev. F. A. WALKER, D.D., F.L.S.

THE subject-matter of the present paper is devoted to a consideration of the diurnal Lepidoptera of Southern Asia, including Hindostan, Ceylon, and the group of numerous and, in most cases, large islands ordinarily known as the Malay Archipelago,—a wide region indeed, and comprising a correspondingly large and varied Fauna. Butterflies of Southern Asia.

Our knowledge of the number of species occurring in these tropical lands, of their local forms and varieties, as well as of their geographical range and distribution, has been materially increased and systematised within the last thirty years by the following sources of scientific information :— Recent Sources of Information.

Wallace's *History of the Malay Archipelago*, and the extensive collections that he made while travelling in the different islands.

Distant's *Rhopalocera Malayana ; or, Description of Butterflies of the Malay Peninsula*, wherein 503 species are described, and nearly the whole of that number figured.

Moore's *Lepidoptera of Ceylon* and also his *Lepidoptera Indica*, now in course of preparation.

Relationship according to Distant, of the Rhopalocera of the Malay Peninsula to those of Burma and North-Eastern India. Also to the islands in the following order of nearness—

- (1) Borneo,
- (2) Sumatra,
- (3) Java and Ceylon.

Wallace's division of the Malay Archipelago into—

- (1) the Indo-Malayan region;
- (2) the Austro-Malayan region.

1) Indo-Malayan region—shallow sea.

(2) Austro-Malayan region—deep sea.

The shallow sea indicates a recent geological change. The deeper sea, a more ancient separation of the islands.

Both mammalia and birds on the more recently formed islands are allied to those of Southern Asia, and are more numerous in genera and species than those occurring in the more ancient and easterly formation.

Distant remarks on page vi. of the preface to his work : " A study of the Rhopalocera of the Malay Peninsula gives unmistakable proof of the relationship, both in genera and species, to those of Burma and North-Eastern India on one side, and to the islands of Borneo, Sumatra, and—in a less degree—to Java at its southern extremity."

And again on pages vii. and viii. : " Our facts are sufficient to show that the Malay butterflies have their nearest relationship with those of Borneo—especially North Borneo ; in a lesser degree with those respectively of Sumatra, Burma, and the North-Eastern Indian districts, and in a still much less degree to those of Java and Ceylon."

Wallace has divided the Malay Archipelago into an Asiatic and an Australian region,—a division, according to his own account, first indicated by Mr. Earl,—and these two regions he terms respectively the Indo-Malayan and the Austro-Malayan divisions of the archipelago.

The Indo-Malayan division consists of the islands Java, Sumatra, and Borneo, all separated from one another, and from the peninsula of Malacca and Siam, by a shallow sea everywhere under 100 fathoms, and in many places under fifty fathoms in depth.

The Austro-Malayan division consists of the island of Celebes, and, to the east of it, of the islands of Gilolo, Ceram, and Waigiou, Bouru, Mysol, Salwatty, and the Aru Islands, and southward of the islands of Lombok, Timor, &c., and still further to the east and nearest to Australia, of the great island of New Guinea. All these, and several others included in the same division, are separated from one another and from Australia by a deeper sea, over 100 fathoms in depth.

The comparatively shallow sea around the Indo-Malay division indicates, according to Wallace, a recent geological change ; the deeper sea around the Austro-Malay division a separation of the islands at a more remote period.

Wallace proceeds to prove this statement more elaborately and in detail by reference, first, to the mammalia, and, secondly, to the birds found in the two divisions respectively, and their great diversity accordingly. The native mammalia of the Indo-Malay region are closely allied to those of Southern Asia, and are far larger in size, and much more numerous in species, than those of the Austro-Malay region. Similarly, the genera of birds are mostly different in the former localities to what they are in the latter.

Java and Sumatra, both islands of the Indo-Malay division, are separated by a strait only fifteen miles wide, yet Java

possesses numerous birds never found in Sumatra. Again, Bali, the easternmost island of the Indo-Malay division, and Lombok, the westernmost island of the Austro-Malay division are only separated from each other by a strait fifteen miles wide, yet practically even this narrow sea constitutes too wide a barrier, it would seem, for birds to wing their way across, and so the diversity above recorded is maintained accordingly.

As regards butterflies, the remarks made about the birds apply to them as well, for, to take the great Ornithoptera, or "Bird-wings," which will be discussed more fully and in detail anon, by way of examples, the green, gold, and blue species are confined to the Eastern or Austro-Malay division; the very characteristic and unique *O. Brookeana* to the islands of Borneo and Sumatra in the Western or Indo-Malay division; and, though the yellow Ornithoptera occur in both divisions alike, yet in these instances, it must be remembered, many of the islands possess, if not each its own separate yellow species, yet a distinct local variety or form.

It by no means follows, if a butterfly succeeds in crossing the sea from the continent to an island, or from one island to another, that, when previously unknown in its new locality, it should manage to survive the first season, or to propagate its species, should the climatal conditions be unfavourable, or the requisite food-plant be not forthcoming for the larva.

It has been asserted that butterflies first existed on the continent, and thence they or some of the species spread to the islands. It would probably be more correct to state that some of the species had continued on the islands ever since the period when the said islands formed a part of the nearest continent, and that other kinds had died out on the islands since their formation in consequence of great changes of temperature in the lapse of ages, or, and in more special reference to the physical geography of the Malay Archipelago, that numerous islands had once formed one continent, or an extension of the great continent of Asia in a south-easterly direction, and that the increase or already-existing multitude of the foes of insect-life, or the disappearance of various plants, or an unfavourable climate, or all these causes combined, caused the extinction of certain species in particular localities, whereas on other islands where the above hindrances did not exist the said butterflies were perpetuated and preserved.

That the gradual separation into a group of islands of what was formerly continent would tend to an increased humidity of climate is certain, and that the said humidity

Birds equally with mammalia are confined to their own islands. The possession of wings gives them no advantage in this respect, even when the separating strait is only fifteen miles in width.

What has been said about the birds applies to the butterflies as well.

Some butterflies casual visitors only, and not to be regarded as additional species of insular Fauna.

Theory that butterflies spread from the continent to islands.

Some of the species continued on the islands ever since those islands formed a continent.

Increase of foes of insects, disappearance of plants, unfavourable climate—one or all of these causes caused the extinction of certain species.

Development of islands causes humidity of climate.

Prevalence,
disappear-
ance,
modification
of species in
consequence.

would conduce to the prevalence of certain species, as well as to the disappearance of others is probable, as also the local modifications in consequence of the change of weather of several kinds in process of time.

Celebes.

No account of the Fauna of the Malay Archipelago is complete without reference to such kinds as occur in the central island of Celebes, which, from its geographical position, might seem at first sight to be likely to contain the kinds that are found in the islands east and west of it, and to be fairly representative of the whole group. But the fact is, to employ Wallace's description once more, it is the poorest in number of species and the most isolated in the character of its productions of all the great islands in the Archipelago. By way of further explanation and illustration, Borneo possesses twenty-nine species of Papilio or Swallow-tail, Celebes only twenty-four; but then only two out of the twenty-nine in Borneo are not found elsewhere. In Celebes, eighteen out of the twenty-four are absolutely peculiar to the island.

Papilios of
Celebes and
Borneo
compared.

Pieridæ of
Celebes and
Java
compared.

Java possesses thirty-seven species of Pieridæ, and Celebes only thirty, but only thirteen of the thirty-seven of Java are peculiar to that island, whereas nineteen of the thirty of Celebes are not found elsewhere. Wallace collected fifteen species of Danaidæ in Borneo, and sixteen species in Celebes. Of the fifteen from Borneo only two were confined to the island, but fourteen of the sixteen kinds in Celebes are found nowhere else. Further reference to Wallace's scientific statistics will establish the fact that it has a larger percentage of peculiar species not only than any island, but than any group of islands in the Archipelago.

The largest
percentage
of peculiar
species in
Celebes,
exceeding
those of any
island or
group of
islands in
the Archipelago.

Species of
Celebes
larger than
those of other
islands, and
with a
different
outline of
wing.
Compare the
Papilios and
Pieridæ as
examples of
this fact.

Again, many of the species occurring in Celebes are much larger, and have a strongly-curved costal margin, compared with the smaller butterflies and their much straighter outline of wing in the surrounding islands. Compare *P. gigon* of Celebes with *P. demolition* of Singapore and Java, *P. miletus* of Celebes with *P. Sarpedon*, as occurring in all the rest of Southern Asia, *T. zarinda* of Celebes with *T. Nero* closely allied to it, and found in all the islands to its west.

Wallace's
explanation
of the local
peculiarity.

The smaller and more obscurely-coloured groups of butterflies, be it noted, have not elongated wings: so possibly the more showy species needed a stronger and more pointed wing once when the abundance of insectivorous creatures rendered the means of escape a necessity.

The number of species on an island is usually smaller than

that of those occurring on an adjacent continent. Thus almost every British insect is also found on the continent, and the number of species occurring in Corsica and Ceylon is fewer than those of the mainland of Europe and of India respectively, although Corsica possesses some and Ceylon several kinds peculiar to itself.

Insular species fewer in number than continental.

In reference to insular and continental forms of the same species, where there is a difference in size, the insular form is, as a rule, the smaller of the two,—as, for example, the Cingalese type of the orange and sulphur coloured *Thestias Rhexia*, and that of the Nicobar Islands are considerably less than the Nepal and Borneo type in my own collection.

Insular and continental forms of the same species

If it be objected that several of the islands of the Malay Archipelago (both from the number of species they possess, and also from the fact of those species including many grand and peculiar kinds not also found on the mainland of Asia) would appear to be an exception to this rule, the great size of some of these islands must be borne in mind, exceeding the dimensions of ordinary islands, and equivalent almost to a small continent. This will be best understood by a reference to the following table:—

Great size of some of the islands of the Malay Archipelago.

	Length.	Maximum Width.	Area.	Comparative dimensions.
New Guinea	1,490 miles	by 430 miles.	306,000 square miles.	
Borneo	730	” ” —	289,000	”
Sumatra	1,047	” ” 230	170,744	”
Java	622	” ” 121	49,176	”
Celebes	580	” ” 530	70,000	”
Borneo	More than double the size of Great Britain and Ireland.			
Sumatra	Thirteen times the size of Holland.			
Java	Four times the size of Holland.			

Eighteen more islands, according to Wallace, are as large as Jamaica, more than 100 as large as the Isle of Wight, and isles of smaller size innumerable. Java, Luzon, and Celebes are also each about the size of Ireland.

The Eastern tropics possess by no means such a variety of species as the Western, as no country in the world is so rich in butterflies as South America; and if I am not mistaken, many of the Asiatic and African kinds have a wider range and distribution across their respective continents than is the case with the same proportion of species in the New World, which are confined to the limits of one valley or mountain range, not occurring outside or beyond.

Eastern tropics not so rich as the Western in variety of species.

More genera of butterflies common to Asia and Africa than to America also.

Only a few species common to Asia and Africa.

That there should be more genera of butterflies common to tropical Africa and Asia than to tropical America as well will be readily understood from the greater proximity of the two first-named continents; but the identity of their respective species is another matter, although there are a few exceptions; but these few exceptions are liable to still further diminution when it is borne in mind that some of the few butterflies common to Asia and Africa are not, properly speaking, tropical kinds, but either cosmopolitan, as our own *V. Cardui*, or subtropical, and found likewise in the south of Europe, like *Danais Chrysippus* and *Lycæna Bætica*. These facts will appear only what in all likelihood might be expected from the circumstances of the wide extent of ocean along the line of the equator, which, stretching across the northern end of the great lake, Victoria Nyanza, and thence extending to the eastern coast of Africa, traverses no more land whatever until it bisects the important island of Sumatra in two nearly equal portions, and also because the distance of 100 miles only where the continent of Africa is united along its north-eastern extremity to that of Asia, and only separated from it by the Suez Canal, is far removed from the tropics.

(1) Genera common to Asia, Africa, and America;

(2) to Asia and Africa only;

(3) peculiar to Asia.

The following are some of the genera common to Asia and Africa, and America:—

<i>Diadema</i> *	<i>Papilio</i>	<i>Callidryas</i>
<i>Danais</i>	<i>Pieris</i>	<i>Terias</i>
<i>Charaxes</i> *	<i>Vanessa</i>	<i>Acræa</i> *

The following are some of the genera peculiar to Asia:—

<i>Euploea</i>	<i>Cethosia</i>	<i>Athyma</i>
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Acræidæ only represented by *Acræa Vestasiæ*.

Diadema, whence so called.

Danais.

As regards the *Acræidæ*,—a tribe which is represented by numerous species in Africa and Madagascar, red, orange, tawny, or brown, some with the wings partially transparent, and many profusely spotted with black dots,—these butterflies are only represented by the dun-coloured *Acræa Vesta* of Nepal in Asia. Genus *Diadema* is so named from a row of white spots round the margin of the wings of many of its species, like gems forming the border of a crown. The ground-colour of several species is dark brown, blue, or purplish black.

Genus *Danais* is a subdivision of the *Danaidæ*, which have of late years been separated into *Danais* and *Amauris*. Most of the species of *Danais* are tawny, black, and white.

* Those marked with an asterisk are only found in Asia and Africa.

This is an instance of a genus which, besides occurring in the before-named localities, is also found, as is that of *Diadema* likewise, in North Australia. It is represented in Southern Europe by one species only, *Charaxes Jasius*, a dark and tawny kind. By far the greater number of species of this genus are found in Africa, and in West Africa in particular. Such as are met with in Southern Asia, with which we are more immediately concerned, are for the most part cream-coloured or tawny, some of the cream-coloured presenting a white, satiny appearance, diversified by elegant markings on the under side. The female of one tawny species was, I believe, new when it came into my possession, and, as such, was named *Charaxes Wallacei* by Mr. Butler, after the writer of the *Malay Archipelago*. Most of these butterflies have four short tails, and their strong and sinewy wings furnish them with the power of rapid flight, and make a rustling or crackling noise, according to the testimony of those who are well acquainted with them in their native habitat. Their larvæ also have a very peculiar appearance.

Such species of the *Vanessidæ* as *Vanessa* (or, perhaps, more strictly speaking, *Junonia*) *cenone* and *orithya*, eyed somewhat similarly to our Peacock, furnish instances of butterflies common to Asia and Africa, though the markings of the local varieties are somewhat different in Africa, Madagascar, India, and Australia. Among the *Vanessidæ* peculiar to Asia may be mentioned two Himalayan species, *V. Kumaon*, closely allied to our *Polychloros*, and *V. Kaschmirensis* to our *Urticæ*. The *V. Calirrhoe* or *Indica*, from the same region, also somewhat resembles our *V. Atalanta*, but the black ground-colour of the latter is replaced by a dusky brown in the wings of the former insect. There are also the blue and black *Vanessidæ*, of which three species, at any rate, are known, one found in Ceylon, another, *V. Charonia*, in Southern Asia, and another, *V. glauconia*, in Japan.

As regards the genera *Callidryas* and *Terias*, these are common to the Eastern and Western tropics as well, and being orange, yellow, or white, do not possess nearly as much variety of colouring and markings as the *Papilios*. Like our own Garden Whites, they are ranked under the great sub-family of *Pierinæ*, and are of various sizes, several species of *Terias* being of the size of our Orange-tip, or smaller, and some of *Callidryas* far exceeding any European *Pieris*, or White, in size. Butterflies of genus *Callidryas* congregate in immense numbers in certain spots (for instance, a pool or puddle in

Charaxes.

Its range.

Its peculiarities.

Vanessidæ.	{	Vanessa.
		Junonia.
		J. cenone.
		J. orithya.

V. Kumaon.	{	V. Kaschmirensis.
		V. Indica.

V. Charonia	{	V. glauconia
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Genera	{	Callidryas
		and Terias.

the forest), rising up like a perfect cloud of pieces of white paper fluttering in the breeze when a horseman approaches. This I state as I heard it from the testimony of an eye-witness in Ceylon.

Euplœa,
Cethosia,
Athyma
peculiar to
Asia.

The genera Euplœa, Cethosia, and Athyma are peculiar to Asia. The greater number of species of Euplœa are dark brown, some pencilled or shot with glossy blue or purple, some with cream-coloured markings. The species of Cethosia are either brick-red or white, with a curious and elaborate pattern round the border of the wings. There is no striking similarity between many of the kinds of Athyma, which are variously coloured.

Genus
Papilio
essentially
tropical.

To assert that a large number of species of the genus Papilio occur in Southern Asia is only to state that the whole of that region forms a portion of the tropics, for the genus Papilio, or Swallow-tail, is essentially a tropical tribe, some hundreds of species having been recorded from the tropics, but only four from the whole of Europe, and a few, but not many, additional ones from Japan, and also from North America.

Name
"Papilio"
given by
Linnæus to
all butter-
flies alike.

Many of the
Oriental
Papilios
dark-
coloured.

Linnæus formerly bestowed the name Papilio on all tribes of butterflies alike, but in more recent days the appellation has been exclusively restricted to the Swallow-tails. A decidedly large proportion of Oriental Papilios, or Swallow-tails, are of a dark and sombre tint, being either black or else dark brown, relieved by cream-coloured patches or markings. Take, for example, such butterflies as *P. Helenus*, *Severus*, *Pammon*, *Nepheles*, *Erectheus*, *Ormenus*, *Euchenor*, *Nox*, *Varuna*, *Memnon*, and many more. Of these species *P. Memnon* and *Pammon* are subject to great variation, the former more especially as regards colour, the latter in its markings. It must be borne in mind that by no means all the Eastern Papilios, any more than those of Africa or South America, are possessed of tails, but are classed among the Swallow-tails all the same, in consequence of the nervation of their wings, which furnishes the chief mark of distinction between all genera of butterflies. Thus, in some cases, neither sex ever has tails; in other instances there are two varieties of the male, or of the female, or of both, of which one has and the other is without tails. In one or more

All Eastern
Papilios not
possessed of
tails.

*P. Double-
dayi*, females
both tailed
and tail-less.

Some groups
of Papilios
known by the
name of one
well-known
species which
they include.

African species, the tailed is of quite a different colour to that of the tail-less variety, and with regard to Oriental Papilios, with which we are more especially concerned, the eggs of the tail-less female of *P. Doubledayi* will produce both tailed and tail-less females too, and similarly those of a tailed one will generate tailed and tail-less alike. It has become the fashion to designate a certain group of Papilios

that are inter-connected by affinity of colouring and markings by the name of some one common and well-known species of the said group. Thus the "Paris" group is the name given ^{"Paris" group.} to the group including *P. Ganesa*, *Polyctor*, *Paris*, *Arjuna*, *Crino*, *Brama*, *Blumei*, and the like. All the said *Papilios* have the appearance of having their wings thickly covered with a fine golden-green dust, and have also a blue band or patch, with a magenta-coloured ocellus at or towards the base of the lower wings. *Papilio Blumei*, from the island of Celebes, is a particularly large and beautiful species, with azure blue spoon-shaped tails. To this class also are referred such butterflies as *Papilio Ulysses* from New Guinea, *P. Telegonus* from Batchian and Gilolo, *P. Montrouzieri* from New Caledonia, and *P. Joesa* (whether species or variety of *Ulysses*) from Queensland, though these last four kinds, having wings of an azure blue and glossy black, are of a different hue to the remainder. Then there is the "Memnon" group, including such species as *P. Protenor*, ^{"Memnon" group.} *Rhetenor*, *Agenor*, *Memnon*, *Deiphobus*, *Ascalaphus*, &c. Several of these are dark, or, at all events, dusky; some, as the very variable *Memnon* itself, are with or without a red patch near the base of the fore-wings, and are either almost black, with an appearance of slate-coloured dust over their wings, or black intermingled with a little white, so gradually shading off in different specimens, that some individuals of this species have the interior of the wings almost completely white. Then there is the "Bathycles" group, including such very ^{"Bathycles" group.} common species as *P. Bathycles*, *Sarpedon*, and *Agamemnon*, the rarer *P. Arycles*, and the *P. Miletus* of Celebes, which is either a local variety of *Sarpedon* or a species closely allied to it. These have a ground-colour of black or else dark brown, numerous spotted with green in the case of the *Agamemnon*, and with stripes, patches, or markings of the same colour in *Bathycles*, *Eurypylyus*, *Sarpedon*, and *Miletus*. *Arycles*, which is a rare Borneo species, looks as if it was a sort of hybrid between *Bathycles* and *Agamemnon*. Among individual species that are singularly distinct in appearance, and not so easily referable to any particular group, may be mentioned the *Papilio Evan*, with hooked wings of ^{P. Evan.} the colour of a withered vine-leaf, from Northern India; *Papilio Semperi*, with black velvety wings and scarlet body, ^{P. Semperi.} like that of a Tiger Moth, &c.; while *Papilio Polymnestor* is ^{P. Polymnestor.} a large and handsome species, occurring commonly in India and Ceylon, its colour black and lavender blue, spotted with black—the said blue paler or greyer in the female; and *Papilio Mayo*, black, with a band of lavender blue at the base ^{P. Mayo.}

of the lower wings, is also a fine kind, recently discovered in the Andamans, where Lord Mayo was assassinated, and named after him on that account.

Genus Ornithoptera.

"Bird-wings."

Expanse of wings.

Geographical distribution.

Females larger than males.

Any paper professing to deal with the diurnal Lepidoptera of Southern Asia would be manifestly incomplete without full and special mention of that magnificent tribe of butterflies known as Ornithoptera or Bird-wings, alike from their shape, and the dark colour of the upper wings of many kinds in both sexes, and of still more kinds in the case of the female only. This tribe has pre-eminently a claim to be regarded as Oriental, as the range of every species that it includes is confined to Southern Asia and Australia. In the expanse of wing from tip to tip that its different species possess, it exceeds every other genus or family of butterflies, taken as a whole, from the Old or the New World either, although there are a few exceptions to this rule in the case of individual species of *Papilio* or *Hestia* or *Morpho*; still, my assertion with regard to the entire tribe that the Ornithoptera are unrivalled in their expanse of wing holds good. The range of the genus extends over Hindostan, Ceylon, the Malay Archipelago, New Britain, New Ireland, and Australia. Only the yellow Ornithoptera, however, are found on the mainland of Southern Asia and in Ceylon, the gold and the blue species, and some of the green ones being confined, some to one, others to two or more of the islands further East. The female of every species belonging to this group is larger than the male, saving only in the instance of *O. Brookeana*, where the sexes are of equal size. The whole of the Ornithoptera, as regards natural affinities, may conveniently be classed under three heads:—

1. The green, the gold, and the blue.
2. *O. Brookeana*, a very distinct species.
3. The yellow.

The green, gold, and blue.

The blue variety, *O. D'Urvilliana*

As regards the green, gold, and blue, these constitute several species, or many varieties of one species, according to the different opinions entertained by various entomologists. Mr. Kirby is disposed to regard them as constituting different varieties of one and the same species, and enumerates fifteen varieties of one kind accordingly. In support of his view it must be admitted that the colour of the gold *O. Crœsus* has a greenish tint, and that of the green *O. Pronomus*, for example, a golden one when seen in a certain light; the blue *D'Urvilliana* also has a golden tinge, and that the green, gold, and blue of *O. Pronomus*, *Crœsus*, and

D'Urvilliana respectively occupy precisely the same position in the wings of all three species. The blue is only represented by one kind, *O. D'Urvilliana*, from New Ireland, and, owing to the fact of there being cannibals in that island until within the last twenty years, this species was only known by a unique specimen in the Paris Museum. Of the gold, there are, at any rate, now three species or varieties known, namely, *O. Cræsus*, discovered by Wallace in Batchian, and afterwards found likewise in Ceram; *O. Lydius*, of a deeper orange, from Gilolo; and *O. Tithonus* from Papua, which is said to have more gold bands than *Cræsus*, and to be a larger and finer insect. I cannot refrain from quoting Wallace's account of his first capture of *O. Cræsus* in the island of Batchian, page 51, vol. ii., of his *Malay Archipelago* :—

The gold
O. Cræsus,
O. Lydius,
O. Tithonus.

"The next day I went again to the same shrub, and succeeded in catching a female, and the day after a fine male. I found it to be, as I had expected, a perfectly new and most magnificent species, and one of the most gorgeously-coloured butterflies in the world. Fine specimens of the male are more than seven inches across the wings, which are velvety black and fiery orange, the latter colour replacing the green of the allied species. The beauty and brilliancy of this insect are indescribable, and none but a naturalist can understand the intense excitement when I at length captured it. On taking it out of my net, and opening the glorious wings, my heart began to beat violently, the blood rushed to my head, and I felt much more like fainting than I have done when in apprehension of immediate death. I had a headache the rest of the day, so great was the excitement produced by, what will appear to most people, a very inadequate cause."

Wallace's
discovery
and capture
of *O. Cræsus*.

The green varieties are very numerous—twelve, at least, in number. Of six of them, not possessing them in my own collection, I know little or nothing, as *O. Euphorion*, *Boisduvallii*, *Oceanus*, *Triton*, *Pegasus*, *Archideus*. Of the remaining six, four, I consider, may be classed as local varieties of one and the same species, namely, *O. Pronomus* from Queensland, *O. Aruanus* and *Poseidon* from the Aru Islands, and *O. Cassandra* from New Britain. *O. Priamus* is so much larger and *O. Richmondia* so much smaller than these four varieties, as to entitle the former, from the Island of Amboyna, and the latter, from the Richmond River, Australia, to be regarded as distinct kinds.

The green.
In Hewitson's collection—from Amboyna and Ceram, *O. Priamus*; Cape York, *O. Pronomus*; Darnley Island, *O. Poseidon*; New Guinea and Waigiou, *O. Aruanus*; *O. Cassandra*; New South Wales, *O. Richmondia*.

O. Priamus is a very old species, and was known to science at least 130 years ago; of late years it has become very rare, probably the rarest of all the green ones, and is best represented by specimens of long stand-

ing in collections and museums in Holland. *O. Pronomus*, which is decidedly smaller, is often offered for sale as true *Priamus*.

Green, gold,
and blue
confined to
the males.

It will, of course, be understood that the green, gold, and blue here mentioned only refer to the males. The ground-colour of the females is invariably dark or dusky, diversified by yellow and white markings or spots.

Wallace thus describes his capture of *O. Poseidon* (in pp. 199 and 200 of vol. ii. of his *Malay Archipelago*) in the Aru Islands :—

Wallace's
capture of
O. Poseidon.

"I had the good fortune to capture one of the most magnificent insects the world contains, the great Bird-winged Butterfly, *Ornithoptera Poseidon*. I trembled with excitement as I saw it coming majestically towards me, and could hardly believe I had really succeeded in my stroke till I had taken it out of the net, and was gazing, lost in admiration, at the velvet black and brilliant green of its wings, seven inches across, its golden body, and crimson breast, &c."

Bodies of
Ornithop-
tera, bright
yellow.

The abdomens of all the *Ornithoptera* are a bright yellow.

O. Brookeana
(so named
after Rajah
Brooke).

O. Brookeana was so named by its discoverer, Wallace, after Rajah Brooke, who showed him hospitality during his travels in Borneo. The Dutch were for terming this fine insect "*Papilio Trogon*," for a reason that appears in Wallace's account of its capture, but its original name, *Brookeana*, is the one by which it will continue to be known.

Compare the following passage from Wallace's *Malay Archipelago* (vol. i., pp. 58 and 59) :—

Wallace's
discovery
of *O.*
Brookeana.

"I obtained some rare and very handsome insects, the most remarkable being the *Ornithoptera Brookeana*, one of the most elegant species known. This beautiful creature has very long and pointed wings, almost resembling a *Sphinx* Moth in shape. It is deep velvety black, with a curved band of spots of a brilliant metallic-green colour extending across the wings from tip to tip, each spot being shaped exactly like a small triangular feather, and having very much the effect of a row of the wing-coverts of the Mexican *Trogon* laid upon black velvet. The only other marks are a broad neckcloth of vivid crimson, and a few delicate white touches on the outer margins of the hind-wings. This species, which was then quite new, and which I named after Sir James Brooke, was very rare."

Locality
of *O.*
Brookeana.

Locality, Simunjon coal-works, near Sarawak, Borneo, in the mining district. Since the time of Wallace's travels a large number of the males have been sent to England, and this butterfly has also, I believe, been discovered in Sumatra, and the female has also been found, but it still continues very rare and costly. It is the only female *Ornithoptera* that possesses even partially the gorgeous colouring of the male,

Female
Brookeana.

the brilliant metallic green triangular spots of the one being replaced by streaks of the same tint in the case of the other.

With regard to the yellow Ornithoptera, the upper wings of all the species are black, and in some kinds a very dark brown, frequently pencilled with white lines, more especially in the female. The colour of the lower wings is bright amber yellow and black, sometimes the one tint, sometimes the other predominating, according to the particular species. In reference to the females, the colour of the lower wings in all the kinds is usually darker than those of the males, as in the former sex the yellow surface is always diversified with a variety of black blotches or patches.

Yellow Ornithoptera.

Females darker than the males.

The yellow Ornithoptera differ, of course, also in size, according to the species, but these have the advantage over the green, gold, and blue group in that particular: the male of the largest of the yellow ones, *O. Helena*, exceeding the large green, *O. Priamus*; the male of the smallest of them, *O. Nephereus*, exceeding the little green, *O. Richmondia*, in size.

Yellow group exceeds green, gold, and blue in size.

To consider the species in detail: much confusion has existed respecting their correct nomenclature, *Minos* having been confounded with *Pompeus*, while Mr. Kirby regards *Minos*, *Pompeus*, and *Heliakon* as three varieties of one species, and in Mr. Hewitson's catalogue the name *Heliakon* does not appear at all. The fact is there are two species:—

1. *O. Minos* (Cram.).
2. *O. Pompeus* (Cram.). (*Heliakon* is only a synonym of this last.)

O. Minos is larger than *O. Pompeus*. The male has a broader margin on the hind-wings, and the fore-wings are not so black as in *O. Pompeus*. It comes from South India. My own specimens are from Malabar.

O. Pompeus is common in North India, and has also been received from Sumatra, Perak, Malacca, and Java. This species is one that has been long known to science, and has probably been far more frequently sent over to this country than any of the rest, being familiar to the eyes of many owing to the fact of its having been included along with other Indian butterflies in glazed cases for hanging against the wall. The name *Heliakon* has long and widely obtained, but *Pompeus* is the oldest title, and the one which will stand. The following localities are given for it in the catalogue of Mr. Hewitson's collection, Makian, Menado, Amboyna, Tondano, and Sylhet.

(2) *O. Pompeus*.

(3) *O.*
Heliconoides.

O. Heliconoides, of Moore, in Mr. Hewitson's collection, but not in my own, is really the Java or Andaman form of *O. Pompeus*. It is smaller than the latter, and the spots on the hind-wings are small. It is doubtful whether it possesses a claim to be regarded as a distinct species.

(4) *O.*
Amphrisius.

O. Amphrisius (Fabr.), Malay Islands. A very distinct species, and, to my thinking, the handsomest of all this group; readily recognised from others by the fact of the male having scarcely any black edging to the clear yellow of the lower wings; upper wings very much pencilled. My own specimens of *Amphrisius* came out of a particularly large and fine collection of Borneo butterflies forwarded from Sarawak by Mr. Lowe to the care of Mr. Higgins, about twenty years since. Mr. Hewitson terms this butterfly *Amphrisius* of Fabr. It is the *Amphrysus* of Cramer, according to Mr. Kirby.

(5) *O.*
Haliphron.

O. Haliphron (Boisd.), from Celebes, according to Mr. Hewitson and Mr. Kirby. My own specimens are from Ceram. The lower wing of the male consists of a patch of yellow, surrounded by a broad black band—not mere scalloping.

(6) *O. Criton.*

O. Criton (Feld.), Batchian and Gilolo. I have only one specimen of this insect, a male; not unlike *Haliphron*, but much rarer. It has more yellow in the lower wing, and the upper wings are deep black, instead of being pencilled.

(7) *O.*
Hippolytus.

O. Hippolytus (Cram.). Mr. Hewitson's specimens are from Celebes and Ceram, my own from Ceram and Amboyna. This butterfly is far better known to the generality of people by the name of *Remus*, but that of *Hippolytus* is the oldest, and therefore the one to be retained. *Panthous* is merely the Amboyna variety of *Hippolytus*. The black spots or blotches may be slightly larger in var. *Panthous*, but I am not sure that any difference really exists. The dark grey in the lower wings of the male and the lighter grey in the lower wings of the female serve to distinguish them from other species.

(8) *O. Rhadamanthus.*

O. Rhadamanthus (Boisd.), from the Philippines, according to Hewitson. My own specimens are from India. According to some there are two varieties of this insect, distinguished by the red or yellow collar respectively. The female *Rhadamanthus* has black scalloping, and black spots within the scalloping on the yellow of the lower wings.

(9) *O.*
Nephereus.

O. Nephereus (Gray) Luzon. The male is much smaller than that of *Rhadamanthus*. The scalloping of the lower wings of the male is also not so distinct, and more gradually shaded. The female *Nephereus* has a broad black band and yellow patch without spots on the lower wings. Mr. Hewitson's catalogue

does not mention *Nephereus*, whether as species or synonym. According to Mr. Kirby, *Nephereus* of Gray is a synonym of *Rhadamanthus* Boisd.

O. Darsius (Gray), Ceylon. Not unlike *Criton*, but a much ^{(10) *O. Darsius*.} commoner species, and with more yellow in lower wings.

O. Helena (Linn.). Specimens from Malayan and Papuan Islands in Hewitson's collection. Also in Kirby's list marked Ins. Papuanæ (one male and one female from Ceram and one female from India in my own collection). Male distinguished from that of most other yellow species by its large size. Black band at border of lower wing; scalloped on the inner edge. ^{(11) *O. Helena*.}

O. Plato (one male and one female from Banda Islands in my own collection). According to Kirby from Timor. Not in Hewitson's collection apparently. Male not unlike that of *Helena*, but much smaller, like that of *Pompeus* also, only deep black band instead of scalloping on lower wings. ^{(12) *O. Plato*.}

O. Miranda (Butler). In my own collection from Merut. ^{(13) *O. Miranda*.} From Sarawak according to Hewitson and Kirby. Only known to science for the last eighteen or twenty years. Male like that of *Amphrisius*, another Borneo species, but with more decided scalloping, and upper wings have a purple bloom, as of a grape when seen in a bright light. Lower wings of female very characteristic and dark, a mere shading of yellow on a uniform black surface.

O. Magellanus (Feld.), Philippines. In Hewitson's collection, but not in my own. Remarkable for green opal-like iridescence of lower wings of the male when shifted in the light. Long and narrow wings. Scarcely any black bordering to the yellow of the lower ones. ^{(14) *O. Magellanus*.}

The most perfect case of resemblance to a dead leaf is afforded by the Leaf Butterflies, *Kallima Paralekta*, of Sumatra and Borneo, and the closely-allied species, *Kallima inachis*, of India, when settled and at rest. All the variations of their under surface (which varies much in tint in different specimens) correspond to those of dead leaves—yellow, ashy brown, or reddish, &c. <sup>Genus *Kallima*.
"Leaf"
butterflies.</sup>

In many specimens, also, according to Wallace's description, and as I can testify by some in my own collection, there are patches and spots formed of small black dots, closely resembling the way in which minute fungi grow on leaves. Further, when the insect thus remains in repose, the head and antennæ are drawn back between the wings so as to be quite concealed. The mid-rib of the leaf and likewise its lateral veins are exactly represented on the under surface of the butterfly, and lastly, the tail of the hind-wing forms a per- <sup>Deceptive
resemblance
of the under
surface of the
insect when
at rest to
dead leaves.</sup>

Protective
imitation.

fect stalk, so that by this "protective imitation" of the surrounding dead leaves it contrives completely to elude the notice of insectivorous birds. To illustrate this adaptation of circumstances, without which the species, in consequence of its numerous foes, would rapidly become extinct, I had some specimens mounted on twigs and enclosed under a glass shade several years since, when delivering a lecture on entomology to a certain London parochial school.

Destructive
imitation.

In some of the Orthoptera that are only found in hot countries, as the Phyllium Scythe, or Walking Leaf, this imitation does not serve for self-protection, as in the instance of the Leaf Butterflies, but for destruction of their prey that unwarily come within their reach, owing to their likeness to the vegetable creation.

"Natural
mimicry";
what it is
understood
to mean.

In the Eastern tropics, as in all other hot countries, there are, of course, many instances of what it has been agreed to term "natural mimicry." Whether this appellation has been felicitously chosen to designate what it is intended to convey may be open to question, but the meaning is that the butterfly, for example, of one genus mimicks the butterfly of another in its natural state, namely, that both are almost alike in the colours, markings, shape, with which they emerge from the chrysalis, and which accordingly they always wear, and that the said colours and markings are not put on or changeable at their will, like those of the chameleon that varies its hues according as its temper is placid or ruffled, and in proportion as that reptile is confined in a dark place of captivity or allowed fresh air, green leaves, and sunlight. Again, with regard to this natural mimicry, the insect that is the mimicker is far rarer than the one mimicked; it has therefore been conjectured that it is a provision of Nature to preserve the rarer species from utter extinction: that a rare Papilio, for instance, should mimic a comparatively common Euplœa, because the Papilio is pleasant to the birds, and the Euplœa distasteful, or because, it may be, the Euplœa can protect itself from its foes by swifter powers of flight; at any rate, these reasons; whether the real ones or not, have been assigned.

Mimicker far
rarer than
mimicked
in some
instances.

Mimicker
pleasant to
the birds, the
mimicked
one not so.
The
mimicked
one posses-
sed of swifter
powers of
flight.

Female of
Diadema
Missippus
mimicks
both male
and female
of Danais
Chrysiippus.

Further, this natural mimicry exists between different genera that have great structural diversity in the nervation of the wings, and there are cases of one sex only of a certain species of one genus mimicking both sexes of another species belonging to another genus. This is aptly exemplified by the female of *Diadema Missippus* mimicking both male and female of the well-known *Danais Chrysiippus* in its general tawny ground-colour, and black and white markings, whereas the male of the above-named *Diadema Missippus* presents a

totally different appearance, being purplish or bluish black with large white discs or circular patches on the wings. Here again is an instance, not of a rare kind mimicking a much commoner species, but of one common kind mimicking another, *Diadema Misippus* and *Danais Chrysippus* being both very common species.

One common species mimicking another.

Once more we must not omit to notice that not only does this mimicry exist between different genera of butterflies, but between moths and butterflies in both hemispheres, notably between moths and such *Papilios* as *Rhetenor* and *Polydorus* and the like in the Eastern tropics. Altogether there are far too numerous instances of this natural mimicry to specify here. I have never visited those regions of the tropics where the species that exhibit natural mimicry are to be found, but should imagine that in many cases the mimicker and the mimicked would be undistinguishable on the wing. Side by side in the cabinet a *Papilio* and a moth mimicking a *Papilio* would at once be recognised by the difference of the antennæ, however alike in all other points of superficial resemblance. Similarly those who are familiar with the female of *Diadema Misippus* and both sexes of *Danais Chrysippus* would never mistake the one for the other, though the respective specimens of these two kinds were mixed up any way and in any number in a box. There is here some slight difference in the tint, and likewise in the markings of the two butterflies in question. The mimicry is not always quite complete, although nearly so—closer between butterflies which we will term, for convenience, A and B, than between two other butterflies which we will name C and D; closer again between butterfly E and moth F, than between butterfly G and moth H. Sometimes the resemblance is not in corresponding size of the two respective species, only in colour, shape, and markings. Compare the South American *Papilio Zagreus* with the considerably smaller *Lycorea Ceres* which it mimics, to take an example not from the Eastern, but from the Western Hemisphere.

Mimicry likewise between moths and butterflies in both hemispheres.

The difference of the insects exhibiting mimicry can always be recognised side by side, though not on the wing.

Mutual resemblance of certain species greater than that of others.

Mutual resemblance only in colour, shape, and markings, not in size in certain cases.

I would not willingly be understood as myself favouring the prevalence of such terms as "natural mimicry," or "mimicker," or "mimicked." Neither do I possess sufficient knowledge to allege reasons why this mimicry should exist in the economy of Nature. I would also prefer to suspend my judgment in reference to reasons given by others that have been above assigned. Thus much I admit, that of two species of two different genera resembling each other, one may be much rarer and more local than the other; that the instances of this mutual resemblance are very numerous in warm

Objections to the term "natural mimicry," and the reasons assigned for the same.

climates, and altogether unknown in temperate regions,* so far as I am aware. But supposing, for argument's sake, a mutual resemblance to exist not only between two species, but between three, or even four, between the representatives, not only of a *Danais* and a *Papilio*, or a *Euplœa* and *Papilio*, or a moth and a *Papilio*, but between the *Papilio*, which we will term A, the *Euplœa*, which we will agree to call B, and the *Danais*, and likewise the moth, C and D respectively. If such resemblance could be ostensibly shown between three or more different genera or tribes, which is the mimicker and which the mimicked? Is the one, namely, the *Papilio*, pleasant to the birds, and the *Euplœa*, *Danais*, and the moth distasteful accordingly? Or are the three, the *Euplœa*, *Danais*, and moth pleasant to their feathered foes, and the one, the *Papilio*, the reverse? Are those that are commoner, and are mimicked, always possessed of swifter powers of wing than those that are rarer, and are the mimickers? Allowing, as has been already granted, the much greater rarity of one species exhibiting the mutual resemblance, as contrasted with the other, is not such rarity to some extent occasioned by our ignorance of the food-plant of its larva, or it may be the exact time of year when to look for both larva and imago? The term I should myself be disposed to employ, with regard to this phenomenon, would be as follows: "Correspondence of superficial resemblance between different genera." It has the merit of being an unexceptionably safe appellation. Colour, size, shape, and markings are all superficial resemblances, quite apart from structural affinities, and it is precisely in colour, size, shape, and markings that one particular *Diadema* resembles a *Danais*, and one *Papilio* a *Euplœa*. Whereas there is no such common similarity in any one of the said superficial resemblances among the very numerous species, taking them as a whole, that make up the great genus *Papilio*, and which has to be sub-divided into minor groups accordingly, only structural affinity in the nervation of the wings.

"Correspondence of superficial resemblance between different genera."

Himalayas and Neilgherries far more productive in number of species of butterflies than the lowlands of British India.

In conclusion, with regard to British India, the Himalayas†

* Though in temperate regions also there are instances of a butterfly mimicking an object of the vegetable creation. Compare the fact of *Satyrus Semele* being undistinguishable from the lichen on the boulder on which it is at rest with its lower wings alone visible, and the similarity of the green-spotted under surface of *Anthorbasis Cardamines* to the flower of the Cow-parsley on which it has settled.—F. A. W.

† I must not omit mention of a very distinct and unique species from the Himalayas, the *Teinopalpus imperialis*, of a uniform mossy-green tint, with yellow and grey patches at the base of the lower wings. The said species is now assigned a place at the end of the *Papilionidæ*.—F. A. W.

that form the northern boundary of that country and the Neilgherries that are situate towards the south are far more productive in the number of the species those mountain chains respectively contain than all the rest of the territory throughout the whole of its plains, whether from the drainage of the low-lying regions for purpose of cultivation, or from greater variety of climate and correspondingly different zones of vegetation in the ascent of the hills favouring the existence of subtropical species, of kinds nearly corresponding to our own, and lastly, of such as are confined to the high Alps, I must leave for more precise and detailed explanation to others.

H. CADMAN JONES, Esq., M.A. (the Chairman).—I must now ask you to join with me in returning thanks to Dr. Walker for his very interesting paper (applause). It would add to the advantage we have already derived if those present who have studied the subject would give us the benefit of their experience.

Mr. W. F. KIRBY.—I have made a few notes in reference to Dr. Walker's interesting paper, and perhaps, I may be allowed to place them briefly before the meeting. The question of the distribution and extension of species from one district to another is one of great interest. The natural means of distribution appear to operate very slowly. It is thought that the greater portion of the butterflies of Europe were either exterminated by the glacial period, or driven out into other parts of the world, whence they slowly returned to us afterwards. But all of those which are found on the Continent did not reach England before its separation from the opposite shores was accomplished; and again, of those that did reach England, only two-thirds found their way to Ireland. Notwithstanding the short distance between the two coasts, very few butterflies, comparatively, now spread from the Continent to England. *Lycæna Baticea* which has been referred to, is found both in Asia and Africa as well as in South Europe. *Syntomis Phegea*, one of the Burnet moths, is a European species which seems to be spreading up the western coast and then gradually making its way eastward north of the Alps, though very slowly. Some insects appear to be spread by artificial means, which at present we can hardly estimate. For instance, one of the largest and most conspicuous of the North American butterflies, *Danais Erippus*, about thirty years ago, spread suddenly through the Eastern Archipelago, and now, I understand, has reached Penang, whence it will, doubtless extend further into the

continents of the Old World. Some years ago, too, specimens were taken in England and France; but a number of unfavourable seasons succeeded each other, and the insect seemed then to have disappeared. However, within the last few years it has not unfrequently been taken in England, especially in the western counties, and also occasionally on the Continent. I suppose the wider range of the African and Asiatic species, as compared with many of those found in tropical America, is due to the greater uniformity of the vegetation, and also to the less frequent occurrence of mountain ranges in the districts over which they are respectively spread. At the same time, some mountain districts are peculiarly favourable to the existence of a great variety of these insects,—a fact partly owing to the difference between the vegetation and climate of the different elevations, and partly to other causes. Although the great genus *Papilio* itself is tropical, yet the greater proportion of the well-defined genera belonging to the same family, are found in the extra-tropical Northern Hemisphere. The following are the well-defined genera of true *Papilionidæ* with their distribution: *Papilio* itself is cosmopolitan. *Ornithoptera* and *Leptocircus* are Indo-Malayan. *Eurycus* is Australian and Papuan. *Euryades* is South American. All the remainder belong to the extra-tropical northern hemisphere. *Doritis* and *Thais* are Mediterranean. *Hypermnestra* inhabits Turkestan. *Parnassius* extends from the Pyrenees to Western North America, but is most numerous in Central Asia. *Mesapia*, *Teinopalpus*, *Bhutanitis*, and *Armandia* are confined to the Himalayas or Thibet; *Sericinus* is Chinese, and *Luehdorfia* is found at Vladivostok and in Japan. *Papilio Memnon* has been referred to as a variable species; but I understand that some entomologists are inclined to think that there are more than one species included under this name; and in regard to *Ornithoptera D'Urvilliana*, I may say that it has been obtained in Duke of York Island as well as in the Solomon Islands. *O. Victoria*, also from the Solomon Islands, is a very distinct species in the male, so much so that if the female did not resemble that of *O. Poseidon* and allies in form, no one would think of placing it in the same genus. *O. Magellanus* from the Philippines is the finest of all the yellow group, and is remarkable for the iridescent colouring of its wings; and yet there is this peculiarity about it, that, if you hold the insect to the light you see no trace of the iridescence,—so that, in order to perceive it, you must stand with your back to the light and hold

the insect almost on a level with the eye, when the peculiar and beautiful green iridescence is seen to perfection. If you do not do this you may have a specimen in your cabinet for twenty years and never notice the iridescence at all. There is one point of distribution I should like to mention, and that has reference to *Pyrameis Indica*,—a species allied to our Painted Lady. It is found in the East Indies, and there is a very similar butterfly in the Canary Islands. The species found in the Canary Islands is, however, completely isolated from any of its allies, and I can only imagine that it must have been introduced many years ago,—possibly in pre-historic times,—by man, or perhaps by some accident, like *Danaus Erippus*, which has thus been introduced into the South Sea Islands, as well as into Europe. But the *Pyrameis Indica* of the Canaries is not quite identical with the same insect from Eastern Asia. Probably length of time and climate may have modified it to some extent. There is one form of mimicry which Dr. Walker has not alluded to, and that is the manner in which some moths and beetles mimic hymenopterous insects. We have a moth, *Ophelia Apiformis*, which is so remarkably like a hornet, that when you see it sitting on the trunks of the poplar trees you would almost mistake it, for one, owing to its peculiar colouring. I will add the following notes on Dr. Walker's paper :—

P. 196.—*Euplœa* is not quite confined to Asia. There are one or two species found in South Africa and Madagascar.

P. 196.—*Acraea*. There are two common North Indian species—*A. vesta* and *A. viola*, the latter very close to some African species; the genus is also represented, though not numerous, in the Moluccas and Australia.

Mr. G. W. OLDFIELD.—I have to congratulate Dr. Walker on his very interesting paper. Referring to the question of Mimicry, it may be interesting to note the observations of Mr. Thomas Belt, in his *Naturalist in Nicaragua*, pp. 314, 315, on the subject where he says: "Ant-like spiders have been noticed throughout tropical America, and also in Africa. The use that the deceptive resemblance is to them has been explained to be the facility it affords them for approaching ants, on which they prey. I am convinced that this explanation is incorrect so far as the Central American species are concerned. Ants, and especially the stinging species, are, so far as my experience goes, not preyed upon by any other insects. No disguise need be adopted to approach them, as they are so bold that they are more likely to attack the spider, than the

spider them. Neither have they wings to escape by flying, and generally go in large bodies, easily found and approached. The real use is, I doubt not, the protection the disguise affords against small insectivorous birds. I have found the crops of some humming-birds full of small soft-bodied spiders, and many other birds feed on them. Stinging ants, like bees and wasps, are closely resembled by a host of other insects; indeed, whenever I found any insect provided with special means of defence, I looked for imitative forms, and was never disappointed in finding them." The mimicry by spiders, *Hemiptera* and *Coleoptera*, of stinging ants is there referred to on pp. 381, 382, the resemblance of curious species of *Orthoptera*, of *Chontales* (with a figure) to green and faded leaves, and of two specimens of the moss insect (with a figure) to moss, the insect being the larva stage of a species of *Phasma*. The author then discusses the extraordinary perfection of these mimetic resemblances, which he attributes to natural selection.

A VISITOR.—With reference to the range of genera, may I ask the author, or Mr. Kirby, a question about the genus *Diadema*? Does not the species *Diadema Misippus* also extend to America? This I regard as a very interesting question. Dr. Walker has alluded to the *Diadema Misippus* mimicking *Danais Chrysippus* and, certainly, *Danais Chrysippus* is not found in America. This would lead us to the conclusion that *Diadema Misippus* has been introduced into America, possibly by the agency of man. In reference to *O. Victoria*, I have seen the specimens of that grand insect, both male and female, which Mr. Woodford has brought from the Solomon Islands, where they are apparently found in considerable numbers. Mr. Woodford was resident there for three years, during two visits, he being the only European among the natives of those islands. The insect is certainly distinct from *O. Tithonus* being a green species. I will not venture to go into the difficult subject of mimicry, which has been so often and so long discussed, since I caught the *Euplœa* and the *Diadema*; but I may say that I have often caught these insects both in India and Ceylon, and other tropical parts, and, if I remember rightly, the *Euplœa* is a slower flyer than the *Diadema*. As to the term "mimicry," it may not have been a happy one originally, but I think we do right to stick to it, my reason being that the term is better than a definition of eight words, and it is one easy to remember.

Mr. KIRBY.—In reply to the question put by the last speaker, I

have to state that *Diadema Misippus* is only found in America in one or two restricted localities on the north coast of South America, in and adjoining Guiana and Trinidad, and probably on one or two of the West Indian Islands. I consider it to have been undoubtedly introduced into America.

Mr. W. WHITE.—As a visitor, perhaps I may be permitted to offer a few remarks on Dr. Walker's most interesting paper. I was struck on reading it with the thorough manner in which the author had treated the subject from the point of view relating to geographical distribution, a point that has become increasingly interesting, especially when fully considered in relation to climatic change and the wider question of its relations, not only to continents and islands, as they now are, but to "the geological extension of continents and islands," as originally discussed by Sir Charles Lyell, which evidently has had very much to do with the condition of existing faunas. Another thing that struck me very much was the complete recognition on the part of the author of an important fact respecting highly variable species, to the extent of the annihilation of species, as such, in many cases. He has described how two forms passing under different names,—even two sexes described as different species,—are really only one species, and that they therefore ought to be limited to one name. He has told us also, that the eggs of certain Papilios will produce imagines, some with tails and some without tails, thus showing their extreme variability; and he has even suggested that the Borneo species, *Papilio Arycles*, may be a hybrid between two other distinct species—*Bathycles* and *Agamemnon*. Therefore, it is patent that the order of insects so dealt with forms a striking illustration of the non-fixity of species, and that a distinct withdrawal of the view that used to be accepted as to the distinction of species under one creative fiat is definitely implied. Indeed, we find there is such an immense variety in this class of insects that probably in no other order of animated nature are the variations so marked. Perhaps, if Dr. Walker will allow me to say so, the paper might have had a more restricted heading. He has dealt with the diurnal *Rhopalocera* only, and has not included the diurnal *Heterocera*, which certainly must be very numerous. Possibly, let us hope, he has reserved that for some future paper. But the second part of his paper,—if I may so term it,—in which he has dealt with the question of mimicry, is one that must be regarded as so important that it would almost seem to require a separate discussion. This is not an hour at which

I ought to trespass on your patience by speaking at any length on this point. Very much has been written on the subject by Darwin, Wallace, and Bates,—the originator of the word “mimicry,”—and the word, as so applied, is a very good one; but I am not quite so sure that the choice of the term “natural mimicry” as used in the paper is entitled to this commendation. I never met with it in that shape before, and the word “natural” is, I think, quite unnecessary. There is, however, a further criticism I would make in reference to a remark made by Dr. Walker. He says: “The instances of this mutual resemblance are very numerous in warm climates, and altogether unknown in temperate regions, so far as I am aware.” I think that Dr. Walker on thinking the matter carefully over would be able to recall very many instances of this mutual resemblance in temperate regions, some of them having already been alluded to by Mr. Kirby; and, as the investigation proceeds, I am inclined to believe that the number of cases will be found very numerous indeed. I would here throw out the suggestion that, among our own British moths there are two common species of *Acronycta* which are so identical in every feature, that there is scarcely a naturalist who will pronounce decidedly which is *Psi* and which is *Tridens*, while it is well known that the larvæ are so distinct that there can be no possibility of mistaking one for the other. I would suggest that this also may be a case of mimicry,—not, perhaps, a case of direct mimicry, but a case of indirect mimicry. The insect is in the habit of sitting at rest on the bark of trees, and I have frequently pointed out specimens when out in the fields with friends, who have been unable to see them on account of their close resemblance to the surface on which they rested. Therefore, it may be, that the two insects, being located similarly, have assumed the same character; but in making this suggestion it may be as well to point out a broad distinction in such cases,—a distinction which Dr. Walker has not defined. In a foot-note he says:—“Though in temperate regions also there are instances of a butterfly mimicking an object of the vegetable creation. Compare the fact of *S. Semele* being indistinguishable from the lichen on the boulder on which it is at rest, with its lower wings alone visible, and the similarity of the green-spotted under-surface of *A. Cardamines* to the flower of the Cow-parsley on which it has settled.” The term “mimic” is here misapplied. These are not properly cases of “mimetic resemblance,” but of “protective resemblance.” The difference is, I think, a highly important one, and in all dis-

cussions on mimicry it ought to be distinctly expressed by the separate phrase.

Captain F. PETRIE, F.G.S. (Hon. Sec.).—Before I read the communications that have been received, may I refer to a remark in Dr. Walker's paper as to certain butterflies being found where they were least expected? I happened to visit Muckcross near Killarney a few days after the late Prince Consort had been there, and my entertainer mentioned to me, with a view of showing the great interest Prince Albert always took in scientific matters, including the subject of entomology, that the Prince had expressed some surprise at finding the British Swallowtail (*Papilio Machaon*) at Killarney;—my friend had introduced it two years before.

Among the letters that have been received in regard to this evening's paper is one from that eminent man of science, Sir Richard Owen, who, I am sorry to say, expresses regret that failing health confines him so much to the house that he is unable to be present to-night.

Mr. H. E. Cox, F.E.S., writes:—

As regards Dr. Walker's very interesting paper, I do not feel qualified to take part in a critical discussion upon it, for I am not possessed of any knowledge of the Lepidoptera; there are, however, two points arising from it which would amply repay full investigation. The first of these is what is called Mimicry. Dr. Walker remarks upon the close resemblance to a dead leaf furnished by certain butterflies (*Kallima Paralekta* of Sumatra and Borneo, and *Kallima inachis* of India), and upon the fact that some of these insects have among their markings patches and spots similar in appearance to those produced by minute fungi on leaves. Not only so, but these apparent leaves are furnished with a stalk by the tail of the hind wing. We are here, I think, placed in a vast and very slightly explored field. These mutual resemblances, which in many cases are so strikingly exact, are found spread over a wide area. Sometimes we find a resemblance to various surrounding natural objects; at other times the products of animal life are imitated; and again, different species of living beings present great similarity of appearance. The case of the butterflies above referred to furnishes an instance of resemblance to surrounding natural objects, with which also we are all familiar from seeing moth larvæ standing stiff and straight out from the side of a twig exhibiting both in colour and attitude so strikingly the appearance of a minute branch. The same thing is seen in the larvæ of the

Mantidæ. In the South of Europe I have observed the larvæ of small Mantidæ, motionless upon the long withered stalks of dry grass, with their long, thin legs extended, clasping a stalk here and a stalk there, and scarcely distinguishable either in form or colour from the stalks among which they stood. There are numerous such instances around us. In some cases moths and insects of other orders present all the appearance of the lichen-covered bark upon which they stand; in others, spiders resemble in colour the petals of flowers; and some beetles might, when motionless, be easily mistaken for seeds or pellets of earth. Of insects which resemble the products of animal life we have an instance in certain moth larvæ which simulate the appearance of a bird's excrement; and among insects exhibiting a similarity to other living creatures we find that the resemblance is not confined to the same order, but that in some cases there is a likeness between Hymenoptera or Coleoptera and Diptera, or between certain Staphylinidæ and Forficula. When we remember that this similarity of appearance is not confined to insects or even to the animal world, but that we can, within easy reach of London, pluck the flowers of the spider orchis, we can, I think, see the great scope for investigation as to the meaning, the origin and progress, and the purpose of these resemblances. In considering this it is well to bear in mind that the mode of life is clearly capable of exercising a great influence upon form. This is well exemplified by the striking peculiarities found in the Coleoptera inhabiting ants' nests. It has been suggested that some of the colours of insects may be produced during the developments which occur immediately on emerging from pupa by a sort of photographic process, by which the tints prevailing around may be reproduced. This, however, would not avail to account for the white winter garb assumed by Arctic animals, for the tawny coat of the lion matching the colour of the sand or rocks, or for the stripes of the tiger and spots of the leopard, recalling the appearance of flickering gleams of sunshine among the leaves. The other point to which I would draw attention is the geographical distribution of species. Dr. Walker in the early part of his paper refers to the division of the Eastern Archipelago into two portions, one part being attached to Asia, and the other part to Australia. I think that it is a matter of great importance that we should know what insects are peculiar to the Australian division. I believe Australia to be a relic of the old world, in which we have preserved for us the forms of life, both animal and vegetable prevalent upon the earth prior to the

appearance of the fauna and flora found elsewhere; in it almost exclusively we find the marsupial animals, the method of whose reproduction is certainly inferior to that of the other mammals, and may, in fact, be described as midway between this and that of the birds. There is almost an entire absence of indigenous placental mammals, (the dingo or wild dog having been very possibly introduced by man). The vegetation also is peculiar, and I think I might say of an inferior type, exhibiting an absence of deciduous trees and showing special forms, such as the Casuarina. On the other hand, the birds, reptiles, and fish of Australia do not present so many striking peculiarities. I therefore believe that Australia was separated from the rest of the land surface at a time when fishes, reptiles, and birds were old and well-spread forms, and antecedent to the appearance of the placental mammals and deciduous trees. If, then, we know what are the insects peculiar to the Australian continent, I think we shall get some idea of the oldest forms.

Mr. C. W. DALE, F.E.S., writes:—

The term "mimicry" is certainly a bad one, as its proper use is for some kind of voluntary action on the part of the animal. However, it is used in cases where one insect resembles another. I do not hold with the conjecture of the present day that it is a provision of nature to preserve the rarer species from utter extinction. I rather believe that the same cause which produces one species to be marked and coloured in a particular way produces another marked and coloured in like manner. Take, for instance, reed feeders of various families, all of a light brown colour:—*Macrogaster Arundinis* amongst the Bombyces; the genus *Leucania*, and its allies, *Simyra venosa*, which mimics the Leucanidæ, but is at once separated from them by the hairy larva, amongst the Noctuæ, *Chilo* and its allies amongst the Crambi, and *Orthotelia sparganella* amongst the Tineæ. *Gnophos obscuraria*, again, on chalk soil is light, on peat soil is dark. The colour is probably affected by certain chemical properties in the food plant. The similarity of the underside of *Anthorbaris Cardamines* to the flower of the Cow-parsley might possibly be brought about in the long run of time by a process of natural photography (perhaps the term is a bad one, like mimicry). Another instance may be seen in people (man and wife, master and servant) who live much in each other's society gradually growing somewhat like each other. Again, it has been said a man's occupation may be inferred from his looks. Certain spiders resemble ants. They live in the same localities,

and have similar vocations. Therefore, the same reason which produces the one in a certain form, produces the other likewise.

Mr. THEODORE WOOD writes :—

“ Protective imitation ” (top of page 206).—One point of interest connected with this subject, and one which I do not know has as yet been touched upon, is this:—Are lepidopterous larvæ, which are protected from the attacks of birds by their resemblance to natural objects, protected also from the attacks of parasitic foes? Are the stick-like *Geometer* larvæ, for example, persecuted by *Ichneumonidæ*? For, if so, this would tend to show that the parasites in question seek their victims, not by sight, but by means of some other sense possibly not known to ourselves. And this supposition is favoured by the obvious fact that hyperparasites must depend upon a sense or senses other than sight in detecting the presence of their victims under the skin of the caterpillar in whose flesh those victims are concealed.—

“ Destructive imitation.”—I would suggest that the imitation of such insects as the *Phyllium* serves for self-protection *as well* as for the capture of unwary prey; for all insects have their natural enemies. In our common British Water Scorpion the resemblance to a withered leaf would certainly avail it as a protection against the *Dyticus* beetle or the Dragon-fly larva, as well as assisting it in the capture of prey.

The Rev. H. S. GORHAM writes :—

I am sorry I shall not be able to avail myself of the Council's invitation, as I am seldom in town, especially in an evening. I am engaged at present partly upon the Coleoptera of Java and Sumatra and Borneo, and I have described a good many from Japan. My own opinion is that at present we have not sufficient acquaintance in detail with the insect productions of the East to make general deductions, but that from what we do see and know the facts all point in the direction sketched out by Wallace in his work on Island Life. I am a decided believer in “mimicry,” though not concerned to defend the term, as critics appear to find in it some suggestion of voluntary action. To those who have eyes the effect is being produced all round them: everywhere I see animals protected by their close resemblance to both living and inanimate objects. Very often the resemblance is imperfect, yet useful, as far as it goes. This seems to show that it is rather the result of gradual evolution than of a sudden creative act. Sometimes closely-resembling forms are found in different parts of the

world, as the *Euphorbias* of Africa and the *Echinocacti* of North America. Clearly a different explanation to mimicry is the true one here, and this has always been admitted.

Mr. WM. F. DE VISMES KANE, M.A., M.R.I.A., writes:—

Dr. Walker's paper deals with the Rhopalocera of parts of the globe which possess a lepidopterous fauna not only diversified in genera and species, but fertile in those strange phenomena of variation to which attaches so great an interest for the scientific zoologist. Speculations on the latent causes which give rise to these cannot, however, proceed on a satisfactory basis without accurate knowledge of the life-history of the insect in all phases previous to the final metamorphosis. This is at present unattainable in respect of the greater part of the Oriental species. But the study of those which are inhabitants of different latitudes in the temperate zone may prove suggestive. The acquisition, for instance, of the so-called "tails" in the genus *Papilio*, *Charaxes*, &c., seems to me to appertain to a comparatively recent stage of evolution. We have in Europe, as elsewhere, several other groups of Rhopalocera (notably the *Lycænidaë*), in which a tendency exists to develop a "tail" at the extremity of those nervures which approximate to the anal angle of the hind-wing. In some cases, as in the Tailed Blues and the *Theclas*, this tail is a constant character. In others, the tail is an aberration developing more in one season or latitude than another. I therefore take it that this is one of the latest (so to speak) ornamental acquisitions among the *Lepidoptera*. And I may, perhaps, venture to suggest that the rays or nervures of the wings seem to have played an important part in the production of certain patterns, as well as in the contour of the wings. On this subject I cannot enlarge. The extension of their extremities (if we except the costal) would seriously interfere with the flight of the insect, if it took place on the fore-wing. Hence, though the tendency shows itself, yet we have no projections on the anterior pair more remarkable than those found in the genus *Vanessa*, *Libythea*, and *Gonopteryx*. And it is only on the posterior or following portion of the hind-wings, where such appendages do not interfere with flight, that they are to be noticed; so that we have the first, second, or third median ray frequently giving rise to these processes. In the Oriental *Papilios* of which Dr. Walker treats, we have species in which both sexes remain still in the ancestral condition, without tails. Others, again, in which (and they are the most numerous) both sexes have acquired them, and again some in which the more conservative sex has

remained tail-less, while the male has adopted these additional attractions. Lastly, we have other species in the abounding vitality of the tropical fauna which are in a state of transition, and sometimes are with and sometimes devoid of these appendages. I draw the conclusion, therefore, that this is one of the most recent developments of wing-structure in the Lepidoptera, and it is to be hoped that further discoveries of fossil forms may eventually throw some light upon the genesis of wing-neuration. The remarkable alteration of contour displayed in the wings of many of the butterflies of the Island of Celebes, described by Wallace in his *Mulay Archipelago*, and alluded to by Dr. Walker, is a very interesting problem. As Mr. Wallace says, the pointed wing in birds and insects usually accompanies rapidity of flight, and he suggests that perhaps when the island formerly possessed a much richer fauna, the abundance of insectivorous creatures rendered some unusual means of escape necessary for the more showy butterflies. Any change of wing-contour, at least in temperate regions, is a very rare occurrence, when compared with an alteration of pattern or colour. But in Europe we have examples in which species inhabiting considerable Alpine altitudes display a rounder wing-contour than their fellows of the lower levels. And we have, perhaps, an explanation of this in the Coleoptera of the Madeiras, where, as you ascend the mountains, the species met with become increasingly apterous, demonstrating that the high winds which there prevail have proved prejudicial to the survival of flying insects. I do not know whether the Island of Celebes, with its very remarkable geographical outline, can be shown to possess an unusually tranquil climate; but if this is so, it might be a factor in the production of some of its zoological anomalies. The phenomena of seasonal dimorphism exhibited so remarkably in many Japanese butterflies has been explained in the case of the bleached female varieties of the *Colias* genus by recurrence to an ancestral type produced during the glacial age (although South African *Coliidae* exhibit a similar dimorphism). It would be interesting to know whether the Japanese group of islands shows traces of glaciation; and if so, whether any of the cases of dimorphism in its Lepidoptera throw a convergent light on the subject. A study of the European fauna shows, according to Ernst Hoffmann, that the larger number of European butterflies have migrated from Siberia, and only a small proportion from South Asia and Africa. The theory that our more brilliant insects have been developed from their more sober sub-Arctic

ancestors by the increasing warmth of climate succeeding the glacial age, and therefore occasionally recur to the primitive type, has gained favour. But the more popular impression is, I think, that the migration has been northward from the sunny south; and that our dull-coloured alpine and boreal species are merely the faded representatives of more gaudy prototypes. The study of Oriental entomology will, I trust, in time throw a light upon this *questio vexata*. I regret that the subject of so-called "mimicry" has been only glanced at by Dr. Walker. The phenomena are so striking, so varied and complex, that they possess an interest almost surpassing any other in the animal kingdom. We find the tendency developed not only between larvæ of different genera, but between the "imagines" of widely-different groups. And further, a wonderfully exact correspondence in form is sometimes exhibited with inanimate objects, such as leaves and flowers, bark and lichen. Are we to refer this power of adaptation of form and colour to vital force, and an internal power of development; and to acknowledge some sort of directive agency on the part of the creature, which is hard to conceive, and against which many observations and experiments militate? or must we fall back for an explanation to the action of environment, and a blind tendency on the part of organised matter to vary in form, and become adapted to their circumstances through the equally blind action of fortuitous influences? Whether we eventually are enabled to decide the question in favour of the theory of the operation of physical causes alone, or an innate tendency implanted in the organism to develop in certain directions, it is equally a proof of the wisdom and power of the Great Source of all Life.*

MR. EDWARD B. POULTON, M.A., F.L.S., writes:—

As the council of the Victoria Institute have honoured me by asking for some criticism of Dr. Walker's paper, I am very glad to send a few remarks which I hope may be of interest. The chief part of the paper is systematic, descriptive, and distributional, and to this I have nothing to add, for my own researches have never been connected with these points of view. It appears to me, however, that Dr. Walker has treated these important considerations extremely well, and has, at the same time, made his paper of great general interest. I

* A Member writes:—As to the concluding remarks made by Mr. de Visnes Kane, may it not be considered that living matter is endowed with a power of developing, under varying circumstances, varied results?—ED.

therefore propose to confine my remarks to the brief exposition of "mimicry" at the end of the paper. I think it is a pity that Dr. Walker has touched upon so important a subject unless he intended to go further, and to include a short account of all that we know about it. "Mimicry" might, indeed, form the subject of a single paper or even of a short series of papers. To me, Dr. Walker's account of it conveys a certain impression of vagueness, and I think it would be a mistake to adopt the formula suggested by him.

A very condensed abstract of all that I can find recorded upon the subject of "mimicry" is given below: I divide the description into a series of stages, each of which corresponds to a marked advance in our knowledge of the subject.

(1.) H. W. Bates was the discoverer of "mimicry": he noticed that the conspicuous and slow-flying Heliconian butterflies in South America were attended by a relatively small number of butterflies belonging to widely different families, and in some instances by moths; and he found that there was a considerable degree of superficial resemblance between the members of the groups thus found together. He suggested the term "mimicry" for the resemblance of the rare to the abundant species, and he further suggested that the latter were protected by the possession of some unpleasant taste or smell, so that they would be avoided by their natural enemies. Although unfortunately too little tested, this explanation has really NEVER BEEN SHAKEN. There is indeed some direct evidence for it. Thus R. Meldola has found "that, in an old collection destroyed by mites, the least mutilated specimens were species of *Danais* and *Euploea*, genera which are known to serve as models for 'mimicry.'" —*Proc. Ent. Soc. Lond.*, 1877, p. xii.

This observation has been since confirmed by J. Jenner Weir (*Entomologist*, vol. xv., 1882, p. 160). Again, M. de Nicéville "has found that *Acraea viola* is the only butterfly which all the species of Mantis he has experimented with, refuse to eat" (*Butterflies of India, Burmah, and Ceylon*, vol. i. pt. ii. p. 318). I do not feel any doubt about the widest proofs of the accuracy of Bates's great suggestion when experiments are generally made. Bates's epoch-making paper was read November 21, 1861, and appeared in the *Trans. Linn. Soc.*, vol. xxiii. His observations were subsequently extended by the record of analogous facts in the Malay Archipelago by A. R. Wallace, and at the Cape by Roland Trimen.

(2.) One great difficulty had been observed by Bates, but remained unexplained by him and the other naturalists. Bates found that not only were the presumably nauseous Heliconians "mimicked" by the palatable groups, but that the different species of the former mimicked each other in certain cases. This remained a complete mystery until the appearance of an important paper by Fritz Müller in 1879 (*Kosmos*, May, p. 100). He suggested that advantage was gained by each of two convergent and nauseous species, because the number of individuals which must be sacrificed to the inexperience of young birds or other enemies would be made up by both of them instead of by each independently. Müller's paper was translated by Meldola, and appeared in the *Proc. Ent. Soc. Lond.*, 1879, p. xx. Wallace also accepted the results (*Nature*, vol. xxvi. p. 86), but the mathematical aspects of the subject were revised and perfected by Blakiston and Alexander (*Nature*, vol. xxvii. p. 481, and vol. xxix. p. 405).

(3.) The next advance was made by Meldola, who brought forward the following suggestion in *Ann. Mag. Nat. Hist.*, Dec. 1882. He saw in the wider application of Fritz Müller's principle an explanation of "the prevalence of one type of marking and colour throughout immense numbers of species in protected groups, such as the tawny species of Danais, the barred Heliconias, the blue-black Euploëas, and the fulvous Acreæas. While the unknown factors of species-transformation have in these cases caused divergence in certain characters, other characters, viz., superficial colouring and marking, have been approximated or prevented from diverging by the action of natural selection, every facility having been afforded for the action of this agency *by virtue of the near blood-relationship of the species concerned.*"

Under this suggestion we expect to find, and we do find, a far greater similarity between the species of a large group of closely-allied nauseous insects in any country than between those of other large groups protected in other ways.

(4.) On March 1, 1887, I read a paper on this subject (*Proc. Zool. Soc.*), attempting to bring together all that had been previously proved by direct experiments and including a number of experiments of my own. Carefully comparing the colours of all the insects of our own country which have been *proved by direct experiment* to be nauseous or dangerous, and neglecting all others, I was able to show that Meldola's generalisation may be still

further extended and may be made applicable to the whole of the scattered small groups and isolated species which are defended by the possession of such unpleasant attributes, the convergence being often *independent of relative affinity*. If such insects are looked at as a whole, it is seen that the same colours are repeated again and again, and are those which are known to produce the greatest effect upon the vertebrate eye. So, also, there are a few eminently conspicuous and simple patterns which are met with again and again in totally distinct groups of insects. The advantage of this convergence in colour and in pattern is certainly found in the fact that it facilitates the education of the vertebrate enemies of insects. Such convergence also passes into and always contains an element of true "mimicry"; and Dr. Walker will find an example of the undoubted protective effects of "mimicry" among our own lepidopterous fauna, which I proved by experiment during the past summer (*P. auriflua* and *L. salicis*. *Abstract of British Association at Manchester*, Section D). Further references and details upon the subject will be found in my paper in the *Zool. Soc. Proc.*, and I have only here attempted to bring forward mere notes of the course of our knowledge on this most interesting subject.

Dr. Walker, in the note on his last page, alludes to instances of protective resemblance, and I understand him to imply that such instances as he cites are relatively rare: I think the difficulty is, *not* to see such modes of protection in five out of six of the species one meets with. A considerable number will be found described in my paper, but only such as have been subjected to experiment and found to be edible or otherwise.

I trust that I may be pardoned for the references to my own paper, but I do not know any other which deals with the historical aspects of the subject, for I paid especial attention to this side of the question in its preparation.

Rev. Dr. WALKER.—There are one or two points raised in this discussion to which I should like to refer. The new definition in place of "natural mimicry" has been said to consist of eight words,—though I think it will be found to consist of seven,—while the definition I have given is in two words only,—"natural mimicry." I may have omitted one or two cases of what I have termed "natural mimicry" in our own temperate region; but what I say is that, for one of these instances in England, we can find hundreds in the

tropics. The last speaker referred to the similarity between *Acronycta Psi* and *Tridens*, and Mr. Kirby alluded to the similarity between *Ophecia Apiformis* and the hornet. For some unknown purpose in nature, we find that one species of one genus of insect almost exactly mimics another species belonging to another genus, and that one tribe almost always mimics another tribe. Mr. Kirby mentions *Sericinus Montela* as a tribe allied to the *Papilio*. Mr. Kirby is better informed than I am as to the affinity he speaks of; but the marking of *Sericinus Montela* is more like *Apollo* than any species of the *Papilio*, or swallow-tail.

The meeting was then adjourned.

ORDINARY MEETING, APRIL 16, 1888.

W. N. WEST, Esq. (HON. TREASURER), IN THE CHAIR.

The Minutes of the last meeting were read and confirmed, and the following Elections were announced :—

LIFE MEMBER.—G. W. James, Esq., F.R.A.S., F.R.H.S., United States.

ASSOCIATE.—Rev. G. J. Perram, M.A., London.

The following paper was then read by Mr. H. Cadman Jones, the author being unavoidably absent in Ireland :—

A PHYSICAL THEORY OF MORAL FREEDOM.

By JOSEPH JOHN MURPHY, Esq.

JOHN STUART MILL has quoted from some unnamed writer that “on all great subjects much remains to be said.” Perhaps, however, he would have made an exception of those subjects which are contemptuously called metaphysical by that Positivist school whereof he was the ablest English exponent; perhaps he would have said that they are partly solved and partly proved to be insoluble, and that on this question of Freedom and Necessity the last word which has been or can be spoken is, not that freedom is proved impossible,—Mill was too cautious a reasoner to commit himself to such an assertion,—but that no valid reason can be given for admitting any exception or limitation to the absolute uniformity of the order of Nature, including not only unconscious Nature, but conscious Mind. And this appears to be the general belief of that philosophical, or scientific, school, which is dominant among us, and has Mr. Herbert Spencer as its chief living exponent. Some, indeed, speak as if they thought this absolute uniformity of the course of things was of the nature of a logical truth, which cannot

be denied without affirming a contradiction. But the more general and plausible opinion is that this uniformity follows by mathematical necessity from the laws of physical nature.

We think, on the contrary, that this question of Freedom *versus* Necessity is not, and perhaps may never be, a closed question. We think it one of those "great questions on which much remains to be said"; and we propose to give an account of some views on the subject, which have been published by French writers during the last few years.

We must begin by stating the question in dispute; for we believe there are many who really affirm this doctrine of absolute uniformity in the order of things—philosophical necessity as it was formerly called, or determinism as it is called now—and yet say that in some transcendental sense they are believers in moral freedom. If we do not misunderstand them, this is the position of Dr. Chalmers and the Duke of Argyll. We cannot state the question in more suitable words than those of Professor Delbœuf, of Liège,* which we translate:

"The fundamental proposition of determinism is the following:—The present state of the Universe, and consequently the movement of the least of its atoms, is the necessary and the only possible consequence of its immediately preceding state, and the sufficient cause of its immediately following state, so that a sufficiently powerful intelligence would be able from a single glance (at the present state of the Universe) to infer its entire past and its entire future.

"The partial denial of this proposition will evidently give the definition (of freedom) which we seek:—Freedom is a faculty or power, which produces movements which are not implied (*renfermés*) in the immediately preceding movements, and consequently cannot be predicted" (by any intelligence, however powerful, which acts under the same conditions as ours).

We have added the concluding words to Delbœuf's, because we believe that the Divine Intelligence does not exist under the same conditions as that of Man, but transcends time, and comprehends all things, past, present, and future.

We do not purpose to go back on the metaphysical aspect of the controversy, but to treat it only in its relations to physical science.

The physical or mechanical, as distinguished from the

* *Bulletin de l'Académie Royale de Belgique*. 3me série, tome 1, No. 4, 1881.—3me série, No. 2, 1882. The quotation in the text is from the latter of these two memoirs.

metaphysical, difficulty in recognising Will as an agency capable of acting on matter was, we believe, first seen by Descartes. He taught that matter and spirit, though in union, are absolutely distinct; that matter acts and is acted on according to rigidly mechanical laws; and that the total quantity of motion in the universe is invariable. From these premises it is an obvious consequence that Will cannot be a source of motive power in the universe of matter; but Descartes solved the difficulty by adding that Will, though unable to produce motion, is able to direct it. We believe this to be in substance the true solution; and it is substantially that of at least two of the three writers of whose views we have undertaken to give an account; but it needs to be translated into not only the language, but the ideas of modern science. "Quantity of motion" is an ambiguous expression; but the truth after which Descartes was groping is what is now known as the doctrine of the Conservation of Energy; that the energy of the universe, though perpetually undergoing transformation, is a constant quantity; that a given quantity of energy, when it undergoes transformation, does an exactly equivalent quantity of work, which work re-appears in some other form of energy. Muscular action, as such, is no exception to this law of Conservation; for it is disputed by none that the energy put forth in muscular action is not created by an effort of the will, but has previously existed in the animal organism, stored up in some form which can be drawn on when needed for use.

Expressed in modern language, the mechanical argument against the possibility of Freedom is that Freedom would be inconsistent with the law of the Conservation of Energy. Freedom, as Delbœuf has defined it in the passage quoted above, implies that it would have been possible for certain events to have befallen differently from what actually has befallen; and it is asserted that, if this had been the case, the sum total of energy in the universe would have been changed either by increase or by decrease;—which is impossible. A possible reply to this is that energy may be transformed, without either gain or loss of quantity, under the influence of a force which remains unchanged, and does not itself pass into energy. Thus, in a "dynamo," or generator of electricity for illuminating or other purposes, the energy due to the motion of the machinery is transformed into electricity, under the influence of magnets which themselves undergo neither increase nor diminution of magnetic power; and it may be argued that the function of the will, in determining the transformation of nervous and mus-

cular energy, is analogous to that of the magnets of the dynamo; being unable to produce energy in the smallest quantity, but able to direct its transformation in one way rather than in another.* This, however, appears a very unsatisfactory analogy. The static force of the magnets belongs to the same order of being with the current of electricity, being related to it somewhat as pressure to motion; while Will is not a physical force, but is of another order of being from matter and its forces.

Another possible reply is, that the Will may determine the time and manner of the transformation of energy, somewhat in the same way that, in mechanism, a very small force is able to guide the action of a very great one. For instance, the steam-engines which propel a large ship, though they work up to several thousand horse-power, can be started or stopped by the will of the engineer moving a lever with the exertion of an amount of muscular force almost infinitesimally smaller than that of the engines which he controls. And it would be possible indefinitely to diminish the muscular power needed, until the gentlest finger-touch on an electric button was sufficient to control the most powerful engines. In such arrangements there is no relation whatever between the magnitudes of the controlling and the controlled forces;—the magnitude of the controlled force may be indefinitely increased, while that of the controlling force remains unchanged. Is not this a significant symbol of the control of Will over the muscular forces?

But in reply to this, it is urged that the analogy altogether fails unless it were possible for the will of the engineer to control the engines without the exertion of muscular power at all; and however this may be diminished by refinement of mechanism, it can never be reduced absolutely to nothing.

Sir John Herschel saw the difficulty, and appears to have concluded that the Will can and does produce energy, though in quantity so minute as to be incapable of experimental proof.† This is cutting the knot rather than untying it.

* We think this suggestion, though quite differently expressed, is fundamentally identical with one made on the same subject in an article on Atomic Theories in the *North British Review*, March, 1868, by the late Prof. Fleeming Jenkin, and now published in the collected edition of his papers.

† We quote from Sir John Herschel's *Familiar Lectures on Scientific Subjects* (Strahan, 1866), page 468.

“The actual force necessary to be originated to give rise to the utmost imaginable exertion of animal power in any case, may be no greater than is required to remove a single material molecule from its place through a space inconceivably minute, no more in comparison with the dynamical force *disengaged*, directly or indirectly, by the act, than the pull of a hair trigger

A French writer of our time,—Professor Armand Sabatier, of Montpellier,—has proposed to cut the knot in another way, by denying the absolute uniformity of the order of Nature.* He admits, of course, that all motions on the largest scale, that is to say, those of the celestial bodies, and indeed of all masses which are visible to the unassisted eye, are absolutely determined; but he maintains that this is not true of those molecular motions which modern science has proved to exist everywhere; and, as he truly remarks, it is not in the greatest but in the minutest motions that the nature of matter is in any degree revealed to us. Light consists of undulations in an ethereal substance, moving, so long as the light is not polarised, in every plane at right angles to the direction of the ray; and the heat of bodies consists of vibrations of their molecules, moving, no doubt, in every direction at once. These motions are, in M. Sabatier's opinion, in some degree undetermined, and not subject to any rigid law of uniformity; and he finds traces of the same indeterminism in some motions which are on a sufficiently large scale to be visible under the microscope. One instance of this which he mentions is that of the "Brownian" motions of minute particles suspended in water or other liquids.† These movements are of very small amplitude; but incessant, of quite sensible rapidity, and in every direction at once. They are well seen in ink when it is sufficiently thick to make them visible, and it is these motions which prevent ink from losing its properties as such by the subsidence of the black particles.

We cannot think there is any truth in Sabatier's hypothesis as regards inorganic nature. To say that the minutest motions are undetermined, is to say that below a certain limit of magnitude the laws of motion cease to be absolutely true.

in comparison with the force of the mine which it explodes. But without the power to make some material disposition, to originate *some* movement, or to change, at least temporarily, the amount of dynamical force appropriate to some one or more material molecules, the mechanical results of human or animal volition are inconceivable. It matters not that we are ignorant of the mode in which this is performed. It suffices to bring the origination of dynamical power, to however small an extent, within the domain of acknowledged personality."

* In a series of articles entitled *Evolution et Liberté*, in the *Revue Chrétienne*, of April, May, September, and October, 1885.

† So named after the eminent botanist, Robert Brown, who first called attention to their importance. Professor Jevons (*Quarterly Journal of Science*, April, 1878), offers what appears to be a satisfactory explanation of these motions as being due to minute disturbances of electric equilibrium. They are precisely analogous to the motions of pith balls in a well-known electric experiment.

Now, the laws of motion are perfectly simple; though not mathematical in the nature of their evidence,—for they are proved only by experiment, and have not that self-evidencing character which belongs to mathematical truth,—yet they are mathematical in form; though the proof that they are absolutely true is never perfectly complete, yet every increase in the accuracy and perfection of astronomical knowledge brings us nearer to such absolute proof; and it seems extremely improbable that they should be subject to any limit whatever. The Brownian motions, the motions of the molecules of gases, the undulatory motion which constitutes light,—all these, however minute, are motions, and we cannot doubt that they are rigidly subject to the laws of motion. It is uncertain how far chemical actions can be resolved into the motions of atoms, accompanied in many cases by transformations of energy, as in the case of heat produced by combustion; but the law of the absolute invariability of chemical properties and actions,—the proof of which, it is true, can never be complete, though every increase of chemical knowledge strengthens it,—makes it probable, with a probability approaching indefinitely near to certainty, that the laws of chemical action admit of no more limitation or exception than the laws of motion. We consequently hold with scientific men generally, that all inorganic actions, on whatever scale of magnitude, whether planetary or atomic, are determined by the laws of motion with a certainty which, though not mathematical in its nature, is equal to mathematical certainty.

But is absolute determinism true in mathematics? An attempt has been made by Professor Boussinesq, of Lille, to show that this is not the fact;*—that absolute determinism, though generally true in mathematics, is not always so, and therefore is not necessarily always true in mechanics. He chiefly makes use in his argument of what are called singular solutions. We must here state when and how a singular solution arises, for the term is by no means self-explaining.

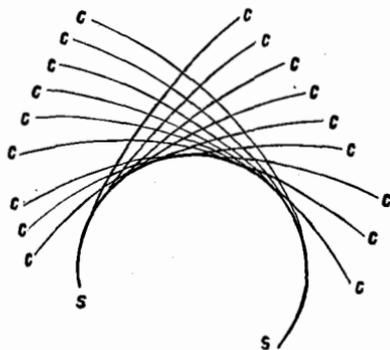
A set of curves are drawn which we shall call C , C' , C'' , &c. They are not in general mathematically similar, but constitute a family, varying continuously from curve to curve according to a definite law. They are indefinite in number and indefinitely near to each other, and are so drawn that C intersects with C' , C' with C'' , and so on.

A curve S , which is generally of a totally distinct kind from the curves C , is drawn through these intersections; and the

* See Paul Janet's article in the *Contemporary Review*, June, 1878.

curves C , at the points where they intersect each other, are tangential to S ; that is to say, they touch it without intersecting it; so that the relation of S to the curves C is somewhat like that of a circle to its tangents. S is called the envelope of the curves C , and it is "singular," that is to say unique, and not one of a family like the curves C .

The following diagram will give an idea of the relation of the curves C to S .



Every line, straight or curved, may be described as produced by the motion of a point P ,—this is actually the case when it is drawn by a pencil,—and consequently the equation which describes the direction of a curve at any place may also be read as describing the direction of the motion of P at that place. Equations usually speak a perfectly unambiguous language, but in singular solutions an exception arises; the equation which describes the direction of motion at that point of any C where it touches S will be equally satisfied by P either continuing to move along its C , or at that point leaving the C and moving along S . So that the equation which describes the direction of the motion of P at any point of S does not absolutely determine its path, but leaves undetermined which of two paths it is to take; those paths being along curves of unlike kinds.

Where there is thus mechanical indetermination, there is, or may be, room for voluntary determination to enter. An agency like the Will, which is not properly a force inasmuch as it cannot exert energy, may nevertheless determine the motion of a point along one of these two curves rather than the other. It is no objection to this that the indetermination shown in a singular solution cannot be realised under experimental conditions. It is impossible to do this, just as it is impossible to make a cone stand on its apex. But it does not seem by any means impossible that it may be realised among

molecular or atomic actions; and the actions in those dim recesses of the brain where alone the Will acts on matter can be only an atomic scale.

This argument appears to us of much importance, as showing that absolute determinism is not a mathematical truth. But we do not think it throws any light on the actual *modus operandi* of Freedom. The processes of life are not mechanical, and its laws are not resultants from the physical and chemical properties of the substances of which the organism is composed. Even if all physiological processes could be referred to chemical laws, this would not be true of the morphological processes which build up tissues and organs; and though it might conceivably be true that the law of Habit, in virtue of which every action tends to become easier with repetition and to repeat itself, was a merely physical law like that whereby "streams their channels deeper wear;"* yet the law of heredity, whereby habits and tendencies of all kinds, both active and formative, tend to be reproduced in the offspring, cannot be merely physical and mechanical. In all life, even the merely organic life of vegetables, there is something as absolutely inscrutable as the ultimate properties of matter; and it seems to us probable, though not capable of demonstration, that Sabatier's theory of a certain limited indeterminism, though untrue of inorganic matter, is true of organic nature. As he reminds us, we do not there find, either in form or in function, the rigid mathematical uniformity of inorganic nature. Variation, though generally very slight, is universal; no two trees in a forest, no two leaves on a tree, are exactly alike; the same is true probably of the physiological processes of all organisms, and certainly of the muscular actions of animals; and even if Darwin's theory of the origin of all organic forms by natural selection among spontaneous variations is unsatisfactory and insufficient, he has at least made it obvious that it is this fact of variability,—so utterly unlike any property of any part of inorganic nature,—which makes the evolution of organic forms possible. It is asserted, no doubt, by those with whom absolute determinism is an article of scientific faith, that organic variations are absolutely determined, partly by differences and changes in the environment of the organism, and partly by the laws of its development. This may be true. It is at present, and may ever remain, impossible to prove either absolute determinism or a certain limited indeterminism in the organic world. Sabatier only insists that his opinion

* "Time but the impression stronger makes,
As streams their channels deeper wear."—Burns.

is as tenable as that of his opponents, and that the facts of organic variation give it support. It may be mentioned that, according to Darwin, the immediate effect of a change in the environment of an organism, whether animal or vegetable, is usually not to produce any special variation, but to promote an indefinite variability. In crystallisation, on the contrary, there is, we believe, no such thing as indefinite variability, unless a tendency to form imperfect and partly amorphous crystals can be so called; but when the environment of crystals is changed by introducing some slight change into the chemical constitution of the liquid from which they are precipitated, the change in the form of the resulting crystals, if any, is definite.

But even if we altogether reject the idea of a certain limited indetermination in vital actions generally, this will not disprove the possibility of indetermination and freedom, also limited, in a self-conscious being like Man. Sensation, consciousness, and self-consciousness are such wonderful phenomena, and so totally unlike anything that can be imagined as properties of mere matter, that it seems rather probable than otherwise that they should be accompanied by other wonderful properties, and especially by this of free self-determination.

We go on to state Delbœuf's theory of the *modus operandi* of this free self-determination. He says: "Freedom disposes of time. This, as we shall see, is sufficient. We consequently define a free being as one which possesses the power of suspending its activity until the moment chosen by itself. A free being is thus a reservoir of force (or, more correctly, energy) in a state of tension, which it can transform at pleasure into actual motive power (*forces vives*). . . . This transformation of latent energy, or energy in the form of tension, is effected without any increase or decrease in the total energy of the system" of which the free being forms a part.

So Delbœuf. We think this is by far the most luminous suggestion yet made on the subject, and we only wonder that, with his knowledge of natural science, he has left it as a bare suggestion, and not worked it out into further detail. With the help of modern physiology, however, this is not difficult. We know that the greater part of our life goes on in unconsciousness and in total independence of the Will,—the Will only enters, as it were, occasionally to control and regulate. Thus the lungs perform their function of breathing without any action of the Will, and without exciting consciousness; and in walking our legs continue to move, though we may be

absorbed in the profoundest reverie, and cease to move only in obedience to a voluntary determination like that which at first set them moving. These facts of ordinary consciousness agree with the results of anatomy and physiology. The involuntary, or what physiologists call reflex, actions of the nervo-muscular system are found to increase in energy when, by accident, or as the result of experiment, they are withdrawn from the influence of the brain, which is the organ of the Will. A case has often been quoted where an injury to a man's spinal cord made it incapable of conducting either sensible impressions to, or motor impulses from, the brain; so that the sufferer had neither sensation in, nor control over, his lower extremities; yet when the sole of his foot was tickled, he kicked more energetically than he would have done if the nervous connections had been unimpaired. Experiments on animals yield similar results, and establish the conclusion that the relation of the voluntary and conscious forces, which have their seat in the brain, to the involuntary and unconscious forces, which have their seat chiefly in the spinal cord, is regulative, and, for the most part, inhibitory. To go back to our former illustration, it may be compared to the relation of the engineer to the steam-engine; for this also is regulative and inhibitory. The engineer controls the steam, not by impelling or ceasing to impel it, which would be impossible, but by permitting or refusing to permit it to flow into the cylinder, and by directing it on the one side or the other of the piston.

This, however, gives no idea of the way in which it is probable that the Will really acts. There appears to be conclusive evidence that the animal system has the power of storing energy, which can be afterwards liberated for the purpose of doing muscular work.* The seat of this stored energy is probably the substance of the muscles; and the Will determines muscular action by determining whether, and at what time, this stored energy shall be transformed into mechanical energy by the contraction of the muscle. It is true that the determination of the Will is conveyed to the muscle, not by any immediate action, but by a current of nervous energy sent downwards from the brain, which involves a transformation of energy, and is as truly a physical agency as the opening or closing of a steam-valve by the engineer. But the chain of physical causation cannot extend

* For the facts which prove this, see Carpenter's *Human Physiology*, and the account of the experiments of Fick and Wislicenus, on muscular work, in the *Philosophical Magazine*, June, 1866.

backwards more than a very few links, and it is at least credible that in the original determination of Will within the brain, the Will may be free, in that absolute sense in which Delbœuf in the passage first quoted defines freedom, either to effect or not to effect that transformation of energy on which depends the sending downwards of the nervous current that sets the muscle in action; for we cannot doubt that energy is stored in the brain and the entire nervous system as well as in the muscles; nor that the motion of every nerve current, as of every electric current, involves the transformation of energy from some other form into that represented by the current.

It may be objected that this is a similar case to that of the engineer, who starts or stops his engine by a turn of his hand, which is a mechanical action, involving an exertion of energy; and consequently that it brings us no nearer to understanding how the actions of the muscular system, which are mechanical, can be directed by the Will, which is not a mechanical agency, and cannot exert energy. But to this we reply, that in the case of the engineer we have seen that the proportion which the muscular force that he has to exert bears to the force of his engine, may be diminished without limit, provided only that it does not become absolutely null. We know what is the *modus operandi* of the engineer in directing his engine. We know nothing whatever of the *modus operandi* of the Will in determining the transformation of stored energy in the brain into a nerve-current, but we are safe in asserting that it bears no resemblance to that of the engineer, and does not consist in anything like turning a handle; and we see nothing improbable in the belief that the Will may exercise its direction and regulative function without the exertion of any energy whatever. When man's mechanical art can diminish the magnitude of the directing force infinitesimally, provided that it is not absolutely reduced to nothing, it seems in no way improbable that it may be absolutely reduced to nothing by the vital powers of the organism, which infinitely excel all human art in subtlety. Boussinesq's illustration from geometry, though not suggesting how this can be done, appears conclusively to show that it implies no mathematical absurdity.

The freedom of which we speak is emphatically called moral freedom; all moralists agree that moral freedom is manifested in self-control, and practically means the power of self-control. We now see the physiological ground and interpretation of this. Self-control consists, primarily, in the control by the Will of muscular actions which without such

control would have gone on in response to stimuli, as in the case of the patient who kicked when tickled on the soles of his feet, though unconscious of the tickling. Will—or, if this word is thought inapplicable, voluntary action—is developed to this extent in animals; and, in our opinion, the step in development which separates the human from the highest animal intellect consists in acquiring the power of directing thought at will.* On this depends the power of abstraction, and with it the ability to use arbitrary signs, and the faculty of language;—for, as Prof. Max Müller has shown in his recent work on the Science of Thought, every word in its origin is a result of abstraction.

These considerations throw some light on the evolution of Will and self-consciousness.† Mind has been evolved from sensation as from a germ. In its earliest development, sensation, or rather nervous action (we have no means of knowing how far down in the animal scale sensation really begins), exists only as a guide to muscular action; and all muscular actions, such as that of the mouth in closing on food, are performed in immediate response to a nervous stimulus. But when the conditions of life so change that the animal can no longer obtain food by merely closing its mouth upon it, as a sea anemone does, but has to use some of the arts of a hunter; and when at the same time the single ganglion, which alone was necessary at first, develops into a rudimentary brain; then when the nervous stimulus, coming probably from the eye or the ear, reaches the brain, and the animal has to watch its prey instead of at once closing upon it, it is probable that the impulse to close upon its prey, inherited from the ages before its brain was developed, is still transmitted, but is counteracted by an inhibitory impulse engendered in the brain itself, and throwing the nervo-muscular system into a state of strain between the two opposing impulses; while at the same time the arrest of muscular action heightens the consciousness which the sensory impression excites in the brain; for it is a well-known law that consciousness is heightened when muscular action is hindered, whether by a voluntary or an involuntary cause. This counteraction of the impulse to close on the prey is the germ of voluntary self-control; this heightening of consciousness is the germ of attention, and ultimately of the consciousness of

* Prof. Max Müller, in a letter in *Nature*, of the 14th July, 1887, speaks of this view as being at least worthy of consideration.

† The following has been suggested by the review of Wundt's *Physiological Psychology* in *Mind*, January, 1876, by Mr. Sully.

self. In this pause, produced by the opposition between the sensory impulse to rush forward and the mental determination to hold back, is contained the germ of all the self-conscious and voluntary life which constitutes Mind.

This may appear fanciful, and we do not advance it as established truth. But, though the first germs of attention and voluntary determination are probably to be found in such creatures as ants and spiders, it is scarcely an exaggeration to say that the evolution which we have endeavoured to describe may be witnessed in that very common though most interesting sight, a dog pointing. His stillness is visibly not that of rest, but of strain, as between two evenly balanced impulses, one urging him forward and the other holding him back. Darwin suggests that this remarkable habit—which, like other acquired habits, has in some degree become hereditary—is only the exaggeration of the pause of a carnivorous animal going to rush on its prey; and he adds that probably no one would have ever thought of teaching a dog to point, unless he had noticed such a tendency.

We may be reminded that while we have offered an account of the evolution of some of the mental powers, we have taken for granted the evolution of the brain, on which the mental powers depend. This is quite true. Structure and Function have been evolved together, and the evolution of each was necessary to that of the other.

To return to the point where we began.

We do not say that we have proved the reality of indeterminism and freedom. We do not think it admits of proof;—it is as much as we can hope for, if we can show that from the scientific point of view our opinion is as defensible as the opposite one, while the moral arguments for the doctrine of freedom remain for what they are worth—and in the opinion of the present writer they are worth very much. Professor Huxley once said—we quote from memory—that the controversy about Necessity and Freedom will always be a drawn battle, and that for all practical purposes this is equivalent to the believers in Freedom gaining the victory. We can assent to this, though Huxley is a Necessarian and we believe in Freedom; all that we hope to do is to help to remove some presumptions in favour of the doctrine of absolute Necessity, and some difficulties in the way of believing in Freedom, which at first sight may appear formidable, and yet diminish and disappear when really understood. We fully admit that the entire world of mere matter is “bound fast in fate;” that Freedom exists in living beings only, perhaps in none but man, and dominates only a small portion even of man’s

life. But we have seen with Boussinesq that absolute determinism is not universally true in mathematics, and therefore need not be universally true in Nature, though we do not think it probable that indeterminism and Freedom actually enter in the way indicated by Boussinesq's reasoning. We have seen with Sabatier that the variability which is so remarkable in the organic world, and, according to Darwin, makes possible the evolution of organic forms, appears to show a sensible though very minute degree of indetermination in the physiological and formative, as well as the motor actions of living beings. And we have seen with Delbœuf that the manner in which the Will most probably determines action, without being itself capable of exerting motive power, is by determining the transformation of stored-up energy in the organism into active energy.

We do not deny that all this is hypothetical. But we have to do with questions in which certainty — demonstrative certainty, at least—is at present unattainable, and may ever remain so. But the doctrine that mind is bound fast in the same chain of fate with inorganic matter is as hypothetical and as incapable of proof as the doctrine of a certain limited freedom of the Will. We are not now replying to those who deny the freedom of the Will on metaphysical grounds; our arguments are directed against those who deny it on grounds of physical science, and we believe their argument may be refuted on purely scientific grounds.

The so-called scientific argument against the possibility of Freedom has been stated already; namely, that Freedom is inconsistent with the Conservation of Energy; and we have stated Delbœuf's reply to it, which we think sufficient and satisfactory. This, however, is not all that is to be said. If it is true, as the argument implies, that no mental determination can alter the direction in which physical causation acts, much more is involved in this than the denial of Freedom. Moral Freedom was denied on metaphysical grounds before any one had thought of bringing the laws of motion and force into the argument; but, if we deny it on purely physical grounds, we must deny the possibility of Mind being an agent at all. When we shrink from pain or seek pleasure, the older Necessarianism did not think of denying that the fear of pain and the hope of pleasure, which are mental affections, are the cause of the appropriate muscular actions. But if it is true that the law of the Conservation of Energy makes it impossible for any mental determination to change the action of physical causation, then mental determination can neither produce nor influence muscular motion, and con-

sciousness misleads us in making us believe that our mental determinations—our desires and our fears—determine our bodily actions.

To mere common sense this conclusion must appear impossible and absurd. Nevertheless it has been accepted by Professor Huxley* and many others of the same school, and is known as the theory of Automatism. It may be thus stated:—"Consciousness, though an effect of physical action, is never its cause, but only its sign. The action of the legs of the patient who kicked violently in response to tickling which he could not feel, is the type of all nervous and muscular action whatever. All such action, whether conscious or unconscious, goes on as if in unconsciousness."

This is a paradox, but many paradoxes are true. To go no further than our present subject, it is a paradox that the Will cannot produce nervous or muscular energy; yet it is quite certain that the Will cannot produce energy, and can at most only direct it. But the paradox which the theory of Automatism requires us to believe is not only great but enormous and monstrous. If Automatism is true, then consciousness is mere surplusage, and not a cause, but only a sign of physical action; and all human history might, without violation of any law of causation, have gone on in unconsciousness; the development of art, science, and faith might have appeared to go on with unconscious puppets for actors, without a throb of pain or a glow of pleasure; wars might have been waged without ambition, pictures painted and statues carved without a sense of beauty, music composed and performed without a sense of harmony, science built up without a love of truth, and prayer uttered without hope or fear,—all as the result of nervous action never translating itself into consciousness. Rather than assent to such a paradox as this, we should believe with Sir John Herschel what is scarcely a paradox at all, that the Will has the power of creating energy to an infinitesimally small amount;—though, as we have shown, we do not think this is necessary to a belief in the freedom and self-determining power of the Will.

It may be said that a *reductio ad absurdum*, however forcible, is worth little outside the domain of pure mathematics and abstract logic. We do not assent to this; but we think a conclusive direct refutation of the theory of Automatism has been given by Mr. Romanes, a writer who is, we believe, beyond any suspicion of theological or meta-

* See his address on Automatism, at the Belfast Meeting of the British Association, as published in the *Fortnightly Review*, November, 1874.

physical prejudice on such a question. It is simply this:—that if consciousness were only an effect without being a cause, and were consequently mere surplusage, it never could have been evolved at all. Whether it is true or not that “natural selection among spontaneous variations” has been the chief cause of vital evolution, it is certain that all vital evolution has been effected under the law of natural selection; and natural selection cannot perfect a useless function, which consciousness would be if Automatism were true.

If, then, the dicta of instinct and common sense are scientifically true; if consciousness can affect matter, and desire and fear can determine bodily actions, all arguments from physical science against Moral Freedom and self-determination are irrelevant and worthless, and the question of the reality of Moral Freedom is left to be decided, or to remain undecided, on the old metaphysical, moral, and, we will add, theological ground.

THE CHAIRMAN (W. N. West, Esq.).—Although the learned author of the paper just read has unfortunately not been able to come to England to attend this evening, I am sure all present will accord him a vote of thanks for this addition to our proceedings, and at the same time feel that his absence has, as far as possible, been compensated for by the clear and distinct manner in which Mr. Cadman Jones has read it. We shall now be glad to hear any observations that may be offered.

SIR J. FAYRER, K.C.S.I., F.R.S. (Vice-President).—Mr. Murphy's paper is not one which I should have felt myself able to discuss, even had it been on a matter to which I had given special attention. One could hardly be expected to take up a subject so abstruse, and containing so much matter for close thought, and discuss it at once. I am glad, however, to have had the opportunity of hearing the paper read, as I like to know that questions of this kind are brought before the Institute, and am glad to see the subject so reasonably argued and fairly considered. I think that a good deal of strong language is occasionally used in reference to great thinkers of the present day, because they do not hold the same views as others who have not had the same opportunities for studying the questions with which they deal.

The subject of to-night is one of importance and interest, and I will not offer any further opinion upon it, except to say that I think conclusions in regard to our organic nature ought not to be accepted as regards our moral nature and our will: at least, I decline so to accept them. An hour ago I did not think I should be standing here in response to a call from the chairman to say a few words. I feel satisfied that in doing this my own will is operating, and that what I am saying is not the result of any precedent cause, other than what may have been excited by the chairman's remarks. There was one point which specially interested me, and that had reference to heredity. There can be no doubt as to the great importance of that subject philosophically and physically; perhaps sufficient attention has not been given to it. The illustrations which the author has given us are those of the pointer and the setter. The peculiarity of these animals is spoken of as being to a certain extent hereditary; and no doubt it is so, for, although the pointer is trained to point and act as a hunting-dog, yet it is also true that he points the first time he goes into the field, and before any teaching can have affected his proceedings. Most sportsmen know that a good young dog will sweep the field after grouse as though it had done the same thing for years. Of course it needs the keeper to direct and teach it. There are other remarkable examples of it. The following illustration has just occurred to me. Since telegraphic wires have become so common on the grouse moors, the number of birds killed by the wires has diminished. It would seem to have become hereditary among the grouse not to fly against the wires and kill themselves, as they formerly did; for one grouse so killed now, the number some years ago was probably tenfold. It is not to be supposed that the grouse which are shot in August can have learned anything more than the birds which have preceded them: the inference is that they have acquired the habit which enables them to avoid the wires in their flight by heredity. It seems very strange that this faculty should be so transmitted. What one would like to know is, the nature of the molecular condition of brain which effects this. Such subjects are of great interest. I will not attempt to discuss them, but as I have been asked to speak, I have thought it right to make the few remarks I have offered.

MR. ST. GEORGE LANE FOX, F.G.S.—I would suggest, in the first place, that there appears to me to be a slight discrepancy between the title of the paper and the author's concluding remarks. Whilst

listening to it, I was not quite sure whether the author intended to put forward a new theory, or to destroy some theories that seem hitherto to have prevailed among scientific men. I now gather that he merely intended to show the futility of attempting to arrive at a solution of the question of moral freedom from a purely physical standpoint. One idea that has been dealt with in the course of the paper is that the operation of the human will is in the direction of suspending the manifestations, as it were, of energy,—of converting latent energy or what the physicists call “potential energy” into the kinetic form, or *vice versâ*. I think, however, the author has not quite realised that there is a very great distinction between individual action from the standpoint of consciousness, and the operation of force in the physical universe. It seems to me that this is the difficulty with which the author had to contend; that he had not grasped the distinction between the microcosm and the macrocosm, which distinction is, to my mind, the key of the great and perplexing problems we see constantly present in regard to moral action. The operation of physical matter according to recognised laws,—that is to say, laws that have been more or less determined by experiment,—is dependent upon a certain phase of material development, upon certain conditions of force and certain limitations of time and space. Now, in the case of the individual man we deal, as it were, with the universe from the microcosmic point of view. There is the will, in the individual effort, as distinct from the operation of force in the physical world, without hypothetically, at any rate, believing in the operation of the universal will. It seems to me that there lies the clue. If we can only conceive that the individual man has a potential universe in himself, and that there are certain relations between his material being, which forms a mere atom, as it were, in the outer universe of which his body is a component part, in its physical aspect, we may gain some insight as to how an interchange of energy takes place between the universal and the individual. This conception of a universal and individualised *will* may, perhaps, although not affording an explanation of the difficulty, offer a clue to the direction in which it can be found. It is, however, almost impossible to deal adequately with these questions from the nomenclature available to modern science. There is one other point to which I would like to draw attention; it is this. That the constant use of the word “proof” or “disproof” appears to be an exceedingly arbitrary mode of dealing with a difficult question. This is one of the failures of modern

thought. It is exceedingly common to hear men of science, especially when dealing with subjects of this kind, making use of the words "proof" or "demonstration," without taking into account the mind or the receptive power, to which the proof or demonstration is to be fitted. Scientific men, as a body, have developed a mind of their own. There are things which they demonstrate to themselves which do not appeal to the minds of those who have not been trained in their particular school of thought. This is a very important point, and one which I think is often lost sight of, particularly when such illustrations as those of the dynamo machine and the steam engine are made use of, as they were, in the paper just read. The whole train of thought and the whole collection of experiments associated with the use of such expressions as the dynamo machine and the steam engine, if thus wrenched from their context and applied to ideas with which they are not technically associated, seem to me to be more or less nonsensical. In conclusion, I would say that, while I think we may accept the paper as a valuable contribution to the discussion of this subject, at the same time it appears to offer a very useful illustration of the futility of attempting to deal with metaphysical subjects from a wholly material standpoint.

Professor ODELL.—I think that freedom of will may be accepted and acknowledged as a fact,—I mean freedom of will in degree, not absolute,—there is not anything absolute except God. No doubt it is hard to speak on an abstruse subject like this without entering into speculative matter. It is accepted by some thinkers that the mind is an emanation of the brain, and is dependent for its existence on the nervous system; while the nervous system is dependent on the general constitution for its health; and furthermore, the general constitution is dependent on a variety of circumstances, such as air, food, &c. If this be so, it seems to me to curtail very much individual freedom of will,—either the moral or the mental will—then, as the first speaker has mentioned, it bears on the question of inheritance which curtails also, even more than anything else, individual freedom of will, provided the will is strictly dependent upon the brain and the nervous system. But there are some who believe that this is not the case, and that the will is part and parcel of the mind, if, indeed, it is not the mind in its entirety. There are proofs it would be impossible for me to bring forward to-night, but which, although they might not be very conclusive, would yet offer fair evidence that mind may exist apart,—and here I do not speak with

absolute certainty, although to myself it is a certainty,—from the brain and the material and physical body. I can very easily conceive that the mind cannot act without a visible organ, which enables it to do so, in the physical world, surrounded by physical matter. For instance, I lift up this paper in my hand. It is not my hand that lifts the paper—my hand is only an instrument. I go further still, and believe that it is not my brain or any portion of my nervous system that acts upon the hand, or upon the paper in lifting it up, except as instruments; for I cannot imagine the brain being able to do an action of that kind. Therefore, I ask, what is the explanation? There must be something besides the brain and the nervous system: if there be nothing more than the brain and the nervous system in the discharge of this function, my reason is not satisfied. My reason induces me to expect something more, and, in accordance with that expectation, I believe that something exists besides the brain and nervous system which it is impossible for us to see and feel with our physical eyes and senses. But although we may never have seen what we call “the mind,” yet we have evidence sufficient for any jury to accept, to prove the existence of the mind, when we can point to actions which we are fairly assured and persuaded could never be done by mere brain and muscle and the corporeal system. Take the case of a writer. Is it the pen that does the work, or is it the hand, except as instruments? Is it the brain by which the grand ideas of Shakespeare, or Milton, or Bacon were put upon paper? To put the matter only to the mere test of common sense and common reason, not mere faith in what people may call superstitious teaching; does it satisfy my mental reasoning powers to rest there with the pen and with the brain and nervous system, and say that all the grand thoughts of the great writers I have mentioned could have been thus evolved? There is a sentence in the paper which I cannot very well understand. On page 237 we are told, “Sensation is, of course, the germ out of which mind has been evolved.” That is a very positive statement. I ask, what is meant by “sensation”? Is it physical sensation? If so, is it not a fact that when physical sensation expires, mind must expire also? The author accepts this statement, which is not a quotation, and gives us to understand that the mind is dependent on sensation. I cannot understand this. I do not think that the author is a materialist, but it is nevertheless a materialist’s statement; and I cannot conceive myself living in any state of existence outside this life apart from the mind as it at present exists. I mean here by “mind” my thinking and reasoning powers,

my present consciousness. It is against reason to suppose that it would be I who would exist; but certainly if I am to exist at all in any other form, I must take with me my intelligence, my reason, and my memory wherever I go. I, therefore, ignore this statement, and say that I do not believe the mind is dependent on physical sensation, if it be physical sensation that is here meant.

The Honourable J. M. GREGORY, LL.D. (Ph. Soc. of Washington):— I have been deeply interested both in the paper and in the discussion that has arisen upon it. They touch points that certainly lie at the bottom of all our experience. Any one who has thought at all must have thought more or less on these subjects. One of the happy suggestions made in the course of this discussion was as to the inaptitude and inadequacy of scientific language borrowed from physical science to express the facts of our mentality. I do not fear that the great question of the freedom of the will will ever be surrendered by the mass of mankind. That common sense, whose value as an evidence was fully recognised by Sir William Hamilton, pronounces in favour of this freedom of will. All institutions of government, our moral sense, our judgments of our life and actions, rest on a basis of belief in some form or decree of freedom of will.

It is true that modern physiological science has shown that this freedom of will is not so unlimited as this universal consensus of opinion of mankind would assume. It is agreed that there are limitations in the hereditary qualities and the physical formation we possess; but after all, although we may thus be driven partly from the ground adopted to allow these limitations, yet, I imagine that common-sense will have its way here just as in the answer to the argument of Bishop Berkeley for the spiritual or ideal, as against the material. We may make the argument as strong as we will, that there is no evidence or proof of the existence of the external objects of nature, still we turn aside if a post is in the road. It has occurred to me that the difficulty in this discussion on the freedom of the will lies in the attempt to pass in thought from one sphere of our nature to the other,—from the physical to the mental, or the reverse. When we come to reason on what we know, we find that we have always proceeded on some fundamental assumption. We have two such fundamental assumptions, on which all our knowledge is based. I know that the physicists and those who deal simply with material science profess to take all phenomena as they present themselves to their eyes; but they certainly assume the *reality* of the phenomena and their *power* to

recognise it. Even from their point of view, if we go down to the basis of our knowledge, we must accept two fundamental assumptions: must assume them because we can neither prove them nor doubt them. One of these is that there is *something which occupies space*—which I take to be the simplest definition of matter. It is assumed, with equal certainty, that there is *something which thinks*. In this simplest definition of mind I use the word “think” in its evident meaning, including all acts of intellect, sense, and will. These two general propositions we can neither prove nor deny. I cannot prove that something occupies space, nor can I demonstrate that there is anything that thinks; but, at the same time, I cannot doubt either assumption. The one is as certain as the other. I am as sure that I think as I am that I weigh so many pounds avoirdupois, or that I stand on my feet. The certainty of one is as great as that of the other. If any choice must be made between the certainty of these two fundamental assumptions, which are unproved and unprovable, but which are always assumed as the bottom of the matter, it must be given to the side of mind. On these two assumptions are built the two great departments of human knowledge or science,—the mental sciences, including the psychologic, social, moral, æsthetic, and political; all springing from the something that thinks; and the sciences of matter, or of the something that occupies and moves in space. The maxim of Descartes,—“*Cogito ergo sum*,”—has been contradicted, as assuming that the part is the whole. In place of his “I think, therefore I am,” one may read, “I am, therefore I think.” In other words, thinking proves my mental existence. With regard to the other assumption, that there is something which occupies space, I have said that this also is unproved but undeniable. All physical science is based upon it. Occupancy of space and motion in space, with their variations, are the data that our senses give us for our science of matter. There is at the bottom of every stage of our development of knowledge a very serious difficulty. If I am accustomed to look at questions relating to the phenomena of life from the side of my consciousness, and confine myself in my studies to the reflective side, I shall find it an exceedingly difficult thing to project myself into the realms of physical science and explain its phenomena. In so doing I must employ the language made familiar by my philosophy, and shall be laughed at by the physicists for the absurdity of any explanations: the fault lies in my phrasology. But when those whose studies have been on the

side of physical science attempt to pass out of their region into mine, I find that they experience the same difficulty. Their language lacks meaning when applied to mental facts.

The true difficulty experienced by material or physical science lies in this, that it assumes, if it does not assert, that all the phenomena which it sees and studies are certain and positive, but that those of metaphysical science are mostly unreal and illusory. When the physicists say you must begin with matter and force and motion, they put limitations upon the possibilities of thought which nature herself has never imposed. They limit the sphere of reflection, or rather they exclude themselves from that sphere, except as they may employ language which is not adapted to the facts of consciousness and reflection. It is unfortunate that in the modern investigation of social, moral, and spiritual truth, they should have so absolutely disposed of, and too often with a contemptuous sneer, all metaphysical truth and the facts of consciousness. In doing this they have disposed of one-half, and the higher half, of the whole question. It is like trying to compel us to walk on our left foot because they think the right foot is not the proper one to use or stand upon.

The whole question of the freedom of will, for example, must find its basis and argument on that side of truth which belongs to our consciousness. I remember that some ten or twenty years ago a writer in *La Revue des Deux Mondes*, criticising a work that had then just appeared, the work of M. l'Huys on the Brain, since published in the International Science Series, said :—" It is indubitably true that in France the medical faculty have concluded, almost to a man, that mental science is nothing more than a chapter of mental physiology " ; but he went on very acutely to remark that we may study mental science without appealing to the facts of physiology to interpret it. That is to say, I may study the phenomena of memory, reflection, classification, and generalisation, and all the different forms of thought, without thinking of the brain by which I do this, or the physiological functions that accompany it. But, the writer added, the man who starts to study mental physiology cannot go a step of the way without appealing to the mental side,—to consciousness,—to interpret the phenomena he has before him. It was, I think, Professor Tyndall who said that if a man had the power to observe the molecular movements of brain,—of its electrical currents and discharges,—if there be such, he would be as far from having passed the gulf which separates the phenomena of matter from those of the

mind as he is now. The study of the mental functions of the brain, without the previous consciousness of the mental facts to be explained, can not go on. This is so obvious that it strikes me it should occur to our physiological friends when they attempt to address us on physiological grounds.

The meeting was then adjourned.

REMARKS ON THE FOREGOING PAPER.

BY THE REV. R. WATTS, D.D., LL.D.

I am much interested in this paper, but have no time for communicating any special remarks upon it. I cannot, as a theist, accept the position that mind cannot act on matter directly. If it cannot act on it directly, it cannot act on it at all, for there can be no mediatory agency which is not either mind or matter. If mind has created matter, it is idle to allege that mind cannot act on its own offspring. To deny that mind cannot act on matter is all one, therefore, with the denial of the creation of matter. Besides, on philosophical principles, I must reject the doctrine that mind cannot put forth energy. The ultimate court of appeal on all such questions is consciousness, and the testimony of consciousness is, that our *ego*, is a fountain of energy potent to the excitation of energy in the material organism we inhabit, and, through it, in the material of our environment. I hold by the Edwardian doctrine of the will, the fundamental principle of which is that the law of causality holds sway within the realm of mind.

THE AUTHOR'S REPLY.

The Honorary Secretary has kindly sent me the report of the discussion on my paper, and Prof. Watts's observations.

Prof. Watts has altogether mistaken my meaning. I have written the paper in order to remove the difficulty which the dynamical philosophy has raised in the way of believing that mind can act on matter. I believe in such action as firmly as he does, though on different grounds. But when he maintains, as a dictum of consciousness from which there is no appeal, that the will "is a fountain of energy, potent to the excitation of energy in the

material organism," I reply that this proves no more than does the dictum of consciousness that the earth stands still. Astronomical science proves that the earth moves, and dynamical science proves that the will can only transform the energy due to the oxidation of the food. To deny this is to deny the conservation of energy. My purpose has been to show that the will may be able to direct energy, and thereby to be an agent in the universe of matter, without having any power to originate energy. If this is true, there is room in the physical universe for moral freedom; though on any theory moral freedom can exist only within narrow limits. Prof. Watts says, quoting apparently from Edwards, that "the law of causation holds sway within the realm of mind." If this only means that the relation of cause and effect exists within the realm of mind, it appears to me not only true, but the fundamental datum of all reasoning on the subject; but my purpose is to show that this does not prove the doctrines of necessarianism and automatism.

Mr. Lane-Fox, if I understand him, thinks any attempt to treat subjects belonging to the moral sciences from the physical point of view is almost necessarily "more or less nonsensical." If my reasoning is sound it must prove itself, but I will remark that the tendency of all modern science is to obliterate the supposed boundaries of the several sciences. Dynamics is now but an application of mathematics, and physics of dynamics; and we cannot tell what possibilities of knowledge would be shut out if we were to acquiesce in the dictum that the physical and the mental sciences can throw no light on each other. It would be a hopeless state of things if, on such a question as this of moral freedom, the two parties were simply to face each other, the one saying "Consciousness affirms it, and we care not what may be said against it;" and the other, "Science disproves it, and we care not what may be said in its favour." Surely it is better to seek for some way of harmonising. An able writer once contemptuously called me a harmoniser, but I am proud of the name.

Professor Odell questions my opinion, that mind has been evolved out of sensation. I think that, as a matter of fact, this is almost as certain as that the organism has been developed out of a minute mass of protoplasm; but I have written my work on *Habit and Intelligence* to prove that there is an element in all intelligence which is not due to any unintelligent materials or forces.

I agree with almost all that Dr. Gregory has said. I do not wish

to be thought insensible to the spiritual side of truth, because my immediate subject does not lead to it. I have, in this paper, only endeavoured to reply to the argument of materialism against moral freedom, with arguments of a kind to which materialists are open. My statement of the arguments of a spiritual philosophy in favour of moral freedom, is to be found in my work on *The Scientific Bases of Faith*.

ORDINARY MEETING, JUNE 18, 1888.

THE PRESIDENT, PROFESSOR G. G. STOKES, D.C.L., P.R.S.,
IN THE CHAIR.

The Minutes of the last meeting were read and confirmed, and the following Elections were announced:—

LIFE MEMBERS.—Francis Sharp Powell, Esq., M.P.; Rev. G. F. Whidborne, M.A., Camb., F.G.S., London.

MEMBERS.—General Sir A. Cotton, R.E., K.C.S.I., Dorking; Professor W. G. Anderson, F.S.S. and G., United States; T. M. Harvey, Esq., London; Rev. C. B. Hutchinson, M.A., London; Rev. T. E. Lindsay, B.A., F.C.S., F.G.S., F.R.G.S., London; Rev. Principal Parker, D.D., Manchester; Carr Stephen, Esq., M.A., E.I.C.S., London.

ASSOCIATES.—Sir M. Monier-Williams, K.C.I.E., Oxford; Professor A. Agassiz, United States; R. Ashby, Esq., London; T. Brown, Esq., London; The Reverends A. L. Blackford, D.D., A.B., A.M., Brazil; the Hon. C. F. Cross, M.A., Camb., Birkenhead; H. Dawson, M.A., Luton; J. O. Fellowes, London; C. J. Goodhart, M.A., Kent; J. H. Honeyburne, M.A., M.R.A.S., Liverpool; J. Kerr, Glasgow; S. T. Lowrie, A.M., D.D., United States; H. Simon, London; H. A. C. Tomkins, Bath; W. T. Warburton, M.A., Camb., Liverpool; E. N. Willson, A.K.C., London; J. Howard, Esq., M.P., London; R. H. Lamborne, Esq., Ph. D., United States; J. F. Mellor, Esq., J.P., S. Australia; J. R. Sturgis, Esq., M.A., Oxon, London; Principal A. Vinter, M.A., LL.M., Leeds; Miss G. Lea, Kent; Miss A. Voile, London.

HON. CORRESPONDING MEMBERS.—Colonel A. R. Clarke, R.E., F.R.S., Redhill; Hon. J. M. Gregory, Ex-President, Illinois University, United States; Professor T. McK. Hughes, F.G.S., Cambridge; Rev. R. Watts, D.D., Belfast.

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

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| "Long Ago," by Rev. E. F. Burr, D.D. | <i>From the Author.</i> |
| "Jephson," by Rev. H. H. Dobney. | ,, <i>Rev. H. Simon.</i> |
| "Preces Veterum," by J. F. France, Esq. | ,, <i>the Author.</i> |

The presentation of the Quarterly Journals of the Royal Society, the Royal Colonial Institute, the Royal Geographical Society, the Royal Institution, the Royal United Service Institution, the Geological Society, and many other Societies with which the Victoria Institute exchanges its Transactions having been duly acknowledged ;—

The following paper was then read by the author :—

THE BOTANICAL GEOGRAPHY OF SYRIA AND PALESTINE.—By Rev. GEORGE E. POST, M.D., Professor of Surgery and Diseases of the Eye and Ear, in the Syrian Protestant College at Beirût, Syria.

THE natural boundary of Syria to the north is the range of Akherdagh, with its continuous range Kanlydagh to the east. These ranges rise like a gigantic yellow wall, trending west-south-west, from the thirty-eighth degree of north latitude towards the Gulf of Iskanderûn. The eastern peak, above Kerhân, rises 8,400 ft. above the sea, while the western, above Marash, is only 6,400 ft. high. But, although this range shuts out the view of the mountain systems of Asia Minor from the side of the Syrian table-land, the waters of its southern as well as its northern slope flow into the Pyramus (the Jihân).

A plain two hours (six miles) in breadth separates the western end of Akherdagh from the northern end of Amanus. This range is no longer known by a single name, as in ancient times, but each peak, with its surrounding spurs, bears a

separate name. The range trends south-south-west, about one hundred miles, and ends in the mass of *Jebel Mûsa*, which overhangs the sea at its western extremity, forming the bold headland of *Ras-el-Khanzîr* (the Boar's Head), which constitutes the eastern pillar of the entrance to the Gulf of *Iskanderûn*. The highest peaks of the *Amanus* chain range from 5,600 to 8,000 feet.

Through the valley which separates *Jebel Mûsa* from *Mount Cassius* (*El-Jebel-el-'Aqra*) flows the *Orontes*, which, after its long course to the north, turns sharply to the west-south-west above *Antioch*, and rolls with a swift turbid stream to the sea.

Mount Cassius is an isolated cone, 6,500 feet high, but, from its eastern base, a low range runs parallel to the course of the *Orontes* until it abuts against the northern end of the *Nusairy Mountains*.

The *Nusairy* chain trends nearly due south, and, after a course of over 100 miles, ends in the latitude of *Hums* (*Emessa*), in the valley which separates it from *Lebanon*. Through this valley, which is about fifteen miles broad, flows the *Nahr-el-Kebîr* (*Eleutherus*). The highest peaks of the *Nusairy* chain do not much exceed 3,500 feet above the sea.

The chain of *Lebanon* follows in general a south-south-west course, to a point midway between *Sidon* and *Tyre*, where the *Qasimiyah*, the continuation of the *Litâny* (*Leontes*), breaks through the southern spurs of the range and separates them from the hill country of *Galilee*. The length of *Lebanon* is about 120 miles, and its highest peaks range from 6,000 to 10,000 feet above the sea.

The hill country of *Upper Galilee* is a tableland, about 2,500 feet above the sea, from the general level of which rises the peak of *Yermuk* to a height of 3,900 feet. The tableland of *Lower Galilee* is only a few hundred feet above the sea, and the peaks of *Tabor* and *Little Hermon* 1,700 feet.

The valley of *Esdraëlon* separates the plateau of *Galilee* from that of *Samaria*, and the chain of *Carmel*, which bounds it to the south, abuts against the tableland of *Samaria* as that of *Cassius* does against the *Nusairy* chain. The highest point of *Carmel* is 1,728 feet above the sea.

The plateau of *Samaria* and *Judæa* is broken by the few marked peaks of *Ebal*, *Gerizim*, and *Olivet*. The general level is from 2,500 feet to 3,000 feet above the sea. South of *Hebron* this tableland breaks away by successive steps to the *Tih*, which desert plain is intersected by several low ranges of chalk hills, and ends in a gigantic V-shaped

bastion, the escarpment of which overhangs the sandy plain of Debbet-er-Ramleh, which separates it from the range of Sinai.

Thus it will be seen that a series of mountain chains extends from two hours south of Marash to Sinai. The course of this series is, in general, north and south, nearly parallel with the coast. In some places, as at Ras-el-Khanzîr, El-Museiliha (the Cape of the Divine Countenance), the Ladder of Tyre, and Carmel, the mountains dip directly into the sea. In others they recede, leaving a more or less broad alluvial plain, which is known as the littoral. The most noteworthy of these maritime plains are those of Lattakia, 'Akkar, Beirût, Sidon, Acre, and Philistia. There cross this series deep river valleys at Suadiyah, En-Nahr-el-Kebîr, El-Qasimîyeh, and Esdraëlon, dividing it into the before-mentioned separate chains of Amanus, Cassius, and the Nusairy Mountains, Lebanon, and Galilee, with the continuous range of Samaria, Judæa, and the Tîh. The loftiest peaks of the series are in Lebanon, then in Amanus, then in Cassius. The general height of the Nusairy chain is about equal to that of Palestine.

On the eastern flank of this great mountain series is a remarkable cleft, extending from near the northern limits of Syria, a little to the west of Killis, to the head of the Gulf of 'Aqabah. This cleft is at first a depression in the uplands north of the bend of the Orontes, through which flows a tributary to that stream. Following up the Orontes towards its source, the cleft at first narrows to a deep gorge, then broadens out into a wide plain between the Nusairy chain and that of the low hills which separate it from the Syrian desert. At the latitude of Hums, where the east and west valley of the Nahr-el-Kebîr crosses it, there is no eastern ridge to mark the boundary of the north and south valley, which is here continuous with the plain to the east. This meeting place of the four arms of a great cross is the "Entrance of Hamath" (Num. xxxiv. 8; Josh xiii. 5, &c.).

A few miles south of Hums, however, the cleft becomes a broad elevated valley, Coelesyria, between Lebanon and Antilebanon. As a geographical feature it is much more marked here owing to the great height of the mountain ridges which shut it in on either hand. For, whereas the Nusairy chain rises but 1,000 to 1,500 feet above the valley of the Orontes between Hums and Hamath, and the eastern ridge is only a series of undulations on the plain, Lebanon and Hermon rise from 4,000 to 7,000 feet above Coelesyria, which is, doubtless, the bed of an ancient lake, which may have had two outlets, one by the Orontes to the north and one

by the Leontes to the south. The highest point of Coelesyria is about 3,000 feet above the sea.

At the latitude where the Leontes makes its sudden bend to the west to empty into the Mediterranean, the Hasbâni, the northernmost of the sources of the Jordan, takes its rise, and the strange trough of the Jordan begins. At the Huleh it has reached the level of 120 feet above the sea; at Tiberias it is 600 feet below the Mediterranean; and at the Dead Sea 1,292 feet. From the southern end of the Dead Sea the bottom of the trough rises at first by a cliff 50 to 150 feet high, and then gradually until at a point about forty miles from El 'Aqabah it reaches its greatest height above the sea, and then descends again to the Gulf of 'Aqabah.

The eastern boundary of the great cleft is formed first by the range which bounds the water basin of the Orontes, in the neighbourhood of Killis; then by the low mound-like hills which shut in the valley of the Orontes, until near the latitude of Hums; then by the chain of Anti-lebanon, which is about one hundred miles long, and ends in Hermon, a peak, 9,500 feet in height. Southward of Hermon, a spur sinks gradually to the level of the Jawalân, breaking up, before it reaches its last peak of Tel-el-Faras, into a chain of conical mound-like hills (or tels), which form a striking feature in the view from the high ground of the Leja. From Tel-el-Faras there is a break in the continuity of the mountain system for about thirty miles. Through this gap flow the Mandhûr and its tributaries, draining the plain of Haurân and Jawalân. This plain extends back for forty miles to Jebel-ed-Durûz (Alsadamus, or the Hill of Bashan), a volcanic range about equal in length to the gap between Tel-el-Faras and Jebel 'Ajlûn, and which appears like a segment of the great mountain wall of the Jordan valley, set back forty miles to the east of the backbone of the range. The highest peak of this range is Jebel-Qulêb, 5,400 feet above the sea.

The range of 'Ajlûn and Gilead rises to the south of the valley of the Mandhûr, culminates in the peaks of Er-Rabadh and Hosha', about 4,000 feet above the sea, and then sinks gradually to the level of the western border of the plateau of Moab, 2,800 feet above the sea, and passing southward into the district known as el-Jebel (Mount Seir), culminates again in Mount Hor, 5,000 feet above the sea. This range ends in the Wadi-el-Ithm, opposite the head of the Gulf of 'Aqabah. It is composed of igneous rocks, overlaid by sandstone and limestone, as in Sinai. It is well watered, and in places fertile.

From the northernmost point of the Jebel-ed-Durûz, a range of low tels extends northward to nearly the latitude of Damascus. A similar range extends north-east from Damascus toward Palmyra. Still another bounds the table-lands of Gilead and Moab to the east. The drainage of the eastern flanks of this watershed flows into the Syrian desert, and is lost there. Far away to the east is a range called the Dhohr-el-Barriyah (the Backbone of the Desert), which constitutes the eastern limit of the Syrian wilderness. The waters from its western flank flow into the desert, and are lost there. Its eastern drainage reaches the Euphrates.

These marked peculiarities of the physical geography of the country have caused a diversity of climate, meteorology, and life history quite unexampled in a territory of equal extent.

For botanical research it is convenient to divide Syria and Palestine into ten regions. I. The Littoral. II. The range of Akherdagh. III. Amanus. IV. Cassius. V. The Nusairy Chain. VI. Lebanon and Antilebanon. VII. The Table-lands of Palestine, east and west of the Jordan. VIII. The Trough of the Jordan. IX. The Southern and Eastern Deserts. X. The Central and Northern Plains.

It is furthermore convenient to indicate the following divisions, according to elevation and surface:—I. The Littoral Plain. II. The Mountains from 400 to 4,000 feet. III. Subalpine and Alpine regions. IV. The sunken Trough of the Jordan, Dead Sea, and 'Arabah. V. The Deserts, where rain is rare and capricious. VI. The Plains of the centre and north.

These latter divisions are indicated in the accompanying map by different colours, while the former are indicated by the usual geographical symbols and names.

Before proceeding to note the special peculiarities of the ten regions above indicated, it will be well to examine the general characteristics of the botany of Syria and Palestine. We will note the following points:—

1. *The large Number of Species in Proportion to the Geographical Extent of the Country.*—The work of preparation of the flora, on which the author is now engaged, is not yet sufficiently advanced to give accurately the number of species. They are, certainly, however, not less than 3,000 of phænogamous plants, and Horsetails, Ferns, and Clubmosses,—probably more, in a territory containing about 50,000 square miles. These species are distributed through one hundred and seventeen orders, *none* of which is peculiar to this country. Of the 850 genera represented, *only three*,—*Nasturtiopsis*, *Astoma*, and

Brocchia,—are peculiar to our region, and each of these has but a single species.

The large number of species is attributable to the extremely varied surface of the country. The highest mountains attain an elevation of over 10,000 feet, and have an Alpine flora of great variety and interest. The deep trough of the Jordan valley, Dead Sea, and 'Arabah, reaches a depression of 1,292 feet below the Mediterranean, with a climate like that of Nubia and Northern India. About twenty-five species of plants grow in this torrid valley and the wadis which debouche into it, which are not found again until we reach distant regions in more southerly latitudes. The great table-lands east of the parallel chains of mountains stretch half-way to Mesopotamia, and swell, by a large number of species, the wealth of the flora. It is safe to say that no territory of equal extent has such a diversity of surface, climate, and rainfall. On the seaward face of Lebanon the rainfall is from 30 to 50 inches a year, nearly all of it being between December 1 and March 15. On the eastern table-land it is probably little more than half as much. In the desert of the Tih, it sometimes fails entirely, and is always very small. In the wooded districts of the Amanus and Taurus it is distributed over a longer period, and comes in less violent floods.

The considerable number of orders arises from the contact of our district with the floras of the three continents, which causes it to share some of the characteristics of them all, and to deprive it of those salient features which characterise the centrifugal floras of the distant portions of those continents. Thus the flora of Southern Europe overlaps Northern Syria, that of Northern Africa the Tih and adjacent deserts, while the great plains borrow their special botanical physiognomy from the vast regions drained by the Euphrates and Tigris.

Although bounded on the north by a spur of the Taurus, yet such is the direction of the valleys of the Seihûn, the Pyramus, and the Euphrates, that they furnish channels down which the northern flora may be said to pour through the mountains about Aintab and Marash, and along the Amanus chain. No continuous east and west Alpine chain like that of the Pyrenees, or the Caucasus, or the Himalayas opposes an impassable barrier to the species on either side. Still less is there any natural barrier between the great plains of Mesopotamia and the Syrian table-land. The low range of the Dhohr-el-Barriyah is barely a watershed, and in no sense a botanical limit. On the side of Egypt the broad isthmus of Suez gives unrestrained access to the plants of North-Eastern Africa. Hence the desert types of the Tih are to a large

extent the same as those of the Egyptian and northern Arabian desert, while the flora of the Syrian desert is an extension of that of Central and Southern Arabia.

The effect of a nearly, though not quite a continuous chain of mountains, even when they are not all Alpine in height, in limiting the diffusion of a flora, is well exemplified in the case of the great mountain series of Amanus, Cassius, the Nusairy chain, Lebanon, and the mountains of Palestine, which separate the narrow strip of coast from the eastern plains in the north, and the longitudinal trough of the Jordan in the south. The difference between the flora of the littoral plain and lower seaward slopes of the coast range and that of the interior is very striking. On the other hand Coelesyria, although bounded on either hand by lofty mountain ranges, yet, through its continuity northward with the tableland of northern Syria, shares the botanical characteristics of that region. Could we imagine a high range of mountains 100 miles east of the Antilebanon series, and shutting off Western Syria from Akherdagh to the Red Sea, with no broad east and west gaps to favour contact, the flora of the Syrian table-land would probably differ as much from that of Mesopotamia as does that of Afghanistan and Beloochistan. And were there a similar barrier across the Isthmus of Suez, and a continuous east and west chain dividing Syria from Asia Minor, we might, instead of three, have thirty genera peculiar to our district.

2. A notable peculiarity of our region is *the small number of Ferns*, only fourteen genera and but twenty species. A similar peculiarity, arising from the general dryness of the climate, is *the small number of Orchidæ*, only eight genera and thirty species, and the absence of the more showy plants of the order.

3. On the other hand, among the striking peculiarities of the Syrian flora is *the large number of odorous plants* distributed through a considerable number of families, but especially in the Rutaceæ, Compositæ, and Labiatæ.

4. A further peculiarity is *the very great number of thorny and prickly plants*. Examples of these are *Paliurus aculeatus*, Lam., several species of *Rhamnus* and *Zizyphus*, *Calycotome villosa*, Vahl., a host of species of *Astragalus*, *Onobrychis*, several *Acacias*, *Poterium spinosum*, L.,* the *Eryngiums*,

* Hundreds of square miles of the hill country are covered with this shrub, insomuch that a district on the eastern flank of Hermon is called Aqlim-el-Billân (*i.e.*, the district of the *Poterium spinosum*). The bushes

many Compositæ, the Acantholimons, Atraphaxis, and scores of others. So pronounced is this peculiarity that it is a great obstacle to the collector, who is perplexed to know how to deal with the refractory spines of such species as *Balanites Ægyptiaca*, *Del.*, *Astragalus deinacanthus*, *Boiss.*, *Astragalus Hermoneus*, *Boiss.*, *Acacia Seyal*, *Del.*, and a host of others.

Syria and Palestine are abundantly supplied with ubiquists. The appended list includes those which are found everywhere except in the Alpine regions, but especially in the neighbourhood of human habitations and along roadsides. It is merely illustrative but not exhaustive.

<i>Ranunculus muricatus</i> , <i>L.</i>	<i>Erigeron Canadense</i> , <i>L.</i>
<i>Capsella bursa-pastoris</i> , <i>L.</i>	<i>Maruta cotula</i> , <i>L.</i>
<i>Senebiera coronopus</i> , <i>D.C.</i>	<i>Filago Germanica</i> , <i>L.</i>
<i>Sisymbrium officinale</i> , <i>Scop.</i>	<i>Centaurea Cyanus</i> , <i>L.</i>
<i>Sinapis alba</i> , <i>L.</i>	" <i>Calcitrapa</i> , <i>L.</i>
" <i>arvensis</i> , <i>L.</i>	<i>Cichorium Intybus</i> , <i>L.</i>
" <i>nigra</i> , <i>L.</i>	<i>Sonchus oleraceus</i> , <i>L.</i>
<i>Raphanus Raphanistrum</i> , <i>L.</i>	" <i>asper</i> , <i>Vill.</i>
<i>Vaccaria vulgaris</i> , <i>Host.</i>	<i>Anagallis arvensis</i> , <i>L.</i>
<i>Silene inflata</i> , <i>Smith.</i>	<i>Linaria Elatine</i> , <i>Mill.</i>
<i>Stellaria media</i> , <i>L.</i>	<i>Antirrhinum Orontium</i> , <i>L.</i>
<i>Cerastium vulgatum</i> , <i>L.</i>	<i>Veronica arvensis</i> , <i>L.</i>
" <i>viscosum</i> , <i>L.</i>	" <i>agrestis</i> , <i>L.</i>
<i>Sagina apetala</i> , <i>L.</i>	" <i>Buxbaumii</i> , <i>Ten.</i>
<i>Spergularia rubra</i> , <i>Pers.</i>	" <i>hederæfolia</i> , <i>L.</i>
<i>Spergula arvensis</i> , <i>L.</i>	<i>Verbena officinalis</i> , <i>L.</i>
<i>Portulaca oleracea</i> , <i>L.</i>	<i>Brunella vulgaris</i> , <i>L.</i>
<i>Malva rotundifolia</i> , <i>L.</i>	<i>Marrubium vulgare</i> , <i>L.</i>
" <i>sylvestris</i> , <i>L.</i>	<i>Lamium amplexicaule</i> , <i>L.</i>
<i>Geranium Robertianum</i> , <i>L.</i>	" <i>purpureum</i> , <i>L.</i>
<i>Erodium cicutarium</i> , <i>L'Her</i>	<i>Ballota nigra</i> , <i>L.</i>
<i>Trifolium procumbens</i> , <i>L.</i>	<i>Lithospermum arvense</i> , <i>L.</i>
" <i>agrarium</i> , <i>L.</i>	<i>Heliotropium Europæum</i> , <i>L.</i>
<i>Melilotus parviflora</i> , <i>Desf.</i>	<i>Solanum nigrum</i> , <i>L.</i>
<i>Medicago sativa</i> , <i>L.</i>	" <i>Dulcamara</i> , <i>L.</i>
" <i>denticulata</i> , <i>Willd.</i>	<i>Datura stramonium</i> , <i>L.</i>
" <i>coronata</i> , <i>Lam.</i> , and others of this genus.	<i>Erythraea ramosissima</i> , <i>Pers.</i>
<i>Vicia sativa</i> , <i>L.</i> , extensively cul- tivated as a fodder plant under the name of Baqiah.	" <i>spicata</i> , <i>Pers.</i>
<i>Conium maculatum</i> , <i>L.</i>	<i>Chenopodium murale</i> , <i>L.</i>
<i>Asperula arvensis</i> , <i>L.</i>	" <i>album</i> , <i>L.</i>
<i>Sherardia arvensis</i> , <i>L.</i>	" <i>opulifolium</i> , <i>L.</i>
<i>Galium aparine</i> , <i>L.</i>	" <i>ambrosioides</i> , <i>L.</i>
<i>Rubia tinctoria</i> , <i>L.</i>	<i>Amarantus hypochondriacus</i> , <i>L.</i>
	" <i>retroflexus</i> , <i>L.</i>
	" <i>chlorostachys</i> , <i>Willd.</i>
	<i>Polygonum Persicaria</i> , <i>L.</i>

are a regular source of fuel for use in the public ovens and limekilns. Stacks of it are collected in the neighbourhood of a kiln, often scattered over a space of half a mile square, and form a remarkable feature in the landscape.

Polygonum Hydropiper, <i>L.</i>	Cynodon dactylon, <i>Pers.</i>
" aviculare, <i>L.</i>	Poa annua, <i>L.</i>
Rumex crispus, <i>L.</i>	" trivialis, <i>L.</i>
" obtusifolius, <i>L.</i>	Eragrostis poaeoides, <i>Beauv.</i>
" conglomeratus, <i>Murr.</i>	Briza maxima, <i>L.</i>
" acetosella, <i>L.</i>	" minima, <i>L.</i>
Mercurialis annuus, <i>L.</i>	Festuca ovina, <i>L.</i>
Urtica urens, <i>L.</i>	Bromus mollis, <i>L.</i>
Salix alba, <i>L.</i>	" sterilis, <i>L.</i>
Lemna minor, <i>L.</i>	Lolium perenne, <i>L.</i>
Alisma plantago, <i>L.</i>	" temulentum, <i>L.</i>
Juncus bufonius, <i>L.</i>	Phalaris Canariensis, <i>L.</i>
Cyperus flavescens, <i>L.</i>	Panicum sanguinale, <i>L.</i>
" rotundus, <i>L.</i>	Setaria verticillata, <i>Beauv.</i>
Scirpus maritimus, <i>L.</i>	" glauca, <i>Beauv.</i>
Polypogon Monspelienis, <i>Desf.</i>	" viridis, <i>Beauv.</i>
Agrostis alba, <i>L.</i>	

With these remarks on the general botany of Syria and Palestine, we will proceed to the consideration of each of the ten regions above indicated.

I. *The Littoral*.—This narrow strip of plain is 400 miles long, by a breadth varying from zero to fifteen or twenty miles. It commences in the plain of Issus at the head of the Gulf of Iskanderûn, which is continuous with the Cilician Littoral. As we pass southward the Plain of Issus narrows from about ten miles at Tchâi Kôï to a sheer precipice overhanging the sea at the famous "Syrian Gates," by the so-called Qal'at Markes (in Turkish, Kislarkalessi). After widening into the small plain of Iskanderûn, it again ends where sea and mountain touch at the bold headland of Ras-el-Khazîr. It reappears at the mouth of the Orontes, and vanishes where the steep sides of Cassius plunge into the sea. Twenty miles north of Lattakia begins a plain, varying from twenty miles in breadth to one, and ending in the Museilihah (Theoprosopon, or the Cape of the Divine Countenance), a bold headland which juts into the sea north of Batrûn (Botrys). For twenty-five miles south from this headland Lebanon approaches quite close to the sea, and does not recede so as to form a broad plain again until a couple of miles south of the Dog River, at the pumping station of the Beirût Water Works Company. The plain of Beirût is about four miles wide at its broadest part, and extends about six miles southward to the Ghadîr, where it becomes reduced to a narrow strip or a mere beach, until an hour north of Sidon. The plain of Sidon is narrower than that of Beirût. From its southern end to Tyre the strip of coast is again very narrow, and ends in the Ladder of Tyre and other precipitous breaks of the mountains into the sea. Then comes the broad plain

of Acre, extending inland into the plain of Esdraëlon, and ending at the south in the headland of Mount Carmel. From Carmel the Philistine plain broadens as it goes southward, until it is merged in the rolling dunes of the Northern Tih.

The Museiliah divides this littoral region into two botanical districts. South of it flourish the palm, the banana, and the sugar-cane. They grow north of this cape, but do not thrive so well as to the southward. The plants of the littoral resemble those of the coasts of the eastern Mediterranean, far more than do the plants of the mountains those of the mountainous regions of Asia Minor, Greece, and Italy. The following list illustrates, but by no means exhausts, the resemblances :—

<i>Clematis Flammula</i> , L.	<i>Medicago littoralis</i> , Rohde.
" <i>vitalba</i> , L.	<i>Lotus ornithopodoides</i> , L.
<i>Anemone Coronaria</i> , L.	<i>Lathyrus Aphaca</i> , L.
<i>Papaver Rhœas</i> , L.	<i>Ceratonia Siliqua</i> , L.
<i>Hypecoum procumbens</i> , L.	<i>Ammi majus</i> , L.
" " var. <i>grandiflorum</i> .	<i>Scandix Pecten-Veneris</i> , L.
<i>Silene Gallica</i> , L.	<i>Ambrosia maritima</i> , L.
" <i>nocturna</i> , L.	<i>Diotis maritima</i> , L.
" <i>bipartita</i> , Desf.	<i>Erythraea maritima</i> , Willd.
" <i>sedoides</i> , Jacq.	<i>Ipomœa littoralis</i> , L.
<i>Alsine tenuifolia</i> , L.	" <i>sagittata</i> , Desf.
<i>Paronychia argentea</i> , Lam.	<i>Anchusa aggregata</i> , Lehm.
<i>Hypericum perforatum</i> , L.	<i>Linaria lanigera</i> , Desf.
<i>Linum Gallicum</i> , L.	<i>Tragus racemosus</i> , L.

Many of the plants of this region grow also in the lower ranges of mountains, especially the maritime chain.

A few species have as yet not been found except in this district. They are :—

<i>Matthiola crassifolia</i> , Boiss. et Gaill.	<i>Campanula sulphurea</i> , Boiss.
<i>Tamarix Syriaca</i> , Boiss.	" <i>Sidoniensis</i> , Boiss. et Bl.
<i>Silene Palæstina</i> , Boiss.	<i>Nonnea Philistæa</i> , Boiss.
<i>Trigonella cylindracea</i> , Desf.	<i>Verbascum Berytheum</i> , Boiss.
<i>Trifolium comosum</i> , Labill.	[<i>V. Blancheanum</i> , Boiss., is to be
<i>Tetragonolobus Palæstinus</i> , Boiss.	regarded as a variety of this
[This species I think to be only a	species.]
variety of <i>T. purpureus</i> , L.]	<i>Euphorbia Berythea</i> , Boiss.
<i>Astragalus Berytheus</i> , Boiss. et M.	<i>Allium papillare</i> , Boiss.
<i>Vicia galeata</i> , Boiss.	<i>Scleropoa Philistæa</i> , Boiss.
<i>Onopordon cynarocephalum</i> , Boiss.	
et Bl.	
<i>Anthemis Tripolitana</i> , Boiss. et Bl.	[A few species peculiar to this
<i>Centaurea araneosa</i> , Boiss.	region may have been overlooked in
	the foregoing list.]

The most abundant and showy of the wild flowers of this region are :—*Anemone coronaria*, L., with scarlet, blue,

lilac, and occasionally whitish flowers,—this plant flowers from December to April; *Ranunculus Asiaticus*, *L.*, with crimson, yellow, and white blossoms, often three or four inches broad,—it flowers in March and April; *Papaver Rhœas*, *L.*, var. *Syriacum*, *Boiss.*, with brilliant crimson flowers as large as the last, with a deep blackish spot at the base of the petals,—it flowers from March to May, and often covers a sandy field with a mass of gorgeous colour; *Silene Atocion*, *Murr.*, with pretty pink flowers, often growing in large quantities, so as to colour a considerable area,—it flowers from February to May; *Chrysanthemum segetum*, *L.*, and *C. coronarium*, *L.*, with their showy yellow flowers, opening in April and May; *Specularia Speculum*, *L.*, with blue flowers, opening from March to May; *Gladiolus segetum*, *L.* and *G. Illyricus*, *Koch*, with bright pink blossoms, growing in spring time among the wheat; *Iris sisyriuchium*, *L.*, with blue flowers; *Asphodelus microcarpus*, *Vis.*, with inch-broad white flowers in showy panicles. All of these species are found in considerable abundance in the lower mountain ranges, especially the maritime chain.

Of native trees there are very few, principally *Pistacia Terebinthus*, *L.*, var. *Palæstina* (*P. Palæstina*, *Boiss.*); *Ficus sycomorus*, *L.*; *Alnus Orientalis*; *Salix alba*, *L.*; and *Salix fragilis*, *L.*

Large groves of mulberries, olives, figs, palms, and pines (*Pinus pinea*, *L.*) are planted at various points along the coast.

The most characteristic shrubs are *Calycotome villosa*, *L.*, with bright yellow flowers, in blossom from December to May; *Rhamnus Palæstina*, *Boiss.*; *Lonicera Etrusca*, *L.*; *Tamarix Pallasii*, *Vill.*; *Elæagnus hortensis*, *M.B.*; *Ephedra campylopoda*, *C.A.M.*; *Smilax aspera*, *L.*, var. *Mauretunica*, *Boiss.*; and of the larger grasses *Arundo Dorax*, *L.*; *Saccharum Ægyptiacum*, *W.*; all of which are found also in the lower mountains.

II. *The Range of Akherdagh.*—The most convenient point of access to this mountain from the south is Marash, a city of 30,000 people, situated in the lap of the mountain, about 2,500 feet above the sea. The Christian population of this town numbers about 10,000, of whom about 3,000 are Protestants. Around the base and on the lower slopes of Akherdagh are found *Delphinium sulphureum*, *Boiss. et Haussk.*; *Amygdalus Orientalis*, *Ait.*; *Echinophora Sibthorpii*, *Guss.*; *Euphorbia denticulata*, *Lam.*; *Rhamnus petiolaris*, *Boiss.*; *Convolvulus Germanicæ*, *Boiss. et Haussk.*; *Verbascum Germanicæ*, *Haussk.*; *Mespilus Germanica*, *L.*;

and other plants, either peculiar to this range, or indicating the transition to the flora of the Taurus.

As one rises on the shingly side of the mountain, and penetrates its mass through a broad valley channelled out of its southern flank, he meets with *Jasminum fruticans*, *L.*; *Nepeta leptantha*, *Boiss. et Haussknecht*; *Stachys Cretica*, *S. et Sm.*; *Cephalaria stellipilis*, *Boiss.* (common also in Lebanon); *Ferulago Blancheana*, *Post* (a fine species thus far not elsewhere found, 6 feet high, and with a panicle 18 inches long); *Cirsium Cataonicum*, *Boiss. et Haussk.* (not elsewhere found); *C. Afrum*, *Jacq.*; *Jurinea ramulosa*, *Boiss. et Haussk.*; *Centaurea Cataonica*, *Boiss. et Haussk.*; *Buplevrum Kurdicum*, *Boiss.*

As one rises to the higher regions of this mountain he unfolds a vast prospect to the southward, taking in the northern portion of the Amanus chain, the hill country toward Aintab, and that around the head of the Gulf of Iskanderûn, and the distant Cilician Taurus. Half-way up the mountain side, a few miles west of the road through the clove, are some scattered cedars of Lebanon, sadly lopped, and almost killed. A little before reaching the summit, in a meadow, 6,000 feet above the sea, inundated by winter rains and melting spring snows, I found *Heliotropium supinum*, *L.*, a great elevation for this species. A little higher up, *Astragalus stromatodes*, *Bunge*; *A. Kurdicus*, *Boiss.*; *Prangos Platyclæna*, *Boiss. et Haussk.*; *Cachrys goniocarpa*, *Boiss.*; *Cousinia foliosa*, *Boiss. et Haussk.* (peculiar); *Acantholimon Armenum*, *Boiss. et Huet.* Few or none of them found on the ranges to the south.

As the traveller rises to the summit of Akherdagh, a truly wonderful prospect stretches away to the north. Opposite is the towering cone of Berytdagh, the mountain on which is the town of Zeitûn, and beyond it range after range of the Taurus rolls away to the north like gigantic waves, a sea of mountains extending half across Asia Minor.

The summit of Akherdagh is so bare and dome-like, and has so few inequalities, that the wind sweeps it almost bare of snow, and the exposed drifts, notwithstanding an altitude (8,400 feet) at which they remain throughout the year on Lebanon, melt early in the summer. The shingly soil supports few plants, and a botanist must supplement the relatively scanty scientific reward of his exertions by the wonderful landscape which he has unveiled. The flora has been studied principally by Haussknecht, Boissier, and the author, whose results are embodied in the forthcoming flora of Syria. While the flora of the base and lower slopes of Akherdagh is exceedingly

rich, and exceptionally interesting as transitional from the northern plains to the system of the Taurus, that of the sub-Alpine and Alpine regions is meagre in comparison with that of Lebanon and Antilebanon.

Opposite Akherdagh, to the southward, and separated from it by the valley of the Ak-Su, is a low range known as Kapucham Dagh. This range is wooded, principally with *Pinus Halepensis*, Mill., from the Turkish word for which the range takes its name. In one of the ravines at the western foot of this range I discovered *Johrenia Porteri*, Post, with elliptical segments to the pinnatipartite leaves, and in a meadow near by collected *Ankyropetalum gypsophiloides*, Fenzl.

III. *The Range of Amanus* is a highly picturesque and beautiful mountain chain, chiefly characterised by the feature, almost unique for Syria, of extensive forests covering a large part of the mountain sides almost to the Alpine region. Most of the mountain peaks of this range are from 4,000 feet to 5,600 feet high. Only three,—Durbindagh, Banderasdagh, and Ziaretdagh,—are over 7,000 feet high. The writer has ascended only the latter, which is the northernmost of the range. The Amanus is cleft from north to south by the valley of the Dalé-Su, an affluent of the Ak-Su. After crossing the pass, 5,400 feet high, at Khotsch-Bel, the traveller descends the valley of the Durdikan-Su, which completes the longitudinal fissure of the range as far as Hassan Beyley, below which the range is single until its termination in Ras-el-Khanzîr and Jebel-Musa.

The forests of this range are composed mainly of *Pinus Halepensis*, Mill.; *Juniperus excelsa*, M. B.; *J. drupacea*, Labill; *Celtis Australis*, L.; *Quercus Cerris*, L.; *Q. coccifera*, L.; *Q. Libani*, Oliv.; *Q. Ægilops*, L.; *Q. Lusitanica*, Lam.; *Fraxinus excelsior*, L.; *Fagus sylvatica*, L.; *Corylus avellana*, L. (not before noted); *Carpinus Duinensis*, Scop.; *Cornus mas.*, L.; *Abies Cilicica*, Ant. et K. (new for Syria); *Taxus baccata*, L. (new for Syria); *Cupressus sempervirens*, L.; *Ostrya carpinifolia*, Scop.; *Salix alba*, L.; *S. fragilis*, L.; *Cedrus Libani*, L. The author noted large numbers of this noble tree (new for Amanus), from the latitude of Hassan Beyley, where one young tree was seen, to the northernmost peaks of the range, always at an elevation of not less than 4,000 feet. In some places, as Buyuk Hodhu, there are clumps and groves of them. On almost all these trees, and on many shrubs, there is a most extraordinary number and variety of galls. A specialist in this line of study would find much more to reward him in this range than in all the rest of Syria together.

Among the noteworthy plants of this region are :—

Alyssum samariferum, *Boiss. et Haussk.*, with large orbicular fruits, abundant in the central parts of the range; *Nigella Orientalis*, *L.*; *Euonymus latifolius*, *Scop.*; *Cytisus drepanolobus*, *Boiss.*; *Dorycnium Kotschyi*, *Boiss. et Reut.*; *D. Haussknechtii*, *Boiss.*; *Colutea arborescens*, *L.*; *Glycyrrhizopsis flavescens*, *Boiss.*; *Astragalus Amanus*, *Boiss.*; *A. ambiguus*, *Ky.*; *Vicia Cassubica*, *L.*; *Sanicula Europæa*, *L.*; *Heracleum Amanum*, *Boiss. et Ky.*; *Lactuca seticuspis*, *Boiss.*; *Cionura erecta*, *L.*; *Acantholimon laxiflorum*, *Boiss.*; *Loranthus Europæus*, *L.*; *Linaria Dalmatica*, *L.*

The following species are peculiar to this chain, and are, as will be seen, several of them new to science :—

Silene Porteri, *Post*; *Hypericum Doddsii*, *Post*; *H. Amanum*, *Boiss.*; *Æthionema spicatum*, *Post*; *Chærophyllum oligocarpum*, *Post*; *Ferulago Amani*, *Post*; *Scaligeria capillifolia*, *Post*; *Galium Tolosianum*, *Boiss. et Ky.*; *Ptosimopappus bracteatus*, *Boiss.*; *Centaurea arifolia*, *Boiss.*; *C. foliosa*, *Boiss. et Ky.*; *Verbascum Amanum*, *Boiss.*

It is quite probable that most or all of the species heretofore regarded as peculiar to Cassius will be found in Amanus, when it shall have been as well explored. The subalpine regions of Amanus are limited to the tops of the lower mountains, and the flanks of the three alpine summits alluded to above. They are wooded, especially on the sheltered eastern flanks of the mountains. Among their characteristic, although not peculiar, plants are :—

Papaver Caucasianum, *M.B.*; *Paronychia capitata*, *Koch.*; *Orobis grandiflorus*, *Boiss.*; *Galium Orientale*, *Boiss.*; *Scrophularia variegata*, *M.B.*; *Veronica Orientalis*, *Mill.*; *V. polifolia*, *Bth.*; *V. cinerea*, *Boiss. et Bal.*; *Salvia verbascifolia*, *M.B.*; *Scutellaria diffusa*, *Bth.*; *S. salviæfolia*, *Bth.*; *Marrubium faucidens*, *Boiss. et Bal.*; *Phlomis Armeniaca*, *Willd.*; *Asphodeline Taurica*, *Pall.*; *Allium calyptrotum*, *Boiss.*; *A. Cilicicum*, *Boiss.*; *A. Cassium*, *Boiss.*

The alpine peaks of Amanus are isolated cones with a small area, and steep,—often precipitous,—sides, on which little snow collects, and where it soon melts from its small bulk and complete exposure, leaving the naked rock with no source of moisture except the clouds. It results from this that the alpine flora of Amanus is far poorer than that of Lebanon, and mainly confined to low species growing in clefts of the rock.

IV. *Mount Cassius* is a naked limestone cone, rising about 4,000 feet above the wooded hills, which cover about 100 square miles to the south and north-east of its base. The most convenient point for the ascent of the cone is from Kessab, a large village containing an Armenian and a Protestant community. This village is about 2,600 feet above the sea. It is remarkable for the size and number of its walnut trees. In rising above the town one encounters such plants as *Alyssum Szowitzianum*, *F.* and *M.*; *Teucrium*

Chamædryas, *L.*; and other plants, growing on dry thin soil or in clefts of rocks. At 4,000 feet, on the patches of rich earth, are quantities of *Ferula meifolia*, *Fenzl.*, with ovate root-leaves a foot or eighteen inches long, dissected into innumerable setaceous divisions, and stem-leaves expanding at base into a horn-shaped sheath, which will often hold half a gill of water. The panicle of this species is a foot or eighteen inches long, with shiny golden flowers. It is one of the most striking field-plants of Syria. Higher up are a few scattered stunted trees of *Ostrya carpinifolia*, *Scop.*, and *Acer Monspessulanum*, *L.*, which constitute almost the sole arboretum of the cone. Of herbaceous plants, *Allium Cassium*, *Boiss.*; *Galium Orientale*, *Boiss.*; *Thymus Serpyllum*, *L.*; *Alsine juniperina*, *Fenzl.*; *Paronychia capitata*, *Koch.*; *Alyssum alpestre*, *L.*; *Anoplanthus coccineus*, *Marsch.*, may serve as specimens. At the very summit I found *Viola modesta*, *Fenzl.* On the whole, the botanical output of the cone is meagre; but the view is surpassingly grand, taking in the southern portion of the Amanus to the north, the whole range of the Nusairy mountains, including the wooded region lying between, and all northern Lebanon, and the Phœnician coast as far south as the Museilihah. In clear weather the mountains of Cyprus and the Taurus are also visible.

The wooded region of Cassius is so varied in surface and exposure that it is admirably adapted for the development of a rich and interesting flora. The most common trees are the same as those which constitute the forests of the Amanus, with the exception of the cedars, hemlocks, and beech. The following list of plants, many of them thus far found only in the woods of Cassius, but probably common also to the far less known Amanus, will show the botanical interest of this region:—

Carpoceras oxyceras, *Boiss.*
Fumana oligosperma, *Boiss. et Ky.*
Silene Cassia, *Boiss.*
Hypericum Cassium, *Boiss.*
Trifolium Cassium, *Boiss.*
Arenaria Cassia, *Boiss.*

Haplophyllum sylvaticum, *Boiss.*
Glycyrrhizopsis flavescens, *Boiss.*
Pyrethrum Cassium, *Boiss.*
Celsia pinetorum, *Boiss.*
Onosma Cassium, *Boiss.*

Besides these local species the woods and glades of Cassius abound in *Helleborus vesicarius*, *Auch.*, a species with globular capsules two inches in diameter; *Pæonia corallina*, *Retz.*, a very showy species with flowers three or four inches broad; *Hypericum scabrum*, *L.*, and *H. hyssopifolium*, *Vill.*, with showy corymbs and panicles; *Pelargonium Endlicherianum*, *Fenzl.*, with purplish showy flowers; *Dictamnus Fraxinella*,

Pers., with foliage of strong rutaceous odour, and a handsome raceme of lilac flowers; *Rhamnus Kurdica*, *Boiss.*, with edible berries as large as large currants; *Ferulago Cassia*, *Boiss.*; *Fontanesia phillyreoides*, *Labill.*, a shrub from four to ten feet high, with the aspect of a myrtle, but the key fruits of the ash family, and of which Cassius is the extreme southern habitat; *Heliotropium rotundifolium*, *Lieb.*; *Linaria genistifolia*, *L.*; *Origanum lævigatum*, *Boiss.*; *Orobanche Anatolica*, *Boiss. et Reut.*; *Sternbergia Fischeriana*, *Herb. Amar.*; *Notochlæna Marantæ*, *L.*

In the southern part of these woods is the farthest northern limit of *Fragaria vesca*, *L.* The transition from the flora of Cassius to that of Lebanon is striking, and as the flora of the Nusairy chain, as far as explored, closely resembles that of the lower regions of Lebanon, Mount Cassius constitutes a somewhat marked botanical centre, with its affinities in the direction of the northern rather than the southern chain.

The following is a somewhat incomplete list of the plants collected by the author during two journeys to the regions of Northern Syria, the first in June, covering the territory from Lattakia to Mount Cassius, Antioch, and along Amanus to Beilân; and the second in September from Beilân along Amanus to Marash and Akherdagh. It also includes a large number of plants collected by correspondents of the writer during the spring and early summer months. A considerable number of these species have not been heretofore noted in Northern Syria.

- Clematis cirrhosa*, *L.*, Marash.
- „ *vitalba*, *L.*, Marash, Amanus.
- Thalictrum minus*, *L.*, Amanus.
- Anemone blanda*, *Schott et Ky.*, Marash, Amanus.
- Adonis autumnalis*, *L.*
- „ *æstivalis*, *L.*, var. *squarrosa*, Marash.
- Ranunculus Sprunerianus*, *Boiss.*, Marash.
- „ *Damascenus*, *Boiss.*, Aintâb.
- „ *Cassius*, *Boiss.*, Kessab.
- „ *muricatus*, *L.*, common everywhere.
- Ceratocephalus falcatus*, *Pers.*, Marash.
- Helleborus vesicarius*, *Auch.*, Marash.
- Nigella stellaris*, *Boiss.*, Marash.
- „ *ciliaris*, *D.C.*, Marash.
- Delphinium axilliflorum*, *D.C.*, Marash.
- „ *sulphureum*, *Boiss. et Haussk.*, Marash.
- „ *Ithaburensis*, *Boiss.*, Amanus.
- „ *peregrinum*, *L.*, var. *laxum*, *Post.*
- Pæonia corallina*, *Retz*, Beilân.
- Leontice leontopetalum*, *L.*, Aintâb.
- Bongardia chrysogonum*, *L.*, Aintâb.
- Rœmeria hybrida*, *L.*, Amanus, Aintâb.
- Papaver Caucasianum*, *M.B.*, Amanus, Akherdagh.

- Papaver somniferum*, *L.*, Aintáb.
 " *rheas*, *L.*, general.
Glaucium luteum, *Scop.*, Coast near Alexandretta.
 " *Aleppicum*, *Boiss.*, Aintáb.
Fumaria officinalis, *L.*, Marash.
 " *parviflora*, *Lam.*, Marash.
 " *Anatolica*, *Boiss.*, Aintáb.
Corydalis solida, *Sm.*, Marash, Aintáb.
Matthiola bicornis, *L.*
 " " var. *pumilis*, *Boiss.*, Marash.
 " " var. *brevicornis*, *Boiss.*, Marash.
Arabis Turrita, *L.*, Amanus.
 " *Aucheri*, *Boiss.*, Marash.
Nasturtium officinale, *R. Br.*, common.
Fibigia clypeata, *L.*, Akherdagh.
Alyssum sp., Marash.
 " *argenteum*, *With.*, Beilán.
 " *crenulatum*, *Boiss.*, Cassius, Amanus.
 " *samariferum*, *Boiss. et Haussk.*, Amanus.
 " *montanum*, *L.*, Amanus.
 " *eriphyllum*, *Boiss. et Haussk.*, Akherdagh.
 " *Szowitzianum*, *F. et M.*, Cassius.
 " *Cassium*, *Boiss.*, Kessáb.
 " *constellatum*, *Boiss.*, Amanus.
 " *alpestre*, *L.*, var. *genuinum*, *Boiss.*, Marash.
 " *præcox*, *Boiss.*, Beilán.
 " *strictum*, *Willd.*, Marash.
 " *campestre*, *L.*, var. *longipilosum*, *Post*, Marash.
Erophila minima, *C. A. M.*, Marash.
Hesperis matronalis, *L.*, var. *runcinata*, *Boiss.*, Amanus.
 " *Aintábica*, *Post*, Aintáb.
Sisymbrium Pannonicum, *L.*, Aintáb.
 " *Sophia*, *L.*, Aintáb.
Erysimum verrucosum, *Boiss.*, Marash.
 " *scabrum*, *D.C.*, Marash.
Conringia clavata, *Boiss.*, Aintáb.
Brassica (Hirschfeldia) adpressa, *Manch.*, Marash.
Sinapis arvensis, *L.*, var. *orientalis*, *Boiss.*, common.
Diplotaxis tenuifolia, *L.*, var. *integrifolia*, *Boiss.*, Antioch.
Lepidium Chalepense, *L.*, Marash.
 " *graminifolium*, *L.*, Antioch.
Aethionema longistylum, *Post*, Amanus.
 " *coridifolium*, *D.C.*, Beilán.
 " *spicatum*, *Post*, Amanus.
 " *cristatum*, *D.C.*, Aintáb.
 " *Buxbaumii*, *Fisch.*, Aintáb, Marash.
Clypeola Jonthlaspi, *L.*, Aintáb.
Thlaspi perfoliatum, *L.*, var. *stylatum*, *Post*, Kessab.
Carpoceras oxyceras, *Boiss.*, Cassius.
Peltaria angustifolia, *D.C.*, var. *grandiflora*, *Post*, Marash.
Iberis Taurica, *D.C.*, Cassius.
Isatis Aucheri, *Boiss.*, Marash.
 " *hispida*, *Post*, Akherdagh.
Crambe orientalis, *L.*, Aintáb.
Neslia paniculata, *L.*, Aintáb.
Erucaria Aleppica, *Gaertn.*, Aintáb.

- Ochthodium Ægyptiacum*, *L.*, Marash.
Raphanus sativus, *L.*, Aintâb.
Capparis spinosa, *L.*, var. *genuina*, *Boiss.*, Marash.
Reseda lutea, *L.*, Marash.
 " " var. *nutans*, *Boiss.*, Marash.
 " *luteola*, *L.*, Beilân.
Helianthemum salicifolium, *L.*, Aintâb.
 " *Kotschyanum*, *Boiss.*, Marash.
Fumana Arabica, *L.*, Marash, Aintâb.
 " *glutinosa*, *L.*, var. *viridis*, *Boiss.*, Kessab, Antioch.
 " *oligosperma*, *Boiss.*, Cassius.
Viola odorata, *L.*, Kessab.
 " *occulta*, *L.*, Kessab.
 " *modesta*, *Fenzl.*, Summit of Cassius.
Polygala pruinosa, *Boiss.*, Marash.
 " *supina*, *Schreb.*, Amanus.
 " *Anatolica*, *Boiss. et Held.*, Kessab.
Dianthus floribundus, *Boiss.*, Marash.
 " " var. *Kerhanicus*, *Post*, Kerhân.
 " *multipunctatus*, *Ser.*, Amanus.
 " *fimbriatus*, *M.B.*, Amanus.
 " *polycladus*, *Boiss.*, Marash, Amanus.
 " *pallens*, *Sibth.*, Beilân.
Ankyropetalum Reuteri, *Boiss. et Haussk.*, Kapu-Cham-Dagh.
Gypsophila Aucheri, *Boiss.*, Akherdagh.
 " *ortegioides*, *F. et M.*, Akherdagh.
Tunica pachygona, *F. et M.*, Aintâb.
Saponaria vaccaria, *L.*, Marash.
Melandrium ericalycinum, *Boiss.*, Amanus.
Silene Kotschyi, *Boiss.*, Aintâb.
 " *compacta*, *Horn*, Amanus.
 " *racemosa*, *Oth.*, Amanus.
 " *macrodonia*, *Boiss.*, Aintâb
 " *Atocion*, *Murr.*, Beilân.
 " *pruinosa*, *Boiss.*, Akherdagh.
 " *Porteri*, *Post.*, top of Ziaret-dagh and Akherdagh.
 " *commutata*, *Guss.*, Marash.
 " *swertiaefolia*, *Boiss.*, Cassius.
 " *gigantea*, *L.*, Amanus.
Githago gracilis, *Boiss.*, Marash.
 " *segetum*, *Desf.*, Marash.
Cerastium vulgatum, *L.*, common.
 " *dichotomum*, *L.*, common.
Holosteum liniflorum, *Stev.*, Marash.
 " *umbellatum*, *L.*, Aintâb.
Stellaria holostea, *L.*, Marash.
Alsine, *Sp.*, Marash.
 " *juniperina*, *Fenzl.*, Beilân.
 " *Smithii*, *Fenzl.*, Amanus.
 " *tenuifolia*, *L.*, Marash.
 " *macrosperma*, *J. A. Gay*, Akherdagh.
Buffonia macrosperma, *J. A. Gay*, Amanus, Akherdagh.
Queria Hispanica, *Læfl.*, Amanus.
Sagina apetala, *Boiss.*, Amanus.
Arenaria acerosa, *Boiss.*, Amanus.
Herniaria incana, *Lam.*, Amanus, Akherdagh.

- Habrosia spinuliflora*, *Ser.*, Aintáb.
Paronychia capitata, *Koch*, Bellán.
 argentea, *L.*, Antioch.
Tamarix Pallasii, *Desv.*, Aintáb.
Hypericum Doddsii, *Post*, Amanus.
 cuneatum, *Poir.*
 " " *var. maximum*, *Post*, Antioch.
 " *scabrum*, *L.*, Marash.
 " *læve*, *Boiss. et Haussk.*, Amanus.
 " *hyssopifolium*, *Vill.*, Marash, Amanus.
 " *helianthemoides*, *Spach.*, Akherdagh.
 " *tetrapterum*, *Fries*, Amanus.
 " *Amanum*, *Boiss.*, Cassius, Amanus.
 " *lanuginosum*, *Lam.*, Antioch.
 " *Cassium*, *Boiss.*, Kessab.
 " *crispum*, *L.*, Marash.
Alcea rufescens, *Boiss.*, Marash.
 " *lavateræflora*, *D. C.*, Marash.
Malva rotundifolia, *L.*, everywhere.
 " *var. perennans*, *Post*, top of Akherdagh.
Linum nodiflorum, *L.*, Marash.
 " *orientale*, *L.*, Marash.
 " *rigidissimum*, *Post*, Kapu-Cham-Dagh.
 " *pubescens*, *Russ.*, Marash, Amanus.
 " *usitatissimum*, *L.*, Amanus.
 " *angustifolium*, *Huds.*, Marash.
Geranium tuberosum, *L.*, Marash.
 " *asphodeloides*, *Willd.*, Marash.
 " *rotundifolium*, *L.*, everywhere.
 " *molle*, *L.*, everywhere.
Pelargonium Endlicherianum, *Fenzl.*, Amanus, Marash.
Erodium Romanum, *L.*, Marash.
 " *moschatum*, *L.*, common.
 " *cicutarium*, *L.*, common.
Ruta graveolens, *L.*, Marash.
Euonymus Europæus, *L.*, Marash.
 " *latifolius*, *Scop.*, Amanus.
Haplophyllum Buxbaumii, *Poir.*, Marash.
Dictamnus Fraxinella, *Pers.*, Cassius.
Peganum Harmala, *L.*, Aintáb.
Paliurus aculeatus, *Lam.*, Amanus, Marash.
Rhamnus Kurdica, *Boiss. et Hoh.*, Marash.
 " *Libanotica*, *Boiss.*, Amanus.
 " *punctata*, *Boiss.*, Amanus.
 " *Palæstina*, *Boiss.*, Amanus.
 " *petiolaris*, *Boiss.*, Amanus.
Vitis vinifera, *L.*, Amanus.
 " *orientalis*, *Lam.*, Antioch.
Acer Monspessulanum, *L.*, Cassius, Amanus.
 " *Hyrcanum*, *F. et M.*, Amanus.
Rhus Cotinus, *L.*, Cassius, Amanus.
 " *Coriaria*, *L.*, Amanus, Akherdagh.
Pistacia Terebinthus, *L.*
 " " *var. Palæstina*, *Post*, Amanus, Akherdagh.
Agayris fœtida, *L.*, Amanus, Akherdagh.
Lupinus hirsutus, *L.*, Kessab.

- Cytisus pauciflorus*, *Post*, Marash.
Genista acanthoclada, *D.C.*, Marash.
 " *Anatolica*, *Boiss.*, Cassius.
 " *patula*, *M.B.*, var. *Antiochia*, *Boiss.*, Antioch.
 " *Libanotica*, *Boiss.*, Marash.
 " *albida*, *Willd.*, Amanus.
Spartium junceum, *L.*
Argyrobolium crotalarioides, *Boiss.*, Aintâb.
Cytisus drepanolobus, *Boiss.*, Cassius, Amanus.
 " *Cassius*, *Boiss.*, Cassius.
 " " var. *multiflorus*, *Post*, Cassius.
Gonocytisus pterocladus, *Boiss.*, Cassius, Amanus.
Ononis leiosperma, *Boiss.*, Marash.
 " *Columnæ*, *All.*, Cassius.
 " *Natrix*, *L.*, var. *stenophylla*, *Boiss.*, Antioch.
 " *biflora*, *Desf.*, Marash.
Trigonella Kotschyi, *Fenzl.*, Marash.
 " *Coelesyriaca*, *Boiss.*, Aintâb.
 " *spicata*, *L.*, Marash.
Medicago sativa, *L.*, common.
 " *lupulina*, *L.*, common.
 " *falcata*, *L.*, common.
 " *tribuloides*, *Rohde*, Cassius.
 " *Shepardi*, *Post*, Aintâb.
Melilotus alba, *L.*, Marash.
 " *parviflora*, *Desf.*, common.
Trifolium Cataonicum, *Post*, Kerhan.
 " *Cassium*, *Boiss.*, Cassius.
 " *arvense*, *L.*, Marash.
 " *angustifolium*, *L.*, Aintâb.
 " *purpureum*, *Loisel.*, Marash.
 " *supinum*, *Savi.*, Aintâb.
 " *Alexandrinum*, *L.*, Marash.
 " *Candollei*, *Post*, Aintâb.
 " *physodes*, *Stev.*, Beilân.
 " *resupinatum*, *L.*, Marash.
 " *Aintabense*, *Boiss. et Haussk.*, Cassius, Aintâb.
 " *xerocephalum*, *Fenzl.*, Marash.
 " *repens*, *L.*, Marash.
 " *Petrisavii*, *Clem.*, Aintâb, Marash.
 " *speciosum*, *L.*, Marash.
 " *erubescens*, *Fenzl.*, Cassius.
 " *agrarium*, *L.*, Marash.
Cytisopsis dorycniifolia, *Jaub. et Sp.*, Cassius, Antioch.
Dorycnium hirsutum, *L.*, Marash.
 " " var. *acuminatum*, *Post*, Cassius.
 " *Kotschyi*, *Boiss et Reut.*, Amanus.
 " *Hausknechtii*, *Boiss.*, Amanus.
Lotus corniculatus, *L.*
 " " var. *alpinus*, *Boiss.*, Marash.
 " *Gebelia*, *Vent.*, Aintâb.
Colutea arborescens, *L.*, Amanus, Kurddagh.
Astragalus, *Sp.*, Antioch.
 " *Sp.*, Marash.
 " *tuberculosis*, *D. C.*, Marash.
 " *hirsutissimus*, *D. C.*, Amanus.

- Astragalus chrysophyllus*, *Boiss.*, Amanus.
 " *diphtherolobus*, *Bge.*, Amanus.
 " *platyrhaphis*, *Fisch.*, Marash.
 " *Sp.*, Kessab.
 " *gummifer*, *Lab.*, Akherdagh.
 " *stromatodes*, *Bge.*, Akherdagh.
 " " var. *microphyllus*, *Post*, Akherdagh.
 " *ambiguus*, *Bge.*, Amanus.
 " *argyrophyllus*, *Boiss. et Gaill.*, Aintâb.
 " *andrachnæfolius*, *Fenzl.*, Marash.
 " *Andrachne*, *Bge.*, Akherdagh.
 " *Seytunensis*, *Bge.*, Akherdagh.
 " *Drusorum*, *Boiss.*, Akherdagh.
 " *gossypinus*, *Fisch.*, Akherdagh.
 " *elongatus*, *Willd.*, Marash.
 " *macrocephalus*, *Willd.*, Akherdagh.
 " *angustifolius*, *Lam.*, Amanus.
 " *vaginans*, *D. C.*, Amanus.
 " *strictifolius*, *Boiss.*, Akherdagh.
 " *schizopterus*, *Boiss.*, Cassius.
Glycyrrhiza glabra, *L.*, Amanus, Akherdagh.
 " *echinata*, *L.*, Cassius, Marash.
Hammatorobium lotoides, *Fenzl.*, Marash.
Coronilla varia, *L.*, Marash.
 " " var. *pauciflora*, *Boiss.*, Marash, Antioch.
 " *emeroides*, *Boiss. et Spr.*, Amanus.
Hedysarum pogonocarpum, *Boiss.*, Amanus, Marash.
Onobrychis æquidentata, *S. et Sm.*, Marash.
 " *sativa*, *Lam.*, var. *montana*, *Boiss.*, Akherdagh.
 " *gracilis*, *Boiss.*, Marash.
 " *Cadmea*, *Boiss.*, Marash.
 " *cornuta*, *L.*, Marash.
 " *aurantiaca*, *Boiss.*, Marash, Amanus.
Vicia Noëana, *Reut.*, Marash.
 " *seriocarpa*, *Fenzl.*, Marash.
 " *sativa*, *L.*, Marash.
 " *peregrina*, *L.*, Cassius, Marash.
 " *gregaria*, *Boiss. et Held.*, Akherdagh.
 " *Cracca*, *L.*, Marash.
 " *Gerardi*, *Vill.*, Cassius.
 " *Ervilia*, *L.*, common.
 " *tenuifolia*, *Roth.*, Amanus.
 " *disperma*, *D. C.*, Cassius.
Ervum lenticula, *Schreb.*, Cassius.
 " *Orientale*, *Boiss.*, Marash.
Lathyrus Aphaca, *L.*, Marash.
 " *Cassius*, *Boiss.*, Cassius, Aintâb.
 " *amœnus*, *L.*, Aintâb.
Orobus sessilifolius, *S. et Sm.*, var. *oblongifolius*, *Post*, Marash.
 " *hirsutus*, *L.*, var. *angustifolius*, *Post*, Amanus.
Pisum elatius, *M. B.*, Marash.
Cercis Siliquastrum, *L.*, Marash.
Amygdalus lycioides, *Spach.*, Aintâb, Marash.
 " *Orientalis*, *Ait.*, Marash.
Prunus monticola, *C. Koch*, Cassius.
 " *spinosa*, *L.*, Amanus.

- Prunus ursina*, *Ky.*, Amanus.
Cerasus tortuosa, *Boiss. et Haussk.*, Aintâb.
Malus communis, *L.*, Marash.
Rubus discolor, *W. et N.*, Antioch.
 " *tomentosus*, *Borckh.*, Marash, Antioch.
Geum urbanum, *L.*, Cassius, Marash.
Poterium verrucosum, *Ehr.*, Marash.
Fragaria vesca, *L.*, Amanus.
Potentilla reptans, *L.*, Marash.
 " *recta*, *L.*, Amanus.
 " *geranioides*, *Willd.*, Amanus.
Agrimonia Eupatoria, *L.*, Amanus, Cassius.
Rosa canina, *L.*, Cassius.
 " *Phoenicea*, *Boiss.*, Marash.
 " *glutinosa*, *S. et Sm.*, Amanus.
Pyrus Syriaca, *Boiss.*, Cassius, Antioch.
Cotoneaster pyracantha, *L.*, Amanus.
 " *nummularia*, *F. et M.*, Amanus, Cassius.
Cratægus Azarolus, *L.*, Marash.
 " *monogyna*, *Willd.*, Marash.
Mespilus Germanica, *L.*, Akherdagh.
Saxifraga scotophila, *Boiss.*, Cassius, Antioch.
Umbilicus Libanoticus, *Labill.*, Marash.
 " *Pestalozzæ*, *Boiss.*, Marash.
 " *intermedius*, *Boiss.*, common.
Sedum, *Sp.*, Marash.
 " *stoloniferum*, *Gmel.*, Amanus.
 " *album*, *L.*, Amanus.
Lythrum Salicaria, *L.*, Antioch.
 " *Græfferi*, *Ten.*, Marash.
Jussiaea repens, *L.*, Aintâb, Marash.
Punica Granatum, *L.*, Amanus, Marash.
Epilobium hirsutum, *L.*, Marash, Antioch.
 " *parviflorum*, *Schreb.*, Marash.
 " *Sp.*, Akherdagh.
Bryonia multiflora, *Boiss. et Held.*, Marash, Kessab.
 " *Syriaca*, *Boiss.*, Aintâb.
Datisca Cannabina, *L.*, Marash.
Eryngium Billardieri, *Laroch.*, Amanus.
 " *campestre*, *L.*, Amanus, Akherdagh.
Echinophora Sibthorpiana, *Guss.*, Akherdagh, Marash.
Sanicula Europæa, *L.*, Amanus.
Physospermum aquilegifolium, *All.*, Cassius.
Coriandrum sativum, *L.*, common.
 " *tordylioides*, *Boiss.*, Aintâb.
Smyrnum connatum, *Boiss. et Ky.*, Cassius.
Lecockia Cretica, *Lam.*, Amanus.
Falcaria Alexandretta, *Post*, Marshes of Alexandretta.
Buplevrum Antiochium, *Post*, Antioch.
 " *Boissieri*, *Post*, Amanus.
 " *croceum*, *Fenzl.*, Aintâb, Marash.
 " *protractum*, *Link.*, Marash.
 " *lophocarpum*, *Boiss. et Bal.*, Marash.
 " *odontites*, *L.*, Cassius.
 " *Gerardi*, *Jacq.*, Cassius.
 " *Kurdicum*, *Boiss.*, Amanus.

- Buplevrum Cappadocicum*, *Boiss.*, Aintáb, Marash.
 „ *irregularare*, *Boiss. et Ky.*, Amanus.
Sium lancifolium, *M. B.*, Amanus, Akherdagh.
Pimpinella corymbosa, *Boiss.*, Amanus, Marash.
 „ *peregrina*, *L.*, Sea-coast Plain.
Carum brachyactis, *Post*, Akherdagh.
 „ *nudum*, *Post*, Amanus.
 „ *elegans*, *Fenzl.*, Aintáb.
Scaligeria Cretica, *L.*, Antioch.
 „ *capillifolia*, *Post*, Akherdagh.
Chærophyllum oligocarpum, *Post*, Amanus.
Scandix pinnatifida, *Vent.*, Marash.
 „ *Pecten-Veneris*, *L.*, common.
 „ *Iberica*, *M. B.*, common.
Oenanthe pimpinelloides, *L.*, Amanus.
Zozimia absinthifolia, *Vent.*, Marash.
Cachrys goniocarpa, *Boiss.*, Amanus, Marash.
Prangos platyclæna, *Boiss.*, Akherdagh.
Colladonia crenata, *Fenzl.*, Cassius.
Fœniculum piperitum, *D. C.*, Kessab.
Cnidium Orientale, *Boiss.*, Cassius, Amanus.
Ferulago Blancheana, *Post*, Akherdagh.
 „ *Cassia*, *Boiss.*, Cassius.
 „ *pauciradiata*, *Boiss. et Held.*, Cassius, Amanus.
 „ *Syriaca*, *Boiss.*, Antioch, Amanus.
 „ *Amani*, *Post*, Amanus.
Ferula meifolia, *Fenzl.*, Cassius.
Peucedanum depaupertatum, *Boiss. et Held.*, Akherdagh.
 „ *var. alpinum*, *Boiss.*, Akherdagh.
Tordylium Syriacum, *L.*, Marash.
Ainsworthia trachycarpa, *Boiss.*, Marash.
Johrenia selinoides, *Boiss. et Bal.*, Antioch.
 „ *Porteri*, *Post*, Kapa-Cham-Dagh.
Exoacantha heterophylla, *Labill.*, Amanus.
Malabaila pastinacæfolia, *Boiss. et Bal.*, Amanus.
 „ *Sekakul*, *Russ.*, Marash.
Artemisia squamata, *L.*, Marash.
Torilis neglecta, *Roem. et Sch.*, Akherdagh.
Daucus setulosus, *Guss.*, Aintab.
 „ *leptocarpus*, *Hochst.*, Marash.
Turgeniopsis foeniculacea, *Fenzl.*, Cassius, Amanus.
Lisæa Syriaca, *Boiss.*, Kessab.
Turgenia latifolia, *L.*, Marash.
Laserpitium sp., Akherdagh.
Angelica sylvestris, *L.*, Kerhân.
Cornus Australis, *C. et M.*, Cassius, Antioch, Amanus.
 „ *Mas*, *L.*, Amanus.
Lonicera Etrusca, *Santi*, Marash.
 „ *nummularifolia*, *Jaub. et Sp.*, Amanus, Marash.
 „ *Orientalis*, *Lam.*, Amanus.
Sambucus Ebulus, *L.*, Amanus.
Putoria Calabrica, *L.*, Marash.
Rubia Aucheri, *Boiss.*, Cassius, Amanus.
 „ *Olivieri*, *Rich.*, *var. stenophylla*, *Boiss.*, Amanus.
Galium cymulosum, *Post*, Amanus.
 „ *erectum*, *Huds.*, Amanus.

- Galium Orientale*, *Boiss.*, var. *alpinum*, *Boiss.*, Marash.
 " " " *tenerum*, " "
 " " " *hispidum*, *Post*, Gesbeldagh.
 " *aureum*, *Vis.*, *Cassius*.
 " *verum*, *L.*, *Cassius*, Amanus, Marash.
 " *tricornis*, *L.*, Marash.
 " *adhaerens*, *Boiss. et Bal.*, Marash.
 " *Decaisnei*, *Boiss.*, *Cassius*.
 " *coronatum*, *S. et Sm.*, Marash.
Asperula dissitiflora, *Post*, Amanus.
 " *odorata*, *L.*, Amanus.
 " *humifusa*, *Bess.*, Amanus.
 " *arvensis*, *L.*, Marash.
 " *Orientalis*, *Boiss. et Hook.*, Marash.
 " *stricta*, *Boiss.*, Amanus.
 " " var. *alpina*, *Boiss.*, Marash.
Callipeltis Cucullaria, *L.*, Aintâb.
Crucianella macrostachys, *Boiss.*
 " " var. *panicellata*, *Boiss.*, Marash.
 " " var. *brachystachys*, *Boiss.*, Marash.
Valeriana Dioscoridis, *Sibth.*, Marash.
Centranthus longiflorus, *Stev.*, var. *latifolius*, *Boiss.*, Marash.
 " *ruber*, *L.*, Marash.
Valerianella coronata, *W.*, Marash.
 " *vesicaria*, *Willd.*, Marash.
 " *carinata*, *Loisel.*, Aintâb.
 " *Boissieri*, *Krok.*, Aintâb.
Morina Persica, *L.*, Marash.
Cephalaria setosa, *Boiss. et Hook.*, Amanus.
 " *stellipilis*, *Boiss.*, Akherdagb.
 " *ambrosioides*, *Sibth.*
 " *Joppensis*, *Spreng.*, Aintâb, Marash.
Scabiosa rotata, *M.B.*, Marash, Amanus.
 " *ochroleuca*, *L.*, var. *intermedia*, *Post*, Amanus.
 " *Palæstina*, *L.*, var. *latiloba*, *Boiss.*, Marash.
 " *Ucranica*, *L.*, Marash, Aintâb.
Knautia hybrida, *All.*, var. *bidens*, *Post*, Marash.
Ptercephalus plumosus, *L.*, *Cassius*, Marash.
Eupatorium cannabinum, *L.*, type and var. *Syriacum*, *Boiss.*,
 Antioch.
Erigeron, sp., Marshes near Kislar-Kalessi.
Bellis perennis, *L.*, Marash.
 " *sylvestris*, *L.*, Marash.
Helichrysum Siculum, *Spring*, Amanus.
Inula viscosa, *Ait.*, Antioch.
Pulicaria Arabica, *Cass.*, Antioch.
Micropus longifolius, *Boiss. et Reut.*, Aintâb.
Ambrosia maritima, *L.*, near coast.
Achillæa micrantha, *M.B.*, Marash.
 " *Santolina*, *L.*, Amanus.
Artemisia monosperma, *Del.*, Plain of Issus.
 " *crithmifolia*.
Anthemis tinctoria, *L.*, var. *discoidea*, *Boiss.*, *Cassius*, Amanus,
 Kurd Dagb, Marash.
 " *hyalina*, *D.C.*, Marash.
 " *scariosa*, *D.C.*, Aintâb.

- Pyrethrum Cilicicum*, *Boiss.*, Amanus, Cassius.
 densum, *Labill.*, Akherdagh.
Senecio vernalis, *W.K.*, Marash.
 doriæformis, *D.C.*, var. megalophron, *Boiss.*, Akherdagh.
Echinops minimus, *Post*, Amanus.
 vaginatus, *Boiss. et Haussk.*, Akherdagh.
Gundelia Tournefortii, *L.*, var. tenuisecta, *Boiss.*, Akherdagh.
Cardopathium corymbosum, *L.*, Amanus.
Jurinea ramulosa, *Boiss. et Haussk.*, Akherdagh.
Xeranthemum squarrosum, *Boiss.*, Marash.
Carlina corymbosa, *L.*, var. involucrata, *Boiss.*, Amanus.
 " " var. Libanotica, *Boiss.*, Amanus.
Cirsium diacantha, *Labill.*, Antioch.
 " Amani, *Post*, Amanus, above Hassan Beyley.
 " leuconeurum, *Boiss. et Haussk.*, Akherdagh.
Carduus nutans, *L.*, Aintâb.
Stæhelia apiculata, *Labill.*, Antioch.
Crupina crupinastrum, *Moris.*, Marash.
Centaurea Cassia, *Boiss.*, Cassius.
 " axillaris, *Willd.*, Marash.
 " aggregata, *F. et M.*, Marash.
 " Antiochia, *Boiss.*, Antioch.
 " thriniciæfolia, *D. C.*, Cassius, Antioch.
 " depressa, *M. B.*, Aintâb.
 " arifolia, *Boiss.*, Plain of Antioch.
 " Cataonica, *Boiss. et Haussk.*, Akherdagh.
 " polycephala, *Post*, Plain of Antioch.
 " Urvillei, *D. C.*, Aintâb, Marash.
 " Behen, *L.*, Amanus.
 " solstitialis, *L.*, Marash.
 " Iberica, *Trev.*, Marash.
 " Babylonica, *L.*, Amanus.
 " cheiracantha, *Fenzl.*, Cassius.
Phæopappus Kotschyi, *Boiss. et Held.*, Akherdagh.
Ptosimopappus bracteatus, *Boiss.*, Amanus.
Zoegea leptaura, *L.*, Plain of Marash.
Cichorium Intybus, *L.*, Marash.
Scolymus Hispanicus, *L.*, common.
Lampsana peduncularis, *Boiss.*, Akherdagh.
Hedypnois Cretica, *L.*, Marash.
Picris stricta, *Jord.*, Antioch.
 " hieracioides, *L.*, Cassius.
 " Sprengeriana, *Lam.*, Marash.
Helminthia echioides, *L.*, Antioch.
Lagoseris bifida, *Vis.*, Marash.
Cymboseris Palæstina, *Boiss.*, Marash.
Crepis parviflora, *Desf.*, Marash.
 " Reuteriana, *Boiss.*, Marash.
Taraxacum Syriacum, *Boiss.*, Akherdagh.
 " officinale, *Wig.*, Akherdagh.
 " *Sp.*, Akherdagh.
Lactuca Scariola, *L.*, Akherdagh.
 " viminea, *L.*, Amanus.
Sonchus asper, *Vill.*, Marash.
 " oleraceus, *L.*, common.
Tragopogon longirostre, *Bisch.* Marash.

- Tragopogon latifolium*, *Boiss.*, var. *angustifolium*, *Boiss.*, Marash.
 " *buphtalmoides*, *Boiss.*, var. *stenophyllum*, *Boiss.*, Marash.
 " " *Boiss.*, var. *humile*, *Boiss.*, Marash.
Scorzonera papposa, *D.C.*, Marash.
Leontodon asperum, *W. K.*, var. *montanum*, *Boiss.*, Amanus.
Michauxia campanuloides, *L'Heritier*, Marash.
Campanula Trachelium, *L.*, Amanus.
 " " var. *solitariaefolia*, *Post*, Amanus.
 " *stricta*, *L.*, var. *Libanotica*, *Boiss.*, Akherdagh.
 " *dichotoma*, *L.*, Marash.
 " *strigosa*, *Russ.*, Marash.
 " *retrorsa*, *Lab.*, Cassius.
 " *Rapunculus*, *L.*, Amanus, Marash.
Specularia pentagonia, *L.*, Marash.
 " *speculum*, *L.*, common.
 " *falcata*, *Ten.*, Cassius.
Arbutus Andrachne, *L.*, Amanus.
Erica verticillata, *Forsk.*, Cassius, Antioch, Amanus.
Acantholimon laxiflorum, *Boiss.*, var. *condensatum*, *Post*, Amanus.
 " *Baltanense*, *Willd.*, Amanus.
 " *acerosum*, *Willd.*, Akherdagh.
 " *Armenum*, *Boiss. et Huet.*, Akherdagh.
 " *Kotschyi*, *Jaub. et Sp.*, Akherdagh.
 " *Lycaonicum*, *Boiss. et Held.*, var. *pictum*, *Boiss.*,
 Akherdagh.
Statice Limonium, *L.*, Alexandretta.
 " *rorida*, *S. and S.*, Coast.
Lysimachia dubia, *Ait.*, Marash, Kerhân.
Androsace maxima, *L.*, Aintâb.
Anagallis arvensis, *L.*, var. *phoenicea*, *Boiss.*, Marash.
 " " var. *caerulea*, *Boiss.*, Marash.
Styrax officinale, *L.*, Marash.
Jasminum fruticans, *L.*, Amanus, Akherdagh.
Fontanesia phillyreoides, *Lab.*, Cassius.
Fraxinus oxyphylla, *W. B.*, var. *Syriaca*, *Boiss.*, Amanus.
Vinca Libanotica, *Zucc.*, Marash.
Periploca Græca, *L.*, Marash.
Cynanchum acutum, *L.*, Antioch.
Cionura erecta, *L.*, Marash.
Chlora serotina, *Koch.*, Marash.
 " *perfoliata*, *Willd.*, Amanus.
Erythraea ramosissima, *Pers.*, Marash.
Heliotropium supinum, *L.*, Akherdagh.
 " *Bovei*, *Boiss.*, Marash.
 " *villosum*, *Willd.*, common.
Symphytum Palæstinum, *Boiss.*, var. *breviflora*, *Boiss.*, Marash.
Paracaryum Reuteri, *Boiss. et Haussk.*, Akherdagh.
Anchusa Italica, *Retz.*, var. *angustifolia*, *Post*, Marash.
 " *Barrelieri*, *All. Ped.*, Marash.
 " *Shattuckii*, *Post*, Marash, Aintâb.
 " *neglecta*, *Alph. D. C.*, Cassius, Amanus.
Nonnea obtusifolia, *W.*, Cassius, Amanus.
Alkanna megalocarpa, *Alph. D. C.*, var. *Shattuckia*, *Post*, Amanus.
Myosotis sylvatica, *Hoffm.*, Marash.
 " *hispida*, *Sch.*, Marash.
 " *refracta*, *Boiss.*; Cassius, Amanus.

- Cynoglossum Nebrodense, *Guss*, Cassius.
 " pictum, *Ait.*, common.
 Lithospermum arvense, *L.*, Amanus.
 " tenuiflorum, *L.*, Amanus.
 " hispidulum, *S. et Sm.*, Antioch, Amanus.
 " purpureo-cæruleum, *L.*, Amanus.
 Echium Italicum, *L.*, Marash.
 " glomeratum, *Poir.*, Marash.
 Onosma frutescens, *Lam.*, Antioch, Amanus.
 " sericeum, *Willd.*, Amanus.
 " flavum, *Lehm.*, Aintâb.
 " Cassium, *Boiss.*, Amanus.
 " Roussæi, *D. C.*, Marash, Aintâb.
 " giganteum, *Lam.*, Amanus.
 " stellulatum, *W.K.*, var. genuinum, *Boiss.*, Marash.
 " " brevifolium, " Cassius.
 Convolvulus Dorycnium, *L.*, var. oxysepalus, *Boiss.*, Cassius.
 " Aucheri, *Choisy*, El-Jebel-el-Ahmar.
 " Galaticus, *Rost.*, Cassius.
 " althæoides, *L.*, Aintâb.
 Ipomæa sagittata, *Desf.*, Marshes of Alexandretta.
 Physalis Alkekengi, *L.*, Marash.
 Hyoscyamus aureus, *L.*, walls ; general.
 Withania somnifera, *L.*, Antioch.
 Solanum nigrum, *L.*, general.
 " Dulcamara, *L.*, Cassius, Amanus.
 Cuscuta monogyna, *Vahl.*, Aintâb.
 Verbascum Antiochium, *Boiss.*, Walls of Antioch.
 " Cæsareum, *Boiss.*, Cassius.
 " Galilæum, *Boiss.*, Marash, Amanus.
 " mucronatum, *Lam.*, Akherdagh.
 " subnivale, *Boiss. et Haussk.*, Akherdagh.
 " Barbeyi, *Post.*, Amanus.
 " Amanum, *Boiss.*, Amanus.
 " Syriacum, *Schrad.*, Aintâb, Marash.
 " sinuatum, *L.*, Base of Cassius.
 " Germanicia, *Haussk.*, Amanus, Marash.
 " scaposum, *Boiss.*, Amanus, Cassius.
 Siphonostegia Syriaca, *B. et R.*, Antioch.
 Celsia heterophylla, *Desf.*, Marash.
 " Orientalis, *L.*, Marash.
 Linaria genistifolia, *L.*, Akherdagh.
 " Dalmatica, *L.*, Amanus, Akherdagh.
 " lanigera, *Desf.*, Antioch.
 " Elatine, *L.*, Amanus.
 " Græca, *Bory et Ch.*, Amanus.
 " arvensis, *L.*, var. flaviflora, *Boiss.*, Aintâb.
 " Chalepensis, *L.*, Marash.
 " Persica, *Chav.*, Aintâb.
 Anarrhinum Orientale, *Bth.*, Marash.
 Scrophularia xanthoglossum, Amanus, Marash.
 " sphaerocarpa, *Boiss. et Reut.*, Beilân.
 " alata, *Gilib.*, Marash.
 " variegata, *M. B.*, Cassius, Marash.
 Wulfenia Orientalis, *Boiss.*, Antioch.
 Veronica Anagallis, *L.*, Marash.

- Veronica Anagallioides*, *Guss.*, Marash.
 " *Orientalis*, *Mill.*, Amanus, Marash.
 " " var. *tenuifolia*, *Boiss.*, Akherdagh.
 " *cinerea*, *Boiss. et Bl.*, Akherdagh.
 " *stenobotrys*, *Boiss. et Bl.*, Cassius.
 " *Cymbalaria*, *Boiss.*, Aintâb, Marash.
 " *acinifolia*, *L.*, Marash.
 " *Syriaca*, *Roem. et Sch.*, Marash.
 " *Aleppica*, *Boiss.*, Amanus.
Odontites lutea, *L.*, Antioch, Akherdagh.
 " *glutinosa*, *M. B.*, Amanus.
 " *Aucheri*, *Boiss.*, Akherdagh.
Eufragia viscosa, *L.*, Marash.
Phelipea lavandulacea, *Rchb.*, Marash.
 " *ramosa*, *L.*, Marash.
Orobanche Anatolica, *Boiss. et Reut.*, Amanus, Marash.
 " " var. *glabrescens*, *Post*, Marash.
 " *Palæstina*, *Reut.*, Cassius.
 " *speciosa*, *D. C.*, Cassius, Marash.
Globularia vulgaris, *L.*, Amanus, Marash.
Acanthus Syriacus, *Boiss.*, Marash.
Verbena supina, *L.*, Antioch.
 " " var. *minor*, *Post*, Akherdagh.
Vitex Agnus-Castus, *L.*, Antioch, Marash.
Mentha sylvestris, *L.*, Antioch.
 " *aquatica*, *L.*, Marash.
Lycopus Europæus, *L.*, Antioch.
Origanum lævigatum, *Boiss.*, Antioch.
 " *Maru*, *L.*, Antioch.
Thymus Serpyllum, *L.*, Amanus, Akherdagh.
 " " var. *Kotschyanus*, *Boiss.*, Akherdagh.
 " *Syriacus*, *Boiss.*, Plain of Antioch.
Satureia hortensis, *L.*, Marash.
 " *Thymbra*, *L.*, Antioch.
Micromeria serpyllifolia, *M. B.*, Antioch.
Thymbra spicata, *L.*, Amanus, Marash.
Calamintha grandiflora, *L.*, Amanus.
 " *Clinopodium*, *Bth.*, Kessab, Akherdagh.
 " *graveolens*, *M. B.*, Aintâb.
Salvia grandiflora, *Ett.*, Cassius, Antioch.
 " *Aucheri*, *Bth.*, Cassius.
 " *acetabulosa*, *Vahl.*, Amanus, Marash.
 " *purpurascens*, *Post*, between Marash and Adana.
 " *Pinardi*, *Boiss.*, Antioch.
 " *Syriaca*, *L.*, Marash.
 " *Euphratica*, *M. et Auch.*, Aintâb.
 " *Sclærea*, *L.*, Cassius.
 " *glutinosa*, *L.*, Amanus.
 " *verbascifolia*, *M. B.*, Amanus.
 " *Horminum*, *L.*, common.
 " *brachycalyx*, *Boiss.*, Marash.
 " *Verbenaca*, *L.*, common.
 " *Russelii*, *Bth.*, Aintâb, Marash.
Zizyphora clinopodoides, *M. B.*, var. *canescens*, *Boiss.*, Akherdagh.
 " *capitata*, *L.*, Marash.

- Lallemantia Iberica*, *M. B.*, Aintâb.
Nepeta nuda, *L.*, var. *albiflora*, *Boiss.*
 " *Orientalis*, *Mill.*, Marash.
 " *Cilicica*, *Boiss.*, Akherdagh.
 " *glomerata*, *Montb.*, Akherdagh.
 " *leptantha*, *Boiss. et Haussk.*, Akherdagh.
 " *Shepardi*, *Post*, Aintâb.
Scutellaria Orientalis, *L.*, var. *alpina*, *Boiss.*, Amanus.
 " " var. *genuina*, *Boiss.*, Marash.
 " *fruticosa*, *Desf.*, Akherdagh.
 " *diffusa*, *Bth.*, Marash.
 " *peregrina*, *L.*, Cassius, Antioch.
Brunella vulgaris, *L.*, Cassius, Amanus.
Sideritis Libanotica, *Labill.*, Akherdagh.
Marrubium faucidens, *Boiss. et Bal.*, Marash.
 " *Libanoticum*, *Boiss.*, Akherdagh.
 " " var. *Hermonis*, *Boiss.*, Amanus.
Stachys Cretica, *S. et S.*, Akherdagh.
 " " var. *Garana*, *Boiss.*, Marash.
 " *viticina*, *Boiss.*, Cassius, Antioch.
 " *pinetorum*, *Boiss.*, Amanus.
 " *Germanica*, *L.*, var. *spicata*, *Post*, Antioch.
 " *Iberica*, *M. B.*, Amanus.
 " *pumila*, *Russ.*, var. *brachyodonta*, *Boiss.*, Antioch.
 " *diversifolia*, *Boiss.*, Cassius, Amanus.
Lamium striatum, *S. et S.*, var. *minus*, *Boiss.*, Amanus, Akherdagh.
 " *Aleppicum*, *Boiss. et Haussk.*, Marash.
 " *truncatum*, *Boiss.*, var. *longidentatum*, *Post*, Marash.
Molucella lævis, *L.*, Marash.
Phlomis Nissolii, *L.*, Marash.
 " *viscosa*, *Poir.*, Amanus.
 " *Armeniaca*, *Willd.*, Akherdagh.
 " *linearis*, *Boiss. et Bal.*, Akherdagh.
 " *Herba-Venti*, *L.*, Marash.
Teucrium multicaule, *Montb. et Auch.*, Marash.
 " " var. *planifolium*, *Post*, Marash.
 " *procerum*, *B. et Bl.*, var. *humile*, *Boiss.*, Marash.
 " *Chamædrys*, *L.*, Cassius, Amanus.
 " *scordioides*, *Schreb.*, Amanus.
 " *Polium*, *L.*, Antioch.
Ajuga lævigata, *Russ.*, Marash.
Plantago lanceolata, *L.*, var. *altissima*, *Boiss.*, Marash.
 " *maritima*, *L.*, coast near Alexandretta.
 " *major*, *L.*, everywhere.
Amarantus hypochondriacus, *L.*, Antioch.
 " *chlorostachys*, *Willd.*, Antioch.
 " *retroflexus*, *L.*, common.
Chenopodium album, *L.*, Antioch, Marash.
Blitum virgatum, *L.*, Akherdagh.
Atriplex Amanum, *Post*, Gesbel-dagh.
Noœa spinosissima, *Moq.*, Akherdagh.
 " *Tournefortii*, *Spach*, Akherdagh.
Polygonum Convolvulus, *L.*, Amanus.
 " *equisitifforme*, *S. et Sm.*, Antioch.
 " *Bellardi*, *All.*, Amanus.

- Polygonum Libani*, *Boiss.*, Akherdagh.
 „ *setosum*, *Jacq.*, Akherdagh.
Rheum Ribes, *Gronov.*, Amanus.
Rumex acetosa, *L.*, Aintáb.
 „ *acetoselloides*, *Bal.*, Marash.
 „ *scutatus*, *L.*, Marash.
 „ *Cassius*, *Boiss.*, Cassius.
Lygia Aucheri, *Meisn.*, Aintáb.
Aristolochia Maurorum, *L.*, Marash.
Daphne sericea, *Vahl.*, Amanus.
 „ *olæoides*, *Schreb.*, Amanus, Akherdagh.
Laurus nobilis, *L.*, Cassius, Antioch.
Elæagnus hortensis, *M. B.*, Marash.
Thesium Bergeri, *Zucc.*, Amanus, Cassius.
 „ *compressum*, *Boiss. et Held.*, Amanus.
Osyris alba, *Lam.*, Cassius, Amanus.
Viscum album, *L.*, Amanus.
Arceuthobium Oxycedri, *D. C.*, Amanus.
Euphorbia pubescens, *Vahl.*, Antioch.
 „ *altissima*, *Boiss.*, var. *glabrescens*, *Boiss.*, Marash.
 „ *tinctoria*, *Boiss.*, Marash.
 „ *denticulata*, *Lehm.*, Marash.
 „ *Apios*, *L.*, Amanus.
 „ *Cassia*, *Boiss.*, Cassius.
Crozophora tinctoria, *L.*, Antioch.
 „ *verbascifolia*, *Willd.*, Antioch.
Cynocrambe prostrata, *Gaertn.*, Antioch.
Carpinus Duinensis, *Scop.*, Amanus, Cassius.
Ostrya carpinifolia, *Scop.*, Amanus, Cassius.
Quercus Lusitanica, *Lam.*, Amanus, Akherdagh.
 „ *Cerris*, *L.*, Cassius, Antioch, Amanus.
 „ *Ilex*, *L.*, Plain of Issus, Amanus.
 „ *coccifera*, *L.*, Cassius, Amanus, Littoral.
 „ *Ægilops*, *L.*, Amanus.
 „ *Libani*, *Oliv.*, Amanus, Akherdagh.
Fagus sylvatica, *L.*, Amanus.
Alnus Orientalis, *Dec.*, Amanus.
Celtis australis, *L.*, Amanus.
Juglans regia, *L.*, Cassius, Amanus, Akherdagh.
Platanus Orientalis, *L.*, Amanus.
Salix alba, *L.*, Antioch, Amanus.
 „ *nigricans*, *Fries.*, Amanus.
Populus nigra, *L.*, cultivated.
Cedrus Libani, *L.*, Amanus, Akherdagh.
Juniperus Oxycedrus, *L.*, Antioch, Amanus.
 „ *drupacea*, *Labill.*, Amanus.
 „ *fetidissima*, *Willd.*, Amanus, Akherdagh.
Pinus Halepensis, *Mill.*, Cassius, Amanus, Akherdagh.
 „ *Pinea*, *L.*, Plain of Issus.
 „ *Brutia*, *Ten.*, Akherdagh.
Abies Cilicica, Amanus.
Taxus baccata, *L.*, Amanus (Gesbeldagh).
Epipactis latifolia, *All. Ped.*, Cassius.
Cephalanthera ensifolia, *Murr.*, Amanus.
Orchis sancta, *L.*, Marash.
 „ *tridentata*, *Scop.*, Amanus.

- Orchis longicruris*, *Link.*, Marash.
 „ *Anatolica*, *Boiss.*, Marash.
 „ *laxiflora*, *Lam.*, Marash.
 „ „ *var. major*, *Boiss.*, Kerhân.
 „ *angustifolia*, *M. B.*, Amanus, Akherdagh.
 „ *saccata*, *Ten.*, Aintâb.
 „ *latifolia*, *L.*, Marash.
Ophrys fusca, *Link.*, Marash.
 „ *aranifera*, *Huds.*, Marash.
 „ *arachnites*, *Scop.*, Mouth of Orontes, Cassius.
Serapias pseudocordigera, *Murr.*
Anacamptis pyramidalis, *Rchb.*, Cassius.
Iris Sisyrrhinchium, *L.*, common.
 „ *reticulata*, *M. B.*, Marash.
 „ *Palæstina*, *Baker*, Marash.
Crocus graveolens, *Boiss.*, Marash.
Romulea Bulbocodium, *L.*, Cassius, Amanus.
Sternbergia Fischeriana, *Herb. Amar.*, Marash.
Gladiolus segetum, *Gawl.*, Marash.
 „ *Illyricus*, *Koch.*, common.
 „ *atroviolaceus*, *Boiss.*, Marash.
Ixiolirion montanum, *Labill.*, Amanus, Akherdagh
Tamus communis, *L.*, Marash.
Ruscus aculeatus, *L.*, Cassius.
Tulipa Oculus-Solis, *St. Amand.*, common.
 „ *montana*, *Lindl.*, Cassius, Amanus.
Gagea foliosa, *Presl.*, Marash.
Fritillaria acmopetala, *Boiss.*, Cassius.
Asparagus acutifolius, *L.*, common.
Asphodeline brevicaulis, *Bert.*, Cassius, Amanus, Akherdagh.
 „ *Damascena*, *Boiss.*, Antioch.
 „ *lutea*, *L.*, Amanus, Cassius.
Puschkinia scilloides, *Adams.*, Marash, Cassius.
Hyacinthus Orientalis, *L.*, Cassius, Amanus, Akherdagh.
Bellevalia ciliata, *Cyr.*, Aintâb, Cassius.
Muscari Pinardi, *Boiss.*, Marash.
 „ *comosum*, *Mill.*, Marash.
 „ *parviflorum*, *Desf.*, Marash.
 „ *commutatum*, *Guss.*, Aintâb.
 „ *racemosum*, *L.*, Aintâb.
 „ *neglectum*, *Guss.*, Aintâb.
Allium Cilicicum, *Boiss.*, Marash.
 „ *rotundum*, *L.*, Marash, Aintâb.
 „ *sphærocephalum*, *L.*, Aintâb.
 „ *Cassium*, *Boiss.*, Marash.
 „ *Tauricolum*, *Boiss.*, Akherdagh.
 „ *Aschersonianum*, *Barb.*, Amanus.
 „ *chloranthum*, *Boiss.*, Marash.
 „ *hirsutum*, *Zucc.*, Marash.
Ornithogalum Narbonense, *L.*, Cassius, Amanus, Marash.
 „ *umbellatum*, *L.*, Marash.
 „ *montanum*, *Cyr.*, Aintâb.
Scilla autumnalis, *L.*, Amanus.
Urginea maritima, *L.*, Plain of Issus.
Colchicum lætum, *Stev.*, Amanus.
 „ *Decaisnei*, *Boiss.*, Amanus.

- Colchicum Haussknechtii*, *Boiss.*, Amanus.
 „ *latifolium*, *Sibth. et Sm.*, Amanus.
 „ *candidum*, *Schott. et Ky.*, Amanus.
 „ *brachyphyllum*, *Boiss. et Haussk.*, Aintâb.
Juncus maritimus, *L.*, Coast, Marash.
 „ *bufonius*, *L.*, common.
Helicophyllum Rauwolfii, *Bl.*, Marash.
Arum Dioscoridis, *S. et Sm.*, Aintâb, Marash.
Butomus umbellatus, *L.*, Aintâb, Marash.
Cyperus flavescens, *L.*, Antioch.
 „ *fuscus*, *L.*, var. *virescens*, *Bolser.*, Antioch.
 „ *longus*, *L.*, Marash.
Fimbristylis dichotoma, *Rottb.*, Antioch.
 „ *ferruginea*, *L.*, Antioch.
Carex divulsa, *Good.*, Amanus.
 „ *divisa*, *Huds.*, Cassius, Amanus.
Scirpus maritimus, *L.*, common.
Spondiopogon pogonanthus, *Boiss.*, Plain of Issus.
Oryza sativa, *L.*, Marash.
Panicum sanguinale, *L.*, Antioch.
 „ *Crista-Galli*, *L.*, Antioch.
Setaria verticillata, *L.*, Antioch.
Andropogon hirtus, *L.*, Antioch.
 „ *Ischœnum*, *L.*, plains along coast.
Sporobolus pungens, *Kth.*, coast.
Antisthiria ciliata, *L.*, Cassius.
Piptatherum miliaceum, *L.*, Antioch.
Heleochoa schœnoides, *L.*, Antioch.
 „ *alopecuroides*, *Schrad.*, Akherdagh.
Polygogon Monspeliense, *L.*, Cassius.
Pennisetum Orientale, *Rich.*, Plain of Issus, Wadi Kondîl.
Tragus racemosus, *L.*, Plain of Issus.
Imperata cylindrica, *L.*, Plain of Issus.
Crypsis aculeata, *L.*, Marshes of Alexandretta.
Cynodon dactylon, *L.*, everywhere.
Arundo Donax, *L.*, Plain of Issus, Alexandretta.
Eragrostis megastachya, *Link.*, Antioch.
Melica ciliata, *L.*, Cassius.
 „ *Cupani*, *Guss.*, Marash.
Cynosurus elegans, *Desf.*, Cassius.
Poa annua, *L.*, everywhere.
 „ *bulbosa*, *L.*, Marash.
Scleropoa rigida, *Gaud.*, Marash.
Brachypodium distachyum, *L.*, Cassius, Amanus.
Bromus erectus, *Huds.*, Cassius.
 „ *tectorum*, *L.*, Cassius.
Ægilops triuncialis, *L.*, common.
 „ *ovata*, *L.*, common.
 „ *Aucheri*, *Boiss.*, Amanus.
Hordeum murinum, *L.*, Amanus.
Cystopteris fragilis, *L.*, Amanus.
Asplenium Trichomanes, *L.*, Antioch.
Cetarach officinarum, *L.*, Antioch.
Scolopendrium officinale, *Sm.*, Antioch.
Nephrodium rigidum, *Sw.*, Marash.
Notochlaena Marantæ, *L.*, Cassius.

V. The *Nusairy Chain* consists of low featureless mountains, denuded of their forests, and in no case rising as high as 4,000 feet. This range has been less studied botanically, or even visited, than any other portion of Syria, not a single locality being noted in Boissier's *Flora Orientalis*. The following list, consisting of collections made by the writer, and by Dr. Kay, of the Syrian Protestant College, is the first attempt to catalogue the plants of this region. It is, of course, far from complete. It does not contain a single species new to science:—

- | | |
|---|--|
| Anemone Coronaria, <i>L.</i> | Raphanus sativus, <i>L.</i> |
| " " var. <i>cærulea</i> , <i>Boiss.</i> | Reseda lutea, <i>L.</i> , var. <i>nutans</i> , <i>Boiss.</i> |
| " " <i>blanda</i> , <i>Schott et Ky.</i> | Cistus villosus, <i>L.</i> |
| Adonis Aleppica, <i>Boiss.</i> | " " var. <i>genuinus</i> , <i>Boiss.</i> |
| Ranunculus aquatilis, <i>L.</i> | " " <i>salviaefolius</i> , <i>L.</i> |
| " <i>cuneatus</i> , <i>Boiss.</i> | Helianthemum salicifolium, <i>L.</i> |
| " <i>asiaticus</i> , <i>L.</i> | Viola odorata, <i>L.</i> |
| " <i>chærophyllus</i> , <i>L.</i> | " " var. <i>Dehnhartii</i> , <i>Boiss.</i> |
| " <i>myriophyllus</i> , <i>Russ.</i> | Saponaria Vaccaria, <i>L.</i> |
| " var. <i>Hierosolymitanus</i> , | Silene Gallica, <i>L.</i> |
| <i>Post.</i> | " <i>Damascena</i> , <i>Boiss. et Gaill.</i> |
| " <i>Constantinopolitanus</i> , | " <i>bipartita</i> , <i>Desf.</i> |
| <i>Arv.</i> | " <i>Atocion</i> , <i>Murr.</i> |
| " var. <i>Palæstinus</i> , <i>Boiss.</i> | " <i>longipetala</i> , <i>Vent.</i> |
| " <i>lomatacarpus</i> , <i>Boiss.</i> | Cerastium glomeratum, <i>Thuil.</i> |
| " var. <i>cornutus</i> , <i>Post.</i> | Alsine tenuifolia, <i>L.</i> |
| Nigella ciliaris, <i>D. C.</i> | Tamarix Pallasii, <i>Desv.</i> |
| Papaver Rheas, <i>L.</i> | Alcea acaulis, <i>Cav.</i> , var. <i>caulescens</i> , |
| Hypecoum grandiflorum, <i>Bth.</i> | <i>Boiss.</i> |
| " <i>procumbens</i> , <i>L.</i> | Lavatera Cretica, <i>L.</i> |
| Corydalis solida, <i>Smith.</i> | " <i>trimestris</i> , <i>L.</i> |
| Fumaria parviflora, <i>Lam.</i> | Malva rotundifolia, <i>L.</i> |
| " <i>Anatolica</i> , <i>Boiss.</i> | Linum pubescens, <i>Russ.</i> |
| Nasturtium officinale, <i>R. Br.</i> | " <i>angustifolium</i> , <i>Huds.</i> |
| Arabis perfoliata, <i>Lam.</i> | Geranium tuberosum, <i>L.</i> |
| " <i>verna</i> , <i>R. Br.</i> | " <i>Libanoticum</i> , <i>Boiss. et Bl.</i> |
| " <i>Montbretiana</i> , <i>Boiss.</i> | " <i>molle</i> , <i>L.</i> |
| " <i>Aucherii</i> , <i>Boiss.</i> | " <i>Robertianum</i> , <i>L.</i> |
| Fibigia clypeata, <i>L.</i> | " <i>lucidum</i> , <i>L.</i> |
| " " var. <i>rostrata</i> , <i>Post.</i> | Erodium Romanum, <i>L.</i> |
| Alyssum Mouradicum, <i>Boiss. et Bal.</i> | " <i>cicutarium</i> , <i>L.</i> |
| Erophila setulosa, <i>Boiss. et Bal.</i> | " <i>moschatum</i> , <i>L.</i> |
| Sisymbrium Thalianum, <i>Steph.</i> | Pistacia Terebinthus, <i>L.</i> |
| " <i>officinale</i> , <i>L.</i> | " " var. <i>Palæstina</i> , <i>Post.</i> |
| Capsella Bursa-Pastoris, <i>L.</i> | Ruta Chalepensis, <i>L.</i> |
| Lepidium cornutum, <i>S. et Sm.</i> | Lupinus, <i>Sp.</i> |
| " <i>crassifolium</i> , <i>M. K.</i> | Ononis Natrrix, <i>L.</i> |
| Biscutella Columnæ, <i>Fen.</i> | " <i>serrata</i> , <i>Forsk.</i> |
| Iberis odorata, <i>L.</i> | Anthyllis vulneraria, <i>L.</i> |
| Peltaria angustifolia, <i>D. C.</i> | Hymenocarpus circinnatus, <i>L.</i> |
| Isatis Aleppica, <i>Scop.</i> | Trigonella Hierosolymitana, <i>Boiss.</i> |
| Ochthodium Ægyptiacum, <i>L.</i> | " <i>filipes</i> , <i>Boiss.</i> |
| Enarthrocarpus arcuatus, <i>Labill.</i> | " <i>stellatum</i> , <i>L.</i> |

- Trifolium purpureum*, *Loisel.*
 " " var. *prostratum*, *Post.*
 " *Alexandrinum*, *L.*
 " *clypeatum*, *L.*
 " *globosum*, *L.*
 " *resupinatum*, *L.*
 " *tomentosum*, *L.*
 " *spumosum*, *L.*
 " *xerocephalum*, *Fenzl.*
 " *nervulosum*, *Boiss.* et
 Held.
 " *repens*, *L.*
 " *speciosum*, *L.*
Cytisoides doryeniifolia, *J. et Sp.*
Tetragonolobus purpureus, *Mönch.*
 var. *Palæstinus*, *Post.*
Astragalus macrocarpus, *D. C.*
 " *schizopterus*, *Boiss.*
Vicia sativa, *L.*
 " *hybrida*, *L.*
 " *Palæstina*, *Boiss.*
Pisum elatius, *M. B.*
Orobis sessilifolius, *S. et Sm.*
Cercis siliquastrum, *L.*
Malus communis, *L.*
Poterium verrucosum, *Ehr.*
Saxifraga scotophila, *Boiss.*
Umbilicus pendulinus, *D. C.*
Sedum littoreum, *Guss.*
Lythrum Graefferi, *Ten.*
Ammi Visnaga, *Lam.*
Scandix Pecten-Veneris, *L.*
Tordylium Ægyptiacum, *L.*
Caucalis leptophylla, *L.*
 " *tenella*, *L.*
Sambucus nigra, *L.*
Vaillantia hispida, *L.*
Rubia Olivieri, *A. Rich.*
 " var. *stenophylla*, *Boiss.*
Galium tricornis, *With.*
 " " var. *verruculosum*, *Post.*
 " *spurium*, *L.*
 " *coronatum*, *S. et Sm.*
 " var. *stenophyllum*, *Boiss.*
 " *articulatum*, *L.*
Asperula arvensis, *L.*
Sherardia arvensis, *L.*
Valeriana Dioscoridis, *Sibth.*
Valerianella carinata, *Loisel.*
 " *coronata*, *W.*
 " *Kotschyi*, *Boiss.*
 " *vesicaria*, *Willd.*
Knautia hybrida, *All.*
Scabiosa Palæstina, *L.*
Helichrysum Siculum, *Spring.*
Anthemis Cassia, *Boiss.*
- Anthemis montana*, *Boiss.*
 " *leucanthemifolia*, *Boiss. et*
 Bl.
 " *Chia*, *L.*
 " *cotula*, *L.*
Chrysanthemum segetum, *L.*
Senecio vernalis, *W. K.*
Centaurea cyanoides, *Berg et Wahl.*
 " *spicata*, *Boiss.*
Lagoseris bifida, *Vis.*
Thrinicia tuberosa, *L.*
Tragopogon longirostre, *Bisch.*
Scorzonera mollis, *M. B.*
Campanula strigosa, *Russ.*
 " *Rapunculus*, *L.*
Specularia Speculum, *L.*
Arbutus Andrachne, *L.*
Erica verticillata, *Forsk.*
Primula acaulis, *Jacq.*
Anagallis arvensis, *L.*
 " var. *Phoenicea*, *Boiss.*
 " var. *cærulea*, *Boiss.*
Styrax officinale, *L.*
Jasminum fruticans, *L.*
Phillyrea media, *L.*
Vinca Libanotica, *Zucc.*
Nerium Oleander, *L.*
Cynoglossum pictum, *Ait.*
Symphytum Palæstinum, *Boiss.*
Anchusa undulata, *Guss.*
 " *strigosa*, *Labill.*
Alkanna macrophylla, *Boiss. et Held.*
Nonnea obtusifolia, *Willd.*
Myosotis hispida, *Sch.*
Lithospermum arvense, *L.*
Echium plantagineum, *L.*
Convolvulus Cantabrica, *L.*
Hyoscyamus aureus, *L.*
Verbascum Blancheanum, *Boiss.*
Celsia Orientalis, *L.*
Linaria Chalepensis, *L.*
Antirrhinum Orontium, *L.*
 " var. *brevifolium*, *Post.*
Scrophularia Scopoli, *Hoppe.*
Veronica Anagallis, *L.*
 " " var. *denticulata*, *Post.*
 " *Syriaca*, *D. C.*
 " *cymbalaria*, *Boiss.*
Trixago Apula, *Stev.*
Eufragia latifolia, *L.*
 " *viscosa*, *L.*
Phelipea ramosa, *L.*
Globularia trichosantha, *F. et M.*
Salvia triloba, *L.*
 " *brachycalyx*, *Boiss.*
 " *Horminum*, *L.*

Stachys annua, <i>L.</i>	Orchis lactea, <i>Poir.</i>
" Arabica, <i>Horn.</i>	" longicruris, <i>Link.</i>
Lamium alexiprurica, <i>L.</i>	" Anatolica, <i>Boiss.</i>
" truncatum, <i>Boiss.</i>	Serapias pseudocordigera, <i>Murr.</i>
Phlomis viscosa, <i>Poir.</i>	Ophrys lutea, <i>Cav.</i>
" var. lanceolata, <i>Boiss.</i>	Iris Sisyrhinchium, <i>L.</i>
Ajuga Orientalis, <i>L.</i>	" pseudacorus, <i>L.</i>
" Chia, <i>Poir.</i>	" Palæstina, <i>Baker.</i>
Plantago major, <i>L.</i>	Gladiolus segetum, <i>Gawl.</i>
" lanceolata, <i>L.</i>	Ruscus aculeatus, <i>L.</i>
" var. altissima, <i>Boiss.</i>	Allium Orientale, <i>Boiss.</i>
" Cretica, <i>L.</i>	Bellevalia ciliata, <i>Cyr.</i>
" Psyllium, <i>L.</i>	" var. paniculata, <i>Post.</i>
Polygonum, <i>sp.</i>	" trifoliata, <i>Ten.</i>
Rumex bucephalophorus, <i>L.</i>	" macrobotrys, <i>Boiss.</i>
Laurus nobilis, <i>L.</i>	" flexuosa, <i>Boiss.</i>
Euphorbia tinctoria, <i>Boiss.</i>	Muscari racemosa, <i>L.</i>
Celtis Australis, <i>L.</i>	Hyacinthus Orientalis, <i>L.</i>
Morus alba, <i>L.</i>	Puschkinia scillioides, <i>Adans.</i>
Urtica urens, <i>L.</i>	Scilla hyacinthoides, <i>L.</i>
" pilulifera, <i>L.</i>	Ornithogalum Narbonense, <i>L.</i>
Parietaria officinalis, <i>L.</i>	" montanum, <i>Cyr.</i>
" Judaica, <i>L.</i>	" fimbriatum, <i>Willd.</i>
Cupressus sempervirens, <i>L.</i>	" var. ciliatum, <i>Boiss.</i>
Juniperus Oxycedrus, <i>L.</i>	Fritillaria acmopetala, <i>Boiss.</i>
Cephalanthera ensifolia, <i>Murr.</i>	" Libanotica, <i>Boiss.</i>
Orchis papilionacea, <i>L.</i>	Tulipa Oculus-Solis, <i>St. Am.</i>
" Morio, <i>L.</i>	Gagea reticulata, <i>Pall.</i>
" sancta, <i>L.</i>	

VI. *Lebanon and Antilebanon.*—These majestic mountains form the most commanding feature in the physical geography of Syria, and are better known botanically than any other portion of the country, except the Littoral. They have been perseveringly explored by Labillardière, Boissier, Blanche, the author, and his pupils in the Syrian Protestant College. They are easily accessible, and a botanist can find in most parts of Lebanon, and in many of Antilebanon, tolerably comfortable quarters in the native villages.

The northernmost range of Lebanon is known as Jebel 'Akkâr, and at its summit is a bold escarpment 2,000 feet high, facing to the west, and overlooking the fertile plain of 'Akkâr. Its highest peaks are but little lower than the more visited summits of Makmel above the cedars. Its botany is far less explored than that of the remainder of Lebanon. Along its eastern flank, and in some of its sheltered ravines, it is somewhat densely wooded. Its more thorough study will doubtless multiply the number of the already rich Lebanon flora. South of this range is that of Makmel, with its sister peaks of the Dhohr-el-Qodhîb, the most truly alpine summits of the chain. These rise to a height of over 10,000 feet.

Their surface is for the most part rounded or conical, and they rise from a plateau or tableland about 9,000 feet above the sea. At the latitude of the cedars, the range of Makmel breaks down into a ridge about 7,000 feet above the sea. This ridge runs southward about thirty miles to Jebel Sunnîn, a pyramidal peak 8,500 feet above the Mediterranean. The top of this peak is truncated, with a triangular surface, having three nearly equal sides, each about three miles long. This surface is broken and hollowed into funnel-shaped excavations, from 500 to 1,000 feet broad at top, and from 200 to 500 feet deep. In these excavations the snowdrifts are deep enough to last all through the summer and autumn, so that Sunnîn is never without snow. South of Sunnîn is another depression of the main chain of Lebanon, to a height of 6,000 feet, then a cathedral-shaped peak 7,500 feet high, known as Jebel Kenîseh (the Church Mountain), then a depression again to about 6,000 feet, a height which is maintained for about twenty-five miles; then a saddle-back double peak, Taumât-Niha (the Twins of Niha), about 6,500 feet high; after which the chain of Lebanon sinks gradually through the range of Jebel Rihân until it ends opposite the Qal'at-esh Shuqîf (Castle of Belfort).

Antilebanon, separated from Lebanon by the Valley of Cœle-Syria, begins opposite the northern end of Lebanon, and runs most of its course as a sub-alpine chain, about 6,000 to 7,000 feet high, until, at its southern extremity, it rises to the only true alpine peak of Hermon, variously estimated at from 9,500 to 10,500 feet high.

The great diversity of surface of these chains, the lofty height of so large a part of their mass, their north and south course, the different meteorological conditions of their seaward and landward slopes, and their isolation on all sides, give a special character of the highest interest to the Lebanon and Antilebanon flora. The list of peculiar plants is a long one. Doubtless it will be diminished as the botany of Northern Syria is better known, but it will still remain one of striking peculiarities and interest.

Lebanon and Antilebanon were once heavily wooded. The many allusions in Scripture indicate that, at least as late as the time of Isaiah, Lebanon was a forest-clothed range. Of its cedar-forests only a few groves remain. They are as follows. The northernmost thus far noted is that of Besherri, the famous "Cedars of the Lord," with about 450 trees. A few miles south of this are the forests of the Maronite Patriarch at El-Hadeth. Farther south are groves at 'Ain Zehaltah, Barûk, and Me'âsir. Cedars have not been noted on

Antilebanon. It would not be strange if they should yet be found. Of other forest trees, the cypress, *Quercus Lusitanica*, Lam.; *Q. Cerris*, L.; *Q. Libani*, Oliv.; *Q. coccifera*, L.; *Pinus Halepensis*, Mill.; *Acer Monspessalanum*, L.; *A. Syriacum*, Boiss. et Gaill.; *Pistacia Terebinthus*, L., with its variety *Palestina*; *Juniperus excelsa*, M.B.; *J. drupacea*, Lab.; *Prunus ursina*, Ky., are common. *Pinus Pinea*, L., is cultivated in open groves, rarely in dense forests, over a large portion of the outcropping sandstone spurs of Lebanon, from an elevation varying from the base to 4,500 feet. It is little, if at all, cultivated in Antilebanon, seeming not to thrive far from the sea. *Ceratonia Siliqua*, L., is scattered here and there over the lower slopes. But the term "forest," in the sense of a continuous, dense growth of trees, covering large tracts of country, can hardly be applied to the tree growth of Lebanon, and only to that of a few places on the eastern flanks of Antilebanon. Isolated trees of *Quercus coccifera*, L., usually planted near tombs of Moslem, or Druze, or Nusairy, or Mutawaly sheiks, often attain imposing proportions, and stand out in bold relief on the mountain peaks, and on the flanks of the ravines.

Of cultivated trees, the olive, the mulberry, and the fig cover a large part of the slopes of Lebanon from its base to a height of 3,000 to 5,000 feet. Silk culture forms one of the principal branches of industry. Wheat and barley are cultivated to a height of 6,000 feet. On the higher levels they are sown in autumn, sprout immediately, are then covered with snow, which kills the tops; but as soon as the snow melts they grow rapidly and vigorously in the moist soil, and produce strong stalks and fine grain.

But for terracing, a large part of Lebanon and Antilebanon would be naked rock. Under the good government guaranteed by the European powers, this process is extending from year to year. If applied to the higher levels, which could thus be utilised for forest-culture, the ancient character of this range could be restored with vast advantage to the climate of the whole Levant.

A complete list of all the plants found in the chain would greatly exceed the limits of this article, and include a large part of the flora of Syria. I will confine myself to a list of plants not hitherto observed elsewhere, so far as known to the writer:—

- Ranunculus Pinardi*, Boiss., Antilebanon.
Papaver Libanoticum, Boiss., Lebanon and Antilebanon.
Aubrietia Libanotica, Boiss., Lebanon.

- Draba oxycarpa*, *Boiss.*, Lebanon.
 „ *vesicaria*, *Desv.*, Lebanon.
Viola Libanotica, *Boiss.*, Lebanon.
Silene Makmeliana, *Boiss.*, Lebanon.
 „ *grisea*, *Boiss.*, Lebanon.
Alsine rupestris, *Labill.*, Lebanon and Hermon.
Arenaria Libanotica, *Ky.*, Lebanon.
Astragalus hirsutissimus, *D.C.*, Lebanon.
 „ *Cedreti*, *Boiss.*, Lebanon.
 „ *emarginatus*, *Labill.*, Lebanon and Hermon.
 „ *Antilibani*, *Bunge.*, Antilebanon.
 „ *coluteoides*, *Willd.*, Lebanon and Antilebanon.
 „ *Hermoneus*, *Boiss.*, Lebanon and Antilebanon.
Vicia canescens, *Labill.*, Lebanon.
Rosa Schergiana, *Boiss.*, Antilebanon.
Potentilla Libanotica, *Boiss.*, Lebanon.
Poterium compactum, *Boiss.*, Lebanon.
Buplevrum Libanoticum, *Boiss. et Bl.*, Lebanon.
 „ *irregulare*, *Boiss. et Ky.*, Lebanon.
Prangos Hermonis, *Boiss.*, Antilebanon.
Pimpinella depaupertata, *Post.*, Lebanon.
Ferula Hermonis, *Boiss.*, Lebanon.
Ferulago frigida, *Boiss.*, Alpine Lebanon and Antilebanon.
Galium Pestalozzæ, *Boiss.*, Subalpine Lebanon.
 „ *Ehrenbergii*, *Boiss.*, Subalpine Lebanon.
 „ *jungermannioides*, *Boiss.*, Subalpine Lebanon.
Helichrysum Billardieri, *Boiss. et Bl.*, Lebanon.
Cousinia Libanotica, *D.C.*, Lebanon.
Cirsium phyllocephalum, *Boiss. et Bl.*, Lebanon.
Jurinea stæhelia, *D.C.*, Lebanon and Antilebanon.
Phæopappus Libanoticus, *Boiss.*, Lebanon and Antilebanon.
Centaurea hololeuca, *Boiss.*, Lebanon.
Leontodon Libanoticum, *Boiss.*, Lebanon.
Scorzonera Libanotica, *Boiss.*, Lebanon.
 „ *Mackmeliana*, *Boiss.*, Alpine Lebanon and Antilebanon.
Crepis robertioides, *Boiss.*, Alpine Lebanon and Antilebanon.
 „ *pterothecoides*, *Boiss.*, Antilebanon.
Hieracium Libanoticum, *Boiss. et Bl.*, Subalpine Lebanon.
Campanula trichopoda, *Boiss.*, Subalpine Lebanon.
Convolvulus Libanoticus, *Boiss.*, Lebanon and Antilebanon.
Verbascum Cedreti, *Boiss.*, Lebanon and Antilebanon.
Veronica bombycina, *Boiss. et Ky.*, Alpine Lebanon.
Origanum Libanoticum, *Boiss.*, Lebanon.
 „ *Ehrenbergii*, *Boiss.*, Lebanon.
Micromeria nummulariæfolia, *Boiss.*, Lebanon and Hermon.
 „ *Libanotica*, *Boiss.*, Alpine Lebanon.
Marrubium Libanoticum, *Boiss.*, Lebanon and Antilebanon.
Stachys Ehrenbergii, *Boiss.*, Lebanon.
Phlomis brevibrabis, *Ehr.*, Lebanon and Antilebanon.
 „ *chrysophylla*, *Boiss.*, Lebanon and Antilebanon.
Acantholimon Libanoticum, *Boiss.*, Lebanon and Antilebanon.
Polygonum Libani, *Boiss.*, Lebanon and Antilebanon.
Thesium Libanoticum, *Boiss.*, Alpine Lebanon.
Euphorbia erinacea, *Boiss. et Ky.*, Alpine Antilebanon.
 „ *caudiculosa*, *Boiss.*, Alpine Lebanon.
Colchicum Libanoticum, *Ehr.*, Alpine Lebanon.

- Tulipa Lownei*, *Baker*, Lebanon and Antilebanon.
Ornithogalum Libanoticum, *Boiss. et Bl.*, Lebanon.
Allium Schergianum, *Boiss.*, Antilebanon.
 „ *Zebedanense*, *Boiss. et Noc.*, Antilebanon.

A botanist ascending Lebanon from the seacoast plain passes in many places through plantations of *Pinus Pinea*, *L.*, and native groves of *P. Halepensis*, *Mill.*, and scrubs of *Quercus coccifera*, *L.* He will note at an elevation of 1,000 feet *Erica verticillata*, *Forsk.*, which flourishes especially on the red sandstone which crops out occasionally from the limestone; *Cistus villosus*, *L.*, and *C. salviæfolius*, *L.* At a height of 4,000 feet he will encounter *Centranthus longiflorus*, *Stev.*, and *Sambucus Ebulus*, *L.* From this level the flora begins to be sub-alpine, comprising such plants as *Eryngium Billardieri*, *Lar.*; *Rhododendrum Ponticum*, *L.*; and *Cedrus Libani*, *L.* It is not until the alpine region is reached, however, that the peculiarities of Lebanon appear. On those rounded, naked summits are innumerable hemispherical clumps of *Acantholimon Libanoticum*, *Boiss.*, several excessively thorny erinaceous species of *Astragalus*, and *Onobrychis cornuta*, *L.* On the surface of the rocks are patches of *Cerasus prostrata*, *Labill.*, and *Cotoneaster nummularia*, *F. et M.*, both intricately branched shrubs. In the patches of soil among the rocks are herbaceous perennials, such as *Heracleum humile*, *Flor. Græc.*, *Nepeta Cilicica*, *Boiss.*; and in crevices and caves *Asplenium Ruta-Muraria*, *L.*; *A. Bourgæi*, *Boiss.*; and *Cystopteris fragilis*, *L.* On the gravelly hillsides are found *Pisum formosum*, *Stev.*, *Erodium trichomanefolium*, *L'Her.*, and *Astragalus trichopterus*, *Boiss.* After a few minutes collecting the portfolio of the botanist is full of rare and most interesting species, many not elsewhere found.

VII. *The Table-lands of Palestine*, east and west of the Jordan, are about 2,500 feet above the Mediterranean. The climate is considerably cooler than that of the semi-tropical maritime plain, and the rainfall in winter is abundant. There is a general resemblance between the flora east and west of the Jordan, but that of the former shades off gradually into that of the central and northern plains. Thus in rising from the maritime plain to the hill country of Palestine one encounters the plants of the coast range of Lebanon. At the summit he finds a flora closely resembling that of the middle zone of Lebanon. Soon after crossing the watershed and descending towards the Ghor, the flora assumes the desert type, which increases as one descends into the trough

of the Dead Sea. Thus there is a very strong contrast between the eastern and western slopes of the Palestine hills. On the other hand, on rising from the Jordan valley up the hills of Moab and Gilead, the botanist soon begins to encounter the familiar plants of the western slopes of Palestine and Lebanon.

Western Palestine has few trees and almost no forests. Eastern Palestine, on the contrary, has some forests, especially in Gilead. There is a considerable grove of *Arbutus Andrachne*, *L.*, on the northern slope of Jebel Hosha, and there are shady forests of oak, pine, and terebinth in many of the wadis which debouche into the Jordan Valley. So closely are the botanical characteristics of the uplands of western Palestine allied to those of the lower and middle zone of Lebanon that there are almost no plants peculiar to this region. East of the Jordan in Moab and Gilead the following plants were found by the author in the spring of 1886:—

Æthionema Gileadense, *Post.*
Anthriscus laticarpa, *Post.*
Hypochaeris altissima, *Post.*

Trichodesma Boissieri, *Post.*
Scrophularia Gileadense, *Post.*

VIII. *The Trough of the Jordan and Dead Sea.*—The flora of the mountain flanks on either side of this great cleft changes at the sea level, which is about half-way down their sides at the latitude of Jericho and three quarters at Tiberias. Above this level the plants are those of the middle mountain zone, while below it they approximate more and more to the desert types. In going down from Jerusalem to Jericho or from Bethlehem to the Dead Sea the change on the former route is noted at Khan Hatrûr (the inn where the Good Samaritan left the wounded man), and on the latter above Mar. Saba. The first of the characteristic plants met with is *Statice Thouini*, *Viv.*; then *Atriplex Palestinum*, *Boiss.*; *Matthiola oxyceras*, *D.C.*; and, as we descend deeper into the torrid valley, *Gymnocarpum fruticosum*, *Pers.*; *Haplophyllum longifolium*, *Boiss.*; *Gypsophila Rokejeka*, *Del.*; *Allium Hierochuntinum*, *Boiss.*; and *Zygophyllum dumosum*, *Boiss.* To the present time the following species have been found only in this valley:—

Tamarix Jordanis, *Boiss.*
Umbilicus lineatus, *Boiss.*
Daucus Jordanicus, *Post.*
Psammogeton microcarpum, *Post.*

Verbascum Tiberiadis, *Boiss.*
Asparagus Palestinus, *Baker.*
 „ *Lownei*, *Baker.*

There are, however, a number of striking species which are peculiar to this cleft as far as our district is concerned,

such as *Balanites Ægyptiaca*, *Del.*; *Solanum coagulans*, *Forsk.*; *Calotropis procera*, *Willd.*; *Loranthus Acaciæ*, *Zucc.*; *Berberis* *plumbaginea*, *Cav.*; *Periploca aphylla*, *Dec.*; *Populus Euphratica*, *Oliv.*; besides a considerable number of herbaceous plants, in all about twenty-five species.

The fringe of trees along the Jordan is principally composed of *Populus Euphratica*, *Oliv.*, several *Salices*, and *Tamarix Jordanis*, *Boiss.*, and *T. Pallasii*, *Desv.* The most numerous of all the trees of the plain about Jericho is the *Zizyphus Spina-Christi*, *L.* The flora of the deep valleys which drain the table-lands on either side of the Jordan is quite of the desert type. For example, about Callirrhœ are found *Aizoön Canariense*, *L.*; *Moringa aptera*, *Gaestn.*; *Pentatropis spiralis*, *Forsk.*; *Dæmia cordata*, *R. Br.*; *Fagonia glutinosa*, *Del.*; *Cleome trinervia*, *Fresen.*; *Trichodesma Africanum*, *L.* From these valleys the transition is easy to—

IX. The Deserts.—The surface of these deserts is extremely varied, and the substratum not less so. In some places there is nothing but hot, barren rocks, and yet even from these spring many interesting plants, such as *Helianthemum Kahiricum*, *Del.*; *Chenolea Arabica*, *Boiss.*; *Moricandia dumosa*, *Boiss.*; *Reaumuria Palestina*, *Boiss.*; *Boucerosia Aaronis*, *Hart.* (peculiar, so far as yet known, to Mount Seir); *Capparis spinosa*, *L.* In other places where the soil is sandy or gravelly, as at the bottom of the wadis, there is a host of annuals, such as *Nigella deserti*, *Boiss.*; *Notoceras Canariense*, *R. Br.*; *Anastatica Hierochuntinum*, *L.*; *Hippocrepis cornigera*, *Boiss.*; *Linaria macilentata*, *Decaisn.*; *L. Hælava*, *Forsk.*; *Atriplex dimorphostegium*, *Kar. et Kir.*; *Kochia latifolia*, *Fresen.*; *K. muricata*, *L.* The majority, however, of the desert plants are perennial herbs or shrubs, as *Farsetia ovalis*, *Boiss.*; *Reseda muricata*, *Presl.*; and *R. pruinosa*, *Del.*; several species of *Zygophyllum* and *Fagonia*; *Nitraria tridentata*, *Desf.*, the Gharqod of the Arabs; *Astragalus Sieberi*, *Del.*; *Acacia Seyal*, *Del.*; *Lithospermum callosum*, *Vahl.*; *Phelipea lutea*, *Desf.*; and *Ph. tubulosa*, *Schenk.*; *Statice pruinosa*, *L.*; *Atriplex Palestinum*, *Boiss.*; and *Ephedra alata*, *Decaisne.*

The following species have their centre of dispersion in or not far from the Tih, although all are not wholly confined to our deserts:—

Delphinium deserti, *Boiss.*
 " *Bovei*, *Dec.*
Glaucium Arabicum, *Fres.*
Morettia canescens, *Boiss.*
Nasturtiopsis Arabica, *Boiss.*
Hussonia uncatata, *Boiss.*

Koniga Arabica, *Boiss.*
Isatis microcarpa, *J. Gay.*
Moricandia dumosa, *Boiss.*
Schimpera Arabica, *H.*
Dianthus Judaicus, *Boiss.*
Reaumuria Palestina, *Boiss.*

<i>Moringa aptera</i> , Gaertn.	<i>Salsola tetragona</i> , Del.
<i>Crucianella membranacea</i> , Boiss.	" <i>lancifolia</i> , Boiss.
<i>Scabiosa eremophila</i> , Boiss.	<i>Ephedra Alte</i> , C. A. M.
" <i>arenaria</i> , Forsk.	<i>Iris Helenæ</i> , W. Barb.
<i>Anthemis microsperma</i> , Boiss.	<i>Pancretium Sickenbergeri</i> , Asch. et Schweinf.
" <i>melanopodina</i> , Del. et G.	<i>Allium Sinaiticum</i> , Boiss.
<i>Chamæmelum auriculatum</i> , Boiss.	" <i>modestum</i> , Boiss.
<i>Brocchia cinerea</i> , Del.	" <i>hirsutum</i> , Zucc.
<i>Artemisia Judaica</i> , L.	" <i>Rothii</i> , Zucc.
<i>Atractylis prolifera</i> , Boiss.	<i>Muscari longipes</i> , Boiss.
<i>Centaurea ammocyanus</i> , Boiss.	<i>Trisetum glumaceum</i> , Boiss.
<i>Carduncellus eriocephalus</i> , Boiss.	<i>Avena Wiestii</i> , Stead.
<i>Leontodon Arabicum</i> , Boiss.	<i>Boissiera bromoides</i> , Hochst.
<i>Crepis Arabica</i> , Boiss.	<i>Vulpia pectinella</i> , Del.
<i>Pentatropis spiralis</i> , Forsk.	<i>Sclerochloa dichotoma</i> , Forsk.
<i>Boucerosia Aaronis</i> , Hart.	
<i>Traganum nudatum</i> , Del.	

The following plants are peculiar to the as yet almost unknown Syrian Desert, which is, however, more to be regarded as an extension of the great plains than a proper desert:—

<i>Reaumuria Billardieri</i> , Jaub. et Sp.
<i>Haplophyllum Blanchei</i> , Boiss.
<i>Trigonella Blanchei</i> , Boiss.
<i>Astragalus ancistrocarpus</i> , Boiss. et Haussk.
<i>Ferula Blanchei</i> , Boiss.
<i>Picris Blancheana</i> , Boiss.
<i>Scleropoa procumbens</i> , Curt.

X.—*The Great Plains* of Cœle-Syria, Haurân, Damascus, Aleppo, and Aintâb are extensive prairies, often broken by ranges of hills or isolated eminences. On these breezy uplands grow a great number of species not found in the mountain, coast, or desert regions, but having a wide range to the eastward, which the journeys of successive travellers are ever extending. These plains are in many places exceedingly fertile, and once supported a teeming population, as is testified by the ruined cities of Haurân and the vast territory to the north-east of Aleppo.

The most characteristic genus of these plains is *Astragalus*, with a list of about thirty species. After it come *Verbascum* and *Phlomis*.

The following list of plants thus far found only in these plains, but in many cases doubtless found also in the Syrian Desert, which shades off into them by imperceptible lines. The peculiar genera are in italics:—

<i>Malcolmia Aurantica</i> , Post.	<i>Habrosia spinuliflora</i> , Ser.
<i>Chrysochamela velutina</i> , D. C.	<i>Hypericum retusum</i> , Auch.
<i>Brassica Aintabensis</i> , Post.	<i>Erodium Gaillardoti</i> , Boiss.
<i>Isatis cochlearia</i> , Boiss.	<i>Fagonia Olivieri</i> , D.C.

Haplophyllum fruticosum, <i>Labill.</i>	Echinops <i>Blancheana</i> , <i>Boiss.</i>
" villosulum, <i>Boiss et</i>	Cousinia <i>Aleppica</i> , <i>Boiss.</i>
<i>Haussk.</i>	" <i>Aintabensis</i> , <i>Boiss. et</i>
Medicago <i>Shepardii</i> , <i>Post.</i>	<i>Haussk.</i>
Trifolium <i>Aintabense</i> , <i>Boiss. et</i>	Centaurea <i>laxa</i> , <i>Boiss. et Haussk.</i>
<i>Haussk.</i>	" <i>thriniciæfolia</i> , <i>D. C.</i>
Psoralea <i>Jaubertiana</i> , <i>Fenzl.</i>	" <i>Onopordifolia</i> , <i>Boiss.</i>
Astragalus <i>triradiatus</i> , <i>Bge.</i>	" <i>polycephala</i> , <i>Post.</i>
" <i>pauciflora</i> , <i>Post.</i>	" <i>Trachonitica</i> , <i>Post.</i>
" <i>Damascenus</i> , <i>Boiss. et</i>	" <i>Postii</i> , <i>Boiss.</i>
<i>Gaill.</i>	Zoegea <i>leptaurea</i> , <i>L.</i>
" <i>aulacolobus</i> , <i>Boiss.</i>	Garhadiolus <i>hamosus</i> , <i>Boiss. et Bl.</i>
" <i>conduplicatus</i> , <i>Best.</i>	Picris <i>Kotschyi</i> , <i>Boiss.</i>
" <i>Dorcoceras</i> , <i>Bge.</i>	Scorzonera <i>Kotschyi</i> , <i>Boiss.</i>
" <i>chrysophyllus</i> , <i>Boiss.</i>	Trachelium <i>Postii</i> , <i>Boiss.</i>
" <i>Rousseanus</i> , <i>Boiss.</i>	Convolvulus <i>stachydifolius</i> , <i>Choisy.</i>
" <i>lepidanthus</i> , <i>Boiss.</i>	Verbascum <i>simplex</i> , <i>Labill.</i>
" <i>Aintabicus</i> , <i>Boiss.</i>	" <i>Syriacum</i> , <i>Schrad.</i>
" <i>deinacanthus</i> , <i>Boiss.</i>	" <i>ptychophyllum</i> , <i>Boiss.</i>
" <i>dipodurus</i> , <i>Bge.</i>	" <i>Damascenus</i> , <i>Boiss.</i>
" <i>oxyphyllum</i> , <i>Boiss. et</i>	" <i>Germaniciæ</i> , <i>Haussk.</i>
<i>Haussk.</i>	" <i>Aleppense</i> , <i>Benth.</i>
" <i>Russelii</i> , <i>Boiss.</i>	Linaria <i>Damascena</i> , <i>Boiss. et Gaill.</i>
" <i>Oocephalus</i> , <i>Boiss.</i>	Scrophularia <i>scariosa</i> , <i>Boiss.</i>
" <i>Trachoniticus</i> , <i>Post.</i>	" <i>tagetifolia</i> , <i>Boiss. et</i>
Hedysarum <i>atomarium</i> , <i>Boiss.</i>	<i>Haussk.</i>
Onobrychis <i>megataphros</i> , <i>Boiss.</i>	Zizyphora <i>acutifolia</i> , <i>Montb. et Auch.</i>
" <i>galegifolia</i> , <i>Boiss.</i>	Nepeta <i>cryptantha</i> , <i>Boiss. et Haussk.</i>
Vicia <i>mollis</i> , <i>Boiss. et Haussk.</i>	" <i>Shepardii</i> , <i>Post.</i>
" <i>Aintabensis</i> , <i>Boiss. et Haussk.</i>	" <i>Trachonitica</i> , <i>Post.</i>
Cucumis <i>trigonus</i> , <i>Roeb.</i>	Stachys <i>satureoides</i> , <i>Montb. et Auch.</i>
Actinolema <i>eryngiodes</i> , <i>Fenzl.</i>	Lamium <i>Aleppicum</i> , <i>Boiss. et</i>
Carum <i>polyphyllum</i> , <i>Boiss. et Bl.</i>	<i>Haussk.</i>
" <i>brachyactis</i> , <i>Post.</i>	Teucrium <i>Auraniticum</i> , <i>Post.</i>
" <i>nudum</i> , <i>Post.</i>	Polygonum <i>Aleppicum</i> , <i>Boiss. et</i>
Coriandrum <i>tordylioides</i> , <i>Boiss.</i>	<i>Haussk.</i>
Colladonia <i>Auranitica</i> , <i>Post.</i>	Euphorbia <i>Chesneyi</i> , <i>Kl. et Gike.</i>
Smyrniopsis <i>cachroides</i> , <i>Boiss.</i>	" <i>Postii</i> , <i>Boiss.</i>
Ferulago <i>Auranitica</i> , <i>Post.</i>	Biarum <i>Russelianum</i> , <i>Schott.</i>
Ferulago <i>Trachonitica</i> , <i>Post.</i>	Arum <i>melanopus</i> , <i>Boiss.</i>
Galium <i>Syriacum</i> , <i>Boiss.</i>	Iris <i>fumosa</i> , <i>Boiss. et Haussk.</i>
" <i>bracteatum</i> , <i>Boiss.</i>	Colchicum <i>fasciculare</i> , <i>L.</i>
<i>Mericarpæa vaillantoides</i> , <i>Boiss.</i>	" <i>brachyphyllum</i> , <i>Boiss. et</i>
Achillæa <i>membranacea</i> , <i>Labill.</i>	<i>Haussk.</i>
" <i>oligocephala</i> , <i>D. C.</i>	[These two species are probably
Anthemis <i>Haussknechtii</i> , <i>Boiss. et</i>	one, and identical with <i>C. Ritchii</i> , in
<i>Bul.</i>	which case they are not peculiar to
" <i>Damascena</i> , <i>Boiss. et</i>	this region.]
<i>Gaill.</i>	Allium <i>Noëanum</i> , <i>Reut.</i>
Chamæmelum <i>grandiflorum</i> , <i>Boiss.</i>	Bellevalia <i>densiflora</i> , <i>Boiss.</i>
<i>et Haussk.</i>	Asphodeline <i>Damascena</i> , <i>Boiss.</i>
Dipterocome <i>pusilla</i> , <i>F. et M.</i>	

Besides the above list of plants thus far peculiar to these plains, the following plants, although found farther east and north, are highly characteristic:—

Delphinium Cappadocicum, <i>Boiss.</i>	<i>Onobrychis</i> Gaillardoti, <i>Boiss.</i>
Sterigma sulphureum, <i>Russ.</i>	<i>Lathyrus</i> chrysanthus, <i>Boiss.</i>
Crambe Orientalis, <i>L.</i>	<i>Asperula</i> Orientalis, <i>Boiss. et Hoh.</i>
Cleome ornithopodoides, <i>L.</i>	<i>Postia</i> lanuginosa, <i>D. C.</i>
Trigonella Aleppica, <i>Boiss. et Haussk.</i>	" <i>microcephala</i> , <i>Boiss.</i>
Astragalus Aleppicus, <i>Boiss.</i>	<i>Acantholopis</i> Orientalis, <i>L.</i>
" <i>Echinops</i> , <i>Boiss.</i>	<i>Phelipea</i> salsa, <i>C. A. M.</i>
<i>Onobrychis</i> Kotschyana, <i>Fenzl.</i>	<i>Bellevalia</i> nervosa, <i>Bert.</i>

The isolated range of Jebel-ed-Durúz might almost be erected into an eleventh botanical subdivision of the lands which form the subject of this article. This range, which was called by the Romans Alsdamus, and by the Hebrews the Hills of Bashan, is one of the most remarkable geological features of Syria. Set back forty miles from the main chain which bounds the great longitudinal cleft to the east, it differs from the other mountains in that it is volcanic in origin. Jebel-Qulêb, the highest peak, 5,400 feet above the sea, is a long extinct crater, with its steep cone still formed of pumice. El-Jawalîl, the next in height, is not crater-like, but is none the less volcanic. Tel-Šihân, at the eastern angle of the Leja, is one of several craters, formed of pumice and lava, the immense stream of which has flowed across the plain, and formed the strange sea, amid the solid waves of which are the crevasses and caverns in which the rebellious Druzes have often been able to defy the military power of Turkey. The black basalt, which is scattered freely over the plain, and of which the solid stone doors and windows of the giant cities of Bashan are formed, extends more or less northward to Aleppo. Doubtless the whole of the region from Callirrhœ to Aleppo was once a seat of volcanic disturbance and eruptions. In this respect it is in striking contrast with the regions west of the Jordan, and Cœle-Syria, and the valley of the Orontes. Only at Safed, at the base of Cassius, about Antioch, and in portions of the Amanus chain is there evidence of volcanic disturbance, and that of the highest antiquity. Nevertheless, the periodical earthquakes at Safed, Lattakia, and Antioch show that some vestiges of subterranean activity are still at work.

The flora of the Hauran Mountains and the continuous ranges of hills to the north and south is as little explored as that of the surrounding plain. Nevertheless, it is certain that the woods which once covered the higher regions of these hills are all cut down. A scanty fringe of *Pistacia terebinthus*, *L.*, only remains on the cone of Jebel-Qulêb. There are, however, extensive oak scrubs along the western foot of the range. Of the herbaceous flora, in addition to other peculia of the trans-Jordanic region, the writer noted *Thalictrum isopy-*

roides, *C. A. U.*, and *Anthriscus nemorosa, M. B.*, on the northern declivity of the cone of *Jebel-Quléb*. These plants have not before been observed in Syria. He also observed an immature *Dianthus*, perhaps *D. libanotis, Labill.* The summit of *El-Jawalil*, is almost totally bare of vegetation. Two new species, *Trifolium Alsadami, Post*, and *Alopecurus involucratus, Post*, were discovered near the base of *Jebel-Quléb*, and *Verbascum Qulebicum, Post*, near its summit.

In closing this article it may not be amiss to allude to the range and number of plants cultivated with ease in the open air in Syria and Palestine. *Nigella arvensis, L.*, is raised from the black seeds which are known as the *El-Habbat-es-saudā* (the black seed), or *Habbat-el-Barakat* (the seed of blessing). These seeds are sprinkled over the surface of the flat loaves of bread. They are the *fitches* of *Is. xxviii. 25, 27*. *Pæonies* grow wild in the northern mountains. The opium poppy, *Papaver somniferum, L.*, is common in cultivation, though opium is not made in Syria. The capsules are used in making sedative infusions. Of crucifers we have black and white mustard, cabbage, cauliflower, turnip, cresses, and radishes.

Flax, rue, sorrel, and *Cactus Ficus-Indica* grow wild. The vine, with an endless variety of fruits, is universal, even to a height of 6,000 feet above the sea. There are maple, tamarisk, terebinth, *Schœnus*, *Pride of India*, and jujube trees. The lemon, orange, and citron are cultivated everywhere along the coast from *Tripoli* southward.

Of *Leguminosæ* the number of cultivated plants is very large,—lupine, beans, horse-beans, peas, lentiles, *Cicer arietinum*, mash (a species of *Phaseolus*), carob-trees, acacia (the *Shittim* of Scripture), and the locust, the latter introduced.

Of *Rosaceous* plants, the strawberry, blackberry, peach, plum, almond, apricot, nectarine, apple, quince, medlar, and *Photinia Japonica*, all flourish. Syria is pre-eminently a rose country, most cultivated varieties attaining an excellent development.

Of *Grossulaceæ* there are none which succeed well in this land, although gooseberries and currants have been cultivated. The pomegranate is indigenous in the north, and the myrtle everywhere. *Eucalypti* flourish in marshy ground. Water-melons, musk-melons, squash, pumpkins, and cucumbers all reach a fine development.

Of *Umbelliferæ*, the coriander, dill, fennel, caraway, anise, celery, parsley, parsnip, and carrot either grow wild or flourish under cultivation.

Valerian grows wild, as also carthamus, chicory, and lettuce of several kinds, and artichokes are cultivated.

Of Solanaceous plants the potato, tobacco, tomato, and egg-plant are cultivated, and henbane and nightshade grow wild.

The sesame forms a considerable part of the produce of the plains.

The olive flourishes everywhere, and yields a considerable part of the wealth of the country. Figs, sycamores, mulberries, hemp, and the ramié (Chinese silk) plant all flourish. The plane tree, the walnut, the edible pine, and a considerable variety of oaks, the hornbeam, and the beech are abundant, the latter two especially in Northern Syria. The castor-oil plant is almost universal.

Of Monocotyledons the palm, the banana, many liliaceous flowers, the *Colocasia antiquorum*, *Schott* (which is cultivated in marshy ground), many kinds of iris, tulip, and crocus flourish in appropriate situations.

Grass is not cultivated for hay, except on the farm of the Damascus Road Company at Shetoorah, in Cœle-Syria. Nevertheless, the success of this company, which makes the hay there raised a considerable part of the food of its large number of horses and mules, warrants the belief that hay could be made one of the staples of Syria.

Maize, wheat, barley, sorghum, and sugar-cane are staples. The papyrus is now confined to the Hûleh, and perhaps to the marshes of the Kishon. *Arundo Donax* and *Saccharum Ægyptiacum*, the gigantic grasses of the country, are put to numerous uses. They are everywhere cultivated as hedge plants.

In conclusion, although this list is illustrative, but by no means exhaustive, it will be seen from the foregoing sketch, that the variety of the flora of Syria and Palestine corresponds with its central situation and diversity of soil, climate, and surface, and the extreme inequality of the meteorological conditions of its different though not distant regions. It will not escape the thoughtful observer of these facts, that the microcosm selected for the development of the chosen people and the revelation of the Word was thus eminently suited to be the physical basis of the world-religion.

The PRESIDENT (Professor G. G. Stokes, D.C.L., P.R.S.).—I have now to invite discussion on the paper just read,—a paper containing a most elaborate account of the botany of regions which, as yet, comparatively few have studied. Among those present who are acquainted with the countries spoken of, I observe Dr. Chaplin, who will, perhaps, be kind enough to open the discussion.

T. CHAPLIN, M.D.—I am much obliged to the President for giving me the opportunity of saying a few words, but I am sure, as all present will feel, I can have very little to add to the elaborate and complete description of the botany of Syria and Palestine given by Dr. Post, for which we owe him a deep debt of gratitude. It has fallen to my lot to study with some care, and not altogether without means of personal observation, the flora of a great portion of the district over which Dr. Post has carried us to-night, and I am very glad of the opportunity of finding how much I still have to learn on the subject. I allude particularly to the reasons the author has given as to why the flora of Palestine and Syria is so copious as we find it to be, and why also it contains, comparatively speaking, so few genera peculiar to itself. It may not, perhaps, be known to all present how very much the scientific world is indebted to Dr. Post for the earnest and constant industry with which he has devoted himself to this interesting and important subject, nor to how large an extent he has availed himself of the opportunities afforded him in Beyrout as the head of the Medical and Scientific College there established. I should like here to add that this is one more brilliant instance of the great and important contributions which have been made by Christian missionary institutions for the advancement of science and the benefit of mankind. Personally, I feel extremely glad to meet my old friend and colleague here in London, and am most deeply indebted to him for his very valuable paper.

REV. F. A. WALKER, D.D., F.L.S.—I am personally more interested in this than in any paper I ever heard read at the Victoria Institute. So far as my own brief and limited experience goes, I have seen in different localities many of the plants in Syria and Palestine which Dr. Post has here recorded, and I have also in Greece seen several of those mentioned as being found in Syria and Palestine. This, however, is only natural when we think of the wide uniformity of the Mediterranean littoral, there being the same

limestone formation in Corsica and Greece as prevails throughout Syria and Palestine. The colour of the soil and the botanical species and geological formations in Greece remind one strongly of what is met with in Syria and Palestine. If one takes an example, there is the *Gladiolus Illyricus* or *Gladiolus Atroviolescens*, which Dr. Post informs us is supposed to be "the lily of the field,"—the lily of the Gospel: first, because it is a lily, which the anemones are not; and, next, because it is found in the fields, where, as I myself have seen, it flourishes in the spring-time at Beyrout and in the neighbourhood of Issus. This gladiolus is found but rarely in England, the New Forest being one of the few localities where it is met with, and I think, speaking under correction, that the *Gladiolus Aleppicus*, a dusky species, is much rarer: I had one specimen of the latter given to me at Jerusalem. I should like to add a few words about the oak galls mentioned in the paper. My late father, Francis Walker, who was a Fellow of the Linnæan Society, was a great authority on oak galls, of which he made a special study, and in Professor Mayer's work, translated by him and continued by Mr. Edward Fitch, there is an account of the galls round Vienna. Five kinds of oak are mentioned as bearing galls. I always heard from my father that the oak had more galls peculiar to it than any other tree. Of the five kinds of oak here alluded to as bearing galls, some of them would seem to be Southern or Eastern species. In fact, most of the trees bearing galls appear to be peculiar to the East. I have seen galls on most of the trees here mentioned.

The AUTHOR.—I may here remark that the number of galls found in the region of Amanus is simply astounding. I never saw such a number. I am now engaged in the study of a collection, but am not at present able to report upon them. If any one would indicate a gentleman who would undertake the study of them I should be greatly obliged. The variety one meets with in the northern woods of Syria is simply astonishing.

Rev. J. NEIL.—I should like to add a word as to our indebtedness to Dr. Post, not only for this paper, but for the valuable work he has accomplished in the regions of which he speaks. In this paper there are no fewer than seventy-five new species or varieties,—mostly species,—which bear Dr. Post's name (applause). The discovery of such a number of species and varieties certainly entitles him to our best thanks. I should like to offer one or two remarks about Southern Palestine, as to the fewness of the

grasses. What Dr. Post says is very true,—the number of species generally in Palestine, when we consider the limit of its extent, is simply enormous. Look at the list given in Canon Tristram's *Flora of Palestine*, and then look at the list of British plants, and one is astonished at the immensely superior number of species found in Palestine,—a land scarcely larger than Wales. The *Leguminosæ* in Palestine are represented by 358 species, but in England, Scotland, and Wales by less than 90 species. That is, in Palestine there are four times as many species of *Leguminosæ* as we have in Great Britain. Of *Compositæ* there are twice as many species in Palestine as we have here; of *Cruciferae*, *Labiatae*, and *Umbelliferae*, more than twice as many; and of *Liliaceæ* more than three times as many. But this is not the case with regard to the grasses, for while there are only 158 species of the *Gramineæ* named in Palestine, we have in England about 138 species. That is, the proportion in this case is only about as eight to seven. This may be said to be characteristic of a country which is swept by the awful Sirocco, or south-east wind of the Bible, which visits it in May and October, and, blowing over a thousand miles of the Arabian sand-desert, bursts upon Palestine like the blast of a furnace, deprived of all ozone and possessed of a terribly scorching power. The small number of species of grasses, compared with the great number of species of other natural orders, is a very singular feature in the botany of Palestine. Hay, Dr. Post says, is made now, but it was never made in olden times, and there is no trace of it in what we have been able to gather of the life and habits of the people, nor any mention of it in the Bible. The practice of making hay has been introduced by Europeans. The natives feed their animals on crushed straw (*teben*, the Hebrew *teven*) and barley for the greater part of the year; and glad enough have I been to see the newly-cut fresh barley grass brought up to my stables for the horses during the two brief months, March and April, when alone any kind of grass could be had. Another feature is the abundance and splendour of the crimson flowers. I do not think Dr. Post points this out, though in the case of the littoral he speaks of *Anemone Coronaria*, and *Ranunculus Asiaticus*. Against all the brilliant crimson flowers of Palestine, we in England have only three amongst all our true wild plants,—the poppy, the pimpernel, and the pheasant's eye (*Adonis autumnalis*). In Syria one may see eight or nine different crimson or scarlet-crimson flowers in a day's walk. I will here say a word about the *Anemone Coronaria*, with which I would associate the

tulip, *Tulipa Gesneriana*, of a brilliant red, the prevailing species, which, when opening in the bud, appears very like *Anemone Coronaria* in the same condition, and which I still think, with all deference to Dr. Post, is the most likely claimant to the title of "the lily" of the Authorised Version. The tulip and the *Anemone Coronaria* are very common flowers. The gladiolus which we have in Southern Palestine seems to be the same as the English one, at least it is the same somewhat insignificant pinkish colour, the other mentioned by Dr. Post being very rare. But the lips of the bride in the Song of Songs are compared to "lilies," and this flower must therefore have been of a crimson colour. I take it that "the Rose of Sharon" must have been a cultivated plant, because among the natives you never hear them talk of the wild flower of any particular district, nor is any wild flower ever alluded to in that way in Holy Scripture. The whole utilitarian, ignorant, and unscientific nature of the masses in the East precludes the possibility of such a thing. Valuable cultivated products are thus alluded to as "the cedars of Lebanon," "the wheat of Minnith," &c., but wild flowers, never. If you ask a *fellah* the name of the loveliest wild flower, he will probably reply with undisguised contempt, *Ya hhawadjah hhasheeh*, "Oh, sir, it's grass." Consequently "the Rose of Sharon" must have been a cultivated flower. It was in all probability a white Damascene rose of the free flowering kind, now grown for the purposes of the perfume market. There is thus afforded a striking and beautiful contrast in the Song of Songs (answering to "the white and ruddy" of Canticles, v. 10) between the lowly wild crimson anemone or tulip, imaging our Saviour's human nature, and the rich white cultivated rose, representing His divine nature, in the words, "I am the Rose of Sharon, and the Lily of the Plains" (Cant. ii. 1). A further very peculiar and striking feature in connexion with the Flora of Southern Palestine, and more or less of all the adjacent regions, is the growth of plants mostly on the northern slopes of the hills, the southern slopes being left comparatively bare, or clothed chiefly with desert species with whitish-woolly or glaucous foliage. Three causes, I believe, account for this curious and highly characteristic feature of Northern Palestine, which makes the country look far greener and more fertile when traversed from north to south, than it does when traversed in the opposite direction. First, the sub-tropical rain, the *geshem*, or "gushing down-pour," of the Hebrew Bible, which during the wet season, November to April, comes up from the south-west, and

washes away the soil on part of the southern side. Secondly, the burning sun, scorching down unshaded by a single cloud all day, for some six months in succession, during the hot season, May to October, pouring its sultry rays from the south. Last, but not least, the terrible Sirocco, the burning south-east wind of May and October, to which I have already alluded. With regard to what is said at the end of Dr. Post's paper as to certain plants flourishing in Syria and Palestine,—in Southern Palestine, I must certainly, with reference to some of these plants, take exception to the word "flourishing." I allude especially to the apricot and the apple. The apples in any part of Palestine are certainly not to be compared with ours; and Mr. Meshullam, who for 25 years, as an experienced practical horticulturalist, cultivated the so-called gardens of Solomon at *Wady Urtas*, assured me that the apple-tree could not bear for more than three or four years running in Southern Palestine, without deteriorating and requiring a fresh graft. The same remark applies to the apricot, which is not grown in any quantity further south than 130 miles north of Jerusalem. I mention this because attempts have been made to identify the apple and the apricot with the *tappoahh*—"the apple," of our Authorised and Revised Versions—which latter I cannot doubt was the orange. (See my two letters to the *English Churchman*, of March 29th and April 5th, 1888.) All Southern Palestine is too hot and dry to allow of the apple flourishing there, as Dr. Tristram states in *Aids to Bible Students*; and this is true in a less measure of the apricot, which, like the apple, ripens well in the open in this country. In a *Guide to Kew*, published under Sir Joseph Hooker's authority, our apple is said to be the "apple" of Scripture.

Mr. W. GRIFFITH.—I agree with the previous speakers that we are greatly indebted to Dr. Post for the valuable contribution he has made to the science of botany. Such a contribution as this will stand as a monument of the research which has been successful in discovering so many new species. I should not be bold enough to criticise his paper; but I desire, as a learner, to ask one or two questions. The flora described to us is rich in the extreme, both the species and the genera being numerous. Will Dr. Post inform us whether many or any of the species contribute much to the *materia medica* of that science in which he has so greatly distinguished himself? Botany is a beautiful study in itself, but we must not lose sight of the utilitarian

part of the question. Again, Dr. Post might give us some information as to whether the articles which are of the greatest value, such as wheat, maize, and so on, are in that part of the world being increasingly produced for commercial purposes? If he would answer these questions he would add to the value of his paper by affording utilitarian information that might be of service, not only to the afflicted in mind or body, but to the wants of the trading, and also of the general, community.

Mr. T. CHRISTY, F.L.S.—I was about to ask the same questions as have just been put. With regard to the *Cannabis Indica*, no doubt this was much used for allaying pain in crucifixions, some of it being put on a sponge and passed into the mouth of the sufferer when nailed to the cross. A considerable effect was then produced on the nerves and muscles. As it was sometimes put forward as a grievance that the crucified persons escaped in consequence, the practice of mutilating their bodies was resorted to in order to prevent their friends taking them away for the purpose of restoring them to life. There are many other drugs used by the natives, opium being one. Of course, in many of these Eastern countries they cannot exist without these drugs. I would add that when we have regard to the great variety of trees and plants in Palestine and Syria, we must not forget the numerous wars that have been waged there; for it is well known that war was always a cause of bringing into the country in which it took place a considerable number of plants and seeds, these being carried by the invading troops and dropped about in places where they became fertilised. Beyond this the birds carry about the seed, a fact which may also help to account for the "enormous flora" of the districts described. With regard to the perfumed woods and gums, they are often very carefully collected, and any one who sees the gums and resins that are brought to this country to be used as incense knows that they are full of seeds, so that when they are broken and pounded the seeds will fall out; and in this way there might be seeds from India, Persia, and elsewhere thus liberated, and thereby accounting for the varieties that have been noticed. I hope this paper is only the first of many whereby Dr. Post will be able to add to the extremely interesting particulars he has already given; because, being on the spot, he is able to collect all the information he requires, feeling, doubtless, as he is doing so, that it is one of the great charms of travelled life to be able to bring together the different connecting links in nature. Moreover, those who come here and

listen to these things have supplied to them food for weeks and weeks of thought. It has certainly been a great treat to hear so interesting a paper, and I must again express a hope that it will ere long be followed by others.

Captain FRANCIS PETRIE, F.G.S. (Honorary Secretary).—I am sure many will regard Dr. Post's paper as one of the most valuable contributions we have had this session. In him we have one who is an undoubted authority, upon the botany of the East, as evidenced by the importance attached by the British Museum to his contributions to our national collections. The fulness of detail in the paper is also an advantage, for this makes it at once a book of reference upon the subject, and one which will be much appreciated and valued, especially by Bible students. Since the days of Dr. Colenso we have often heard dissertations and questions in regard to so called mis-statements on botanical matters in the Scriptures; and, therefore, a paper like this is a decided step in the right direction, for it will tend to prevent erroneous conclusions.

The following communication has been received in regard to the paper:—

“Dr. Post mentions in his most valuable paper that Globe Artichokes are cultivated in Palestine. This is the case at Jerusalem, especially in the gardens of the King's Dale at Siloam. But they are also indigenous on the great Plain of Sharon, where I was so fortunate as to see them growing in July, 1859, by millions, north of Ras el Ain (identified, by Consul Finn, with *Antipatris* in 1849). The stately plants, many of them six feet and more high, were full of blossom, the rich purple of which glowed over the plain for leagues. The name ‘artichoke’ is adopted by us from the native appellation (*Ard-i-shok*), ‘thorn of the ground.’ This name leads one to think that the Globe Artichoke, as well as many others of our vegetables and flowers, was brought to this country from Palestine by the Crusaders and pilgrims. Seeing these forests of artichokes was one of many instances in which we learned how easily the usual traveller may be unaware of the products of the country which he sees only at the particular season of his journey, perhaps in early spring, before many of the plants are in flower, or in autumn when the summer heats have ripened and dried up the greater part. None but residents can become fully acquainted with the botany of any country. And in Syria, where, as Dr. Post has shown, and as we constantly observed,

there is such immense difference between the climates of the various localities and of the various seasons, even a resident has but small chance of an accurate acquaintance with the plants, unless he is able to visit each locality again and again at the various seasons of the year, so as to find the plants which, utterly insignificant at other times, come into prominence, each at its own proper season. But for the fact that we passed our summers out in tents near Jerusalem, I should probably never have observed the blue Larkspur, which blossoms in some places of the neighbourhood in early June, or the Red Everlasting, the Yellow Stock, the Great Iris, the Hollyhock, the variety of *salvia* and of *cistrus*, or the Yellow Mullein, with its spreading branches like the great candlestick of the Temple. The sea-shore lily, near Tyre, and many other flowers are never seen by passing travellers. It flowers in summer. Major Conder, whose knowledge of Palestine is extensive, yet failed to observe the rose, and tells us in his *Tent Life* that the rose is not a product of Palestine. Yet I have a Dog-rose blossom gathered in the Lebanon, and have seen the Dog-rose flourishing between Jerusalem and Nabloos and elsewhere. The yellow roses, of Baalbek are celebrated. Dr. Post includes the rose among the native plants of Syria. Perhaps I may be allowed to add a word as to the magnificence and variety of the thistles of Palestine. They testify by their luxuriant growth to the fertility of the soil, and are in themselves a most interesting set of plants, and the fragrance of some kinds of thistles is also remarkable in this country where, as Dr. Post well observes, the land is clothed and covered with sweet-smelling flowers and foliage from year's end to year's end, 'even as a field which the Lord hath blessed.' Not only wild thyme and varieties of mint, rosemary, rose, and others, but also many kinds of *salvia* and *cistus*, and various shrubs, all add their fragrance, even in the hottest of the summer, to the perfumes brought out by the dews and wafted on every breeze. The *Poterium spinosum* abounds all over the Samaria and Judæan districts. It is there also still used as 'thorns for the burning of lime' (see Isaiah xxxiii. 12), and it has furnished not only the allusion to "thorns" growing in the path of the Sower in our Lord's parable, but also, I think, a remarkable emblem in the use of the Hebrew word טַבַּח in Jeremiah v. 10, translated *nettesh*—'battlements,'—which is, no doubt, its meaning. The *Poterium spinosum* (called Beilân in the North) is, in the Jerusalem district, called *nettesh*,—a word identical with that used

by Jeremiah for battlements. The link between the two seemed to me to be this. The Shepherds in Judæa use this thorny plant and pile it up as *battlements* for defence upon the loose stone walls of their open-air sheepfolds. And here we have another instance of the persistence of *local* phraseology and custom. Doubtless, *nettsk* was thus used by shepherds in ancient times, and hence the name was afterwards applied to stone-built battlements."—
E. A. FINN, *Member of the Royal Asiatic Society.*

THE AUTHOR.—To reply fully to all that has been said to-night would take up so much time, that I should prefer to deal with it at some future opportunity in a paper on the economic and therapeutic products of Syria and Palestine, rather than to offer, on the spur of the moment, a few desultory remarks that would vanish into thin air. At some future period, when I return to Syria and get settled, I may obtain the leisure to finish a paper on that subject.

The meeting was then adjourned.

NOTES BY THE REV. F. A. WALKER, D.D., F.L.S.

P. 257.

"Horsetails, Ferns, and Club Mosses."

During the whole of my visit to the East, I noticed very few ferns—*Pteris longifolia* at Beyrout and the Nahr el Kelb, and *Adiantum capillus venèris* at Beyrout, and also at Mount Sipylus, Asia Minor; *Equisetum arvense*, common horsetail; also at the Nahr el Kelb. The common bracken (*Pteris aquilina*) I noticed near the reputed tomb of S. Luke at Ephesus, for the first time since quitting England.

P. 260.

"*Sisymbrium officinale*, three species of *Sinapis* and *Anagallis arvensis* are recorded.

I gathered *Sisymbrium Iris* from off the tomb of St. George at Damascus a species of *Sinapis* at the fountain of Calirrhoe, Athens, and *Anagallis arvensis*, blue pimpernel, at the seashore, Jaffa.

P. 262.

"*Papaver Rhæas*."—Probably the same as *Papaver Syriacum*, which I found by the shore at Jaffa, and at the village of Mezi, Damascus. It is somewhat larger than our field poppy, and has more black in the centre.

P. 263.

"*Chrysanthemum segetum*."—Our corn marigold, abundant on plain of Jericho.

"*Gladiolus Illyricus*."—Common in neighbourhood of Beyrout, Alexandria, towards Issus.

"*Asphodelus microcarpus*."—I found both *Asphodelus albus* and *lutens* at Ephesus; ditto *ramosus* on Areiopagus, and *Lycabettus*, Athens.

"*Calycotome villosa*."—Between Jaffa and Latroon.

"*Elæagnus hortensis*."—Pass of Daphne and Bay of Eleusis, also on line of rail between Smyrna and Ephesus—Lisifa tree.

"*Amygdalus orientalis*."—*Amygdalus*, on plain of Litany.

P. 266.

"*Marrubium faucidens*."—Found species of *marrubium* in valley of Jehoshaphat.

P. 267.

"*Ferula meifolia*."—I find this plant in my list from Philadelphia and Ephesus, as *Ferala tingitana*.

P. 268.

"*Clematis vitalba*."—In Corfu.

"*Adonis autumnalis*."—Pheasant's eye, very common and widely distributed in Palestine, Aeldama, Nicopolis, Yalo; also in Syria, Baalbek, and Kankab. The orange variety known as *dentata* is far scarcer than *autumnalis* at Kankab in Syria, and at Fountain of Elisha, plain of Jericho.

P. 269.

"*Glaucium luteum*."—By river Meles, near Smyrna, and at Sumium, Attica.

"*Fumaria parviflora*."—The *Lumaria micrantha*, probably; the same plant grows luxuriantly in the cactus hedges of the orange groves of Jaffa.

P. 270.

"*Reseda lutea*."—I find "*reseda alba*" recorded in my list as occurring generally in island of Malta, and on St. John's Church, Ephesus.

P. 270.

"*Linum pubescens*."—Between Jaffa and Latroon.

"*Geranium tuberosum*."—Protestant Cemetery, Damascus; also at Abana and Pharpar.

"*Peganum harmala*."—Acropolis.

"*Rhus cotinus*."—Decellia.

"*Rhus coriaria*."—Alexandretta towards Issus.

P. 272.

"*Spartium junceum*."—Corfu.

"*Trifolium purpureum*."—Between Yâsur and Jaffa.

"*Lotus gebelia*."—Jaffa and road to Beyrout.

A great many species of *Trifolium* are recorded on p. 20. These probably include two species which occur in my list under other names, viz., *T. tomentosum*, Jaffa, and *T. clypeatum*, between Latroon and Jerusalem.

P. 20 and p. 21 also contain a great many species of *Astragalus*. The name *Aleppicus* is not mentioned here. I find *Astragalus aleppicus* recorded from plain of Litany.

P. 273.

"*Onobrychis cadmea*."—On hillside above Baalbek.

"*Vicia sericoarpa*."—Between Jaffa and Jerusalem.

"*Vicia cracca*."—Jaffa; road to Beyrout.

"*Lathyrus amœna*."—Between Jaffa and Latroon.

"*Cercis siliquastrum*."—Judas tree. Alexandretta, towards Issus; near Stadium, Ephesus.

P. 274.

"*Punica granatum*."—Pomegranate. Jaffa, Calvary, Tripoli, Bay of Eleusis, &c.

P. 275.

"*Astedia squamata*."—Tomb of Maccabees, Nicopolis, Yâlo.

P. 276.

"Asperula arvensis."—Plain of Litany.

P. 278.

"Scorzonera papposa."—I found the *Scorzonera* fairly plentiful on the commencement of the ascent from Jericho.*"Campanula Trachelium."*—I found a *Campanula* very nearly allied to *C. Trachelium* at three places in Asia Minor—Mount Sipylus, Mount Pagus, and Ephesus.*"Styrax officinale."*—Mount Prion, Ephesus.*"Jasminum fruticans."*—Philadelphia, Ephesus, and Mount Sipylus. I have got their species named "*fruticosum*."*"Anchusa Italica."*—Jaffa and road to Beyrout.*"Alkanna megalocarpa."*—*Alkanna orientalis* from ruins of Baalbek.

P. 279.

"Echium Italicum."—I have a species of *Echium* from Mount Pagus.*"Onosma frutescens."*—Nahr el Kelb.*"Hyoscyamus aureus."*—Bethany, Jaffa, &c.

P. 280.

"Salvia Horminum."—Between Latroon and Jaffa.

P. 281.

"Phlomis viscosa."—Nahr el Kelb.

P. 282.

"Quercus Ilex."—Alexandretta, towards Issus.

P. 283.

"Orchis Anatolica."—Deceleia.*"Iris Sisyrrhinchium."*—Between Jaffa and Jerusalem, generally distributed.*"Tulipa Oculus Solis."*—Shtora.*"Muscari comosum."*—Beyrout.*"Muscari racemosum."*—Hobah and Baalbek.*"Ornithogalum umbellatum."*—Hobah and Shtora.

P. 285.

"Raphanus sativus."—I found a species of *Raphanus* at Munychia.

P. 286.

"Vinea Libanotica."—Vinea herbacea, Plain of Litany.

P. 291.

"Cistus salviaefolius."—Sweet Waters, and between Jerusalem and Jaffa.*"Pisum formosum."*—Deceleia.

P. 292.

"*Asparagus Palestinus*."—" *Asparagus Lownei*."—Asparagus. Banks of Jordan.

P. 293.

"*Populus Euphratica*."—Banks of Jordan.

"*Cleome trinervia*."—Shore of Dead Sea.

"*Solanum coagulans*."—Fountain of Elisha.

"*Nitraria tridentata*."—Fountain of Elisha.

"*Statice pruinosa*."—Plains of Jericho.

P. 295.

"*Lamium Aleppicum*."—*Lamium maculatum*. Kolomeli.

P. 297.

"*Papaver somniferum*."—Opium poppy. Philadelphia and Sardis.

"*Cactus Ficus-Indica*."—Jaffa, Jerusalem.

"*Pride of India*."—Beyrout. *Melia arederach*.

APPENDIX A.

ON FLINT ARROW HEADS OF DELICATE STRUCTURE.

BY THE RIGHT HON. SIR C. MURRAY, K.C.B.

AT one of the Institute's meetings* Mr. E. Charlesworth, F.G.S., expressed much curiosity to understand how some flint arrow heads of very light and delicate form "could have been used in war or in the chase without being broken."

I will offer a few remarks which may throw some light upon this:—In the year 1835—fifty years ago—I spent the summer in the great Prairies of the Far West with the Pàrir tribe of N. American Indians, hunting the Bison (usually miscalled the Buffalo) in the region lying between the Upper Missouri and the head waters of the Arkansas,—a region then a thousand miles west of any white man's settlement. Living constantly with them, I had, of course, abundant opportunities for observing not only all their domestic habits, but also all their preparations for war and the chase. Leaving other matters, probably more interesting, aside, I will proceed at once to the special subject of the present observations, namely, their *arrow-heads*. These were mostly, if not all, made of iron, (though some tribes still make them of flint,) those intended for the chase are of an elongated oval shape *without a barb*, like those of Figures 1 and 10 in the Journal diagrams, and they are firmly tied on to the arrow by threads made from bison-sinew. Those intended for war are equally fine and sharp, but they have a barb at the base and are very *slightly* tied on with thread of the same sinew, so that when it strikes an enemy and an attempt is made to draw it out, the arrow-head remains embedded in the body, and makes a

* Vol. xvii., page 263.

horrible and often incurable wound. Now as the North American Indians have devised this method of torturing an enemy, is it not very possible that the same device may have occurred to the pre-historic savages in Belgium, and that those fine and delicate flint arrow-heads were *meant* to break and splinter in the wound that they had made.

I may add what perhaps will surprise the reader, that in Bison hunting the bow and arrow is a far more effective implement than rifle or pistol; but he must remember that the chase is generally followed at full gallop, and a Bison unless struck on the spine or in the heart, will run for miles with several balls in him; but when struck by an arrow eight or ten inches deep in his body, every movement that he makes gives him so much pain that he stands still, bleeding inwardly, and the Indian returns and kills him at leisure.

APPENDIX B.

ANCIENT HUMAN FOOTPRINTS IN NICARAGUA.

At a meeting of this Institute (*see page 146*), reference was made to some ancient human footprints in Nicaragua, and an early copy of Dr. D. G. Brinton's investigations in regard thereto (as laid before the American Philosophical Society) was read. Since then, the discoverer, Mr. Earl Flint, demurring to the conclusions of Dr. D. G. Brinton, has sent the Victoria Institute a statement of his objections, as they appear in the *American Antiquarian* for 1888. The following is a reprint of the first three paragraphs, which specially bear upon the point at issue:—

“As adverse sentence has been pronounced before the American Philosophical Society, by my friend Dr. D. G. Brinton, on the antiquity of footprints found in a quarry near Lake Managua, and other locations, which was due to a misunderstanding of my letter, leading him to associate *surviving* eocene shells from another locality and eocene sand, on which the Tufas containing the footprints lie, permit me to reply.”

“An imprint was sent him, and one to Prof. Baird, and the sand on which they lay was sent separate to both parties; the bag of shells contained a slip, stating, ‘shells from Lake Giloa, or Jiloa, whose entire beach is made up of them,’ which is six miles north-east of quarry, and considered as belonging to same horizon. This collateral evidence would aid in placing the geological age of the Tufas; as the shells were a new species, and with many others abundant near the old caves, on the southwest slope of the volcanic range, were covered with similar types spread over our northern Territories.”

“Of those here, not four per cent. are existing species. The ‘*scarphaca*’ is not represented among living forms. The same remark applies to many others included in those sent to the National Museum in 1878, private Nos. 187 to 289, still undetermined, but older than those found in the ‘shell heaps’ along the coast range, which was re-peopled long after; even these contain old

shells, among them the 'calista,' are abundant, and though not passing beyond the cretaceous formation, are common among those found in the Territories, while those found near the caves are much older and pertain to the eocene-tertiary merging into the miocene; there is no doubt that the cave dwellers used them as food, at the same time made the inscriptions of the sea monsters with uncommon accuracy, and some in relief. I was unable to copy one correctly without the aid of instruments, while their authors lying face upwards chiseled them in rock."

"In conclusion, for the fifth time, I try to make myself understood when I say that man's works were buried here in eocene times; that the first volcanic eruption containing the footprints lies on sand and other formations of that epoch, while his works are in close proximity with eocene shell beds and were buried together."

Since the record of its Meeting of November, 1887, the transactions of the American Philosophical Society have contained no further allusion to the subject; the *American Antiquarian* for March, 1889, however, inserts the following remarks upon the "*Age of the Nicaragua Footprints*":—

"The subject of the Nicaragua footprints has been discussed during the past year. Dr. Earl Flint was the first discoverer. He maintains that the footprints belonged to the eocene strata. Dr. D. G. Brinton, on the contrary, taking by Dr. Earl Flint's own testimony, makes out that they did not belong to the eocene, but were of a much more recent date. He submitted the shells which were found in the yellow sand to Prof. Angello Heilprin for examination. He thinks that the deposit is more nearly post-pliocene than eocene. The leaves which were discovered in the new look of the shells, are cited as proofs of volcanic forces, which at a modern date covered the human tracks. Another proof more conclusive to Dr. Brinton's mind is that the footprints indicate the use of sandals or moccasins. As to the genuineness of the footprints the wood-cut* kindly furnished to us by Dr. Brinton will illustrate the point. Several specimens have been sent to the United States. Four of them are in the Peabody Museum. One of these has an appearance as

* *Victoria Institute Transactions*, p. 146, ante.

if a sandal had been used; the others are impressions of the bare foot. The specimen sent to Dr. Brinton contains the impression of a left foot. The apparent length of the foot was eight inches, though the total length of the impression was nine and a quarter inches, the breadth at the heel three inches, toes four and a half inches. The greatest depth of the impression is two inches, being at the ball of the foot, the weight having evidently been thrown forward as in vigorous walking. The place at which these footprints were discovered is in Nicaragua, a region which is subject to earthquakes and where volcanic eruptions were formerly numerous. Some of them were on the slope of the Sierra de Managua, near the town of San Rafael. The present specimen was taken from a quarry near the town of Managua, 300 feet from Lake Managua.

“The volcano Tizcapa is about two and a half miles from the shore of this lake, and in ancient times its molten streams found their way into the waters of the lake. Its eruptions were irregular and evidently long periods of quiescence intervened, periods long enough for the tufa beds to become covered with vegetation. The impressions are found on the first or lowest tufa beds.” Dr. Flint says that the rock-bound shores of this and other lakes are covered with inscriptions of which no tradition can be obtained. Seven well-marked beds of tufa are penetrated; next a deposit of clay, the soil of other times, containing plants, trees, leaves, then four more deposits, including pumice, sand-drift, tufa black sand, volcanic sand, fossil leaves, etc., and then come the footprints.

One point of inquiry would be as to the certainty of Dr. Flint's divisions of the strata. On this there is great opportunity for imagination to work, and it will require very close observation on the part of skilled geologists and naturalists to decide upon the number of deposits and the age of each. The subject is at arm's length at present. Dr. Flint is the only observer on the spot, but the professors in the university at Harvard, Philadelphia, and the gentlemen in the National Museum at Washington have only the few stone slabs which have been forwarded to them to judge from. An argument for exceeding antiquity has been made from the relative length of the big toe and the second toe, but the specimen sent to Dr. Brinton gives no such impression; it is quite a modern-looking foot. There is no doubt of these being genuine human footprints; but the use of sandals would certainly contradict the idea of very great age. A race which wears shoes can not be assigned to the early stages of human culture.”

APPENDIX C.

CAVE DEPOSITS.

At a recent meeting of the Institute, the statement was made that the bones of animals found in caves were "washed in or carried there by beasts of prey," and a member (Mr. J. Stalkartt) remarked at the time that their presence in caves was not usually due to being *carried in* by beasts of prey. Since then, Mr. Stalkartt, writing from India, gives instances in which bears had come down from the hills to his estate and killed and eaten cattle upon the spot; and in doing so he refers to the following notes of a paper read in 1888, before the Bombay Natural History Society.

Mr. Inverarity, a noted *shikari* discussed the habits of the tiger, and especially the mode in which it kills and eats its prey. Some have thought that the tiger seizes by the throat, others by the nape of the neck from above. Mr. Inverarity has examined scores of slain animals with special reference to this point, and in every case but one the throat was seized from below. The exception was an old boar, who had been seized by the back of the neck from above. One of a single file of villagers who was once seized by the nape of the neck by a man-eater, but saved by his companions, and had no idea when he recovered his senses what had happened. Whether dislocation of the neck takes place is doubtful. The tame hunting leopards always kill by pressure on the windpipe, without breaking the skin; possibly the tiger kills in the same way. It is only by accident, if at all, that tigers in killing sever any important vein or artery, and no blood to speak of flows from the throat wounds. Very large and powerful animals like the bull, buffalo, and bison, if attacked at all, are in the first instance attacked from the rear with a view to disabling them. Having killed, the tiger almost invariably begins eating a hind-quarter, consuming one or probably both. Sometimes he leaves the stomach and intestines as they are; sometimes he will remove them to one side, making a neat parcel of them. A tiger and tigress together will finish an ordinary sized animal at one meal, leaving only the head. In this case it is probable that the second

begins at the fore-quarter. Animals are never eaten where they are killed, but are always dragged a short distance. They are not lifted clear of the ground, but dragged. Having gorged himself, the tiger sometimes lies close by his prey, but if it is hot weather and there are hills in the neighbourhood, he will go a long distance off before resting for the day. He prefers to lie in a cool cave or in a breeze on the hill-side, than in the close hot jungle. He returns next night and finishes what is left, but he never eats a second time on the same spot, but drags the remains of the prey forty or fifty yards off. Sportsmen coming on a half-devoured animal and desiring to catch the tiger, tie the prey to a tree. The tiger takes about two hours' steady eating to finish the fourquarters of a bullock. Mr. Inverarity sat over a small tigress one night who ate for ten minutes, then went away for twenty, probably to drink, and on her return ate steadily for two and a quarter hours. He did not fire, as he could not see her. Tigers are cannibals; they will make their meals off each other. They are supposed to kill once in five or six days, and no doubt the tiger, after a heavy feed, does not care to hunt much for a few days; but a tiger kills whenever he can. They have been known to kill on fourteen consecutive nights. Mr. Inverarity believes that animals killed by tigers suffer little beyond the panic of a few seconds. The shock produces a stupor and dreaminess in which there is no sense of pain or feeling of terror. The powerful stroke of the fore paw of the tiger is a fiction; he clutches with his claws as one might with the fingers, but does not strike a blow. Tigers wander immense distances at night, and, as they like easy going, they go on roads and paths. They do not like to move during the heat of the day, as the hot ground burns their pads and makes them raw. They can on occasion climb trees. In Salsette one climbed after a certain Pandoo, but could not reach him and retired. Pandoo, thinking the coast clear, got down and ran towards home, but on the way was caught by the tiger and killed. The inquest report stated "that Pandoo died of the tiger eating him; there was no other cause of death. Nothing was left except some fingers, which probably belonged to the right or left hand."