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A table of contents for *Journal of the Transactions of the Victoria Institute* can be found here:

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JOURNAL OF THE TRANSACTIONS
OF
THE VICTORIA INSTITUTE

VOL. LXX

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

VOL. LXX

1938



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PREFACE

THE outstanding contribution to this volume is Dr. Edwyn Bevan's paper on "The Teaching of Jesus about Non-resistance to Evil." It is a very timely contribution to a problem which has been exercising the mind and consciences of many for a considerable period, one whose gravity was emphasised very forcibly during the last week of September, when the civilized world seemed to be tottering on the brink of war with all that that now implies. Dr. Bevan's discussion cannot but prove to be very helpful in view of its clear and dispassionate investigation of what Our Lord really meant when He made certain statements regarding the duty of his disciples when subjected to unjustifiable usage. The paper evoked comments so varied and numerous that it would be hard to find the equal in the Transactions of the Institute since its foundation. It will be found that all shades of opinion are voiced so that paper and discussions constitute a kind of symposium on a very difficult question.

Of the four strictly scientific papers Mr. Albert Eagle's trenchant criticism of the Einstein-Eddington Conception of Curved Space attracted a good deal of attention when it was first read. That was partly due to the outspoken criticisms which it contains, but also to the individuality of a University lecturer who would venture to challenge so boldly a theory which had become so widely accepted. The other three may hardly lay claim to the same originality but they will be found to be authoritative surveys of their subjects.

The syllabus always comprises a large proportion of essays dealing with Biblical subjects. Two are concerned with Genesis in various relations. Another is devoted to the Greek New Testament, while two deal with the geography of Bible

lands. It is necessary to repeat again and again that in all such investigations dealing with Holy Scripture, the standpoint of the Institute is conservative. It regards the Bible as the inspired Word of God, given to man to serve as the supreme rule of faith and practice. The contributions of papers for the most part are in harmony with these views. But that observation does not apply to all, and it must be carefully stated that the authors of papers are only responsible for what they themselves write. Nor does the Institute commit its members to all that may be found in this volume. With these reservations, it can be said that these Biblical studies are directed to the defence of that view of Holy Writ which has enjoyed the confidence of the Christian Church for so many centuries.

The thanks of the Institute are due to all who read papers during the session, and, in lesser measure but none the less sincere, to those who contributed in speech and writing to the discussions.

H. S. CURR,
Hon. Editor of Transactions.

CONTENTS

	PAGE
PREFACE	v
REPORT OF COUNCIL FOR THE YEAR 1937.....	ix
SPECIAL GENERAL MEETING.....	xvii
THE ANNUAL BUSINESS MEETING HELD ON MONDAY, May 23rd, 1938	xix
FACTS AT VARIANCE WITH THE THEORY OF ORGANIC EVOLUTION. By E. L. GRANT WATSON, ESQ., B.A. (Cantab.)	1
<i>Discussion.</i> —Remarks by the Chairman, Mr. D. Dewar, B.A., F.Z.S., Mr. H. S. Shelton, Mr. R. Duncan, M.B.E., I.S.O., Mr. W. McAdam Eccles, M.S., F.R.C.S.	12
<i>Communications from the President, Sir Ambrose Fleming, F.R.S., Dr. R. E. D. Clark, M.A.</i>	16
THE INTERIOR OF THE EARTH. BY R. STONELEY, ESQ., Sc.D., F.R.S.	22
<i>Discussion.</i> —Remarks by Dr. F. J. W. Whipple	27
<i>Communication from Lt.-Col. L. M. Davies, M.A. (late R.A.), F.G.S., F.R.S.E.</i>	27
THE FIRST TWO CHAPTERS OF GENESIS CONSIDERED AS A BASIS OF SCIENCE. BY THE REV. D. E. HART-DAVIES, M.A., D.D.	29
<i>Discussion.</i> —Remarks by the President, Sir Ambrose Fleming, F.R.S., Mr. S. Collett, Mr. H. W. Bryning, Dr. J. Barcroft Anderson, Mr. G. Brewer, F.C.I.B.	66
<i>Communications from Mr. W. H. Drury Yule, Lt.-Col. L. M. Davies, M.A., F.G.S., F.R.S.E., F.R.A.I., Lt.-Col. A. G. Shortt (late R.A.), M.D., B.S., B.Sc., F.R.C.S., Mr. T. Fitzgerald</i>	77
THE SIGNIFICANCE OF THE "SIX DAYS" IN GENESIS I. BY WING- COMMANDER P. J. WISEMAN, R.A.F.	88
<i>Discussion.</i> —Remarks by the Chairman, Brig.-Gen. W. Baker Brown, C.B., Rev. A. W. Payne, Mr. W. C. Edwards, Mr. H. W. Bryning, Mrs. Maunder, Mr. L. E. Jose, Mr. S. Collett	105
<i>Communications from Mr. T. Fitzgerald, Dr. R. E. D. Clark, M.A., Lt.-Col. L. M. Davies, M.A., F.G.S., F.R.S.E., F.R.A.I., Major H. B. Clarke (late R.E.).....</i>	115
FROM THE RIVER OF EGYPT UNTO THE GREAT RIVER, THE RIVER OF EUPHRATES. BY A. HIORTH, ESQ., C.E.	126
<i>Discussion.</i> —Remarks by the Chairman, Lt.-Col. F. A. Molony, O.B.E. (late R.E.), Rev. A. W. Payne, Mr. H. W. Bryning	146

	PAGE
THE TEACHING OF JESUS ABOUT NON-RESISTANCE TO EVIL. BY E. R. BEVAN, ESQ., O.B.E., D.Litt., LL.D.	153
<i>Discussion.</i> —Remarks by the Chairman, Lt.-Col. F. A. Molony, O.B.E. (late R.E.), Mr. S. Collett, Mr. P. O. Ruoff, Mr. G. Brewer, F.C.I.B., Col. A. H. van Straubensee, Lt.-Col. Skinner, F.R.Met.S.....	165
<i>Communications.</i> —Dr. R. E. D. Clark, Brig.-Gen. H. Biddulph, C.B., C.M.G., D.S.O., R.E., Rev. Principal H. S. Curr, M.A., B.D., B.Litt., Major R. B. Withers, D.S.O. (late R.A.)	173
DIFFICULTIES UNDERLYING THE EINSTEIN-EDDINGTON CONCEPTION OF CURVED SPACE. BY A. EAGLE, ESQ., B.Sc., A.R.C.Sc.	177
<i>Discussion.</i> —Remarks by the Chairman, Dr. R. E. D. Clark, M.A., Brigadier N. M. McLeod, Mr. H. S. Shelton, Mr. W. E. Leslie	193
SOME FRESH LIGHT ON THE GREEK SCRIPTURES. BY MAJOR R. B. WITHERS, D.S.O. (late R.A.)	201
<i>Discussion.</i> —Remarks by the Chairman, Mr. R. Duncan, M.B.E., I.S.O., Rev. C. W. Cooper, F.G.S., Dr. A. Druitt, Mr. W. E. Leslie	216
<i>Communications</i> from Mr. E. J. G. Titterington, Rev. H. Temple Wills, M.A., Col. A. H. van Straubensee, Mr. T. Fitzgerald, Dr. J. H. Moulton	219
SYNOPTIC METEOROLOGY; THE BASIS OF WEATHER FORECASTS. BY LIEUT.-COL. E. GOLD, D.S.O., F.R.S., F.R.Met.S.	228
<i>Discussion.</i> —Remarks by the Chairman, Dr. B. A. Keen, F.R.S., F.Inst.P., F.R.Met.S., Lt.-Col. T. C. Skinner, F.R.Met.S., Mr. L. C. W. Bonacina, Mr. F. Entwistle, Mr. R. A. Watson Watt	255
<i>Communication</i> from Mr. J. M. Smyth, M.Inst.C.E.	259
BIBLICAL SITES IN THE CUNEIFORM RECORDS OF THE LATER ASSYRIAN EMPIRE. BY MR. E. B. W. CHAPPELOW, M.R.A.S., F.R.S.A.	263
THE CREATION OF MAN AND THE FIXING OF THE ANUNNAKI. BY ERNST F. WILDNER, Berlin	285
THE INVESTIGATION OF THE PERIODS IN SCRIPTURE PROPHECY. BY WILLIAM BELL DAWSON, M.A., D.S.M., Inst., C.E.	292
LIST OF MEMBERS, ASSOCIATES, ETC.	297
CONTENTS OF THE LAST TWENTY-SEVEN VOLUMES	318
OBJECTS, CONSTITUTION AND BY-LAWS	329

** The object of the Institute being to investigate, it must not be held to endorse the various views expressed either in the papers or in the discussions.

VICTORIA INSTITUTE

REPORT OF THE COUNCIL FOR THE YEAR 1937.

TO BE READ AT THE

ANNUAL GENERAL MEETING, MAY 23RD, 1938.

1. *Progress of the Institute.*

In submitting the Seventieth Annual Report of the Victoria Institute, the Council desire to place on record again their gratitude to God for all the marks of His favour enjoyed during the period covered. The foundation of the Institute is laid in His revelation of grace and truth, which has been made available for all mankind in the pages of Holy Scripture. It is organised and conducted on the conviction that them that honour God He will honour. The year with which this report deals has not been lacking in fresh evidences of the truth of these things, chief among them, perhaps, being the continued interest of talented authors who contribute freely of their time and work to the Transactions of the Society. Generous gifts have also been made to the funds, and, though the membership is actually lower than for the year previous, the set-back is believed to be only temporary. Meetings have been well sustained, and full of profit to mind and heart. The volume of correspondence relative to the work and interests of the Society is always increasing. There is a general impression that the usefulness of the Institute will be more widely recognised in days when its testimony to the existence and value and influence of the things which cannot be shaken is more necessary than ever. The Council are full of hope for its future.

2. *Meetings.*

Ten ordinary meetings were held during the Session 1937. The papers published were :---

“ On the Methods of Determining the Age of the Earth,” by
SIR AMBROSE FLEMING, D.Sc., F.R.S., President.

Alan Stuart, Esq., M.Sc., F.G.S., in the Chair.

“ The Person of Christ,” by H. R. KINDERSLEY, Esq., Barr.-at-law.

The Rev. Charles W. Cooper, F.G.S., in the Chair.

“The Relation of Change to the Eternal,” by G. H. LANGLEY, Esq., I.E.S. (ret.), late Vice-Chancellor of the Dacca University.

W. N. Delevingne, Esq., in the Chair.

“Science and the Interpretation of Scripture,” by ALAN STUART, Esq., M.Sc., F.G.S.

W. E. Leslie, Esq., in the Chair.

“The Crown in England: Its Significance among other Political and Constitutional Ideas,” by MAJOR H. C. CORLETTE, O.B.E., F.R.I.B.A.

Brig.-General W. Baker Brown, C.B., late R.E., in the Chair.

“Some Recent Views of the Universe and their Reaction on Present-day Thought,” by the Rev. T. E. R. PHILLIPS, M.A., F.R.A.S.

Mrs. M. A. Evershed, F.R.A.S., in the Chair.

“The Dead Sea and the Lost Cities of the Plain,” by E. W. G. MASTERMAN, Esq., M.D., F.R.C.S., F.R.G.S.

Sir Ronald Storrs, K.C.M.G., C.B.E., in the Chair.

“The Book of Jonah in the Light of Assyrian Archæology,” by the Rev. D. E. HART-DAVIES, M.A., D.D.

Sir Charles Marston, J.P., F.S.A., in the Chair.

“The Gospel of St. John ‘in situ,’” by the Rev. D. M. McINTYRE, D.D.

The Rev. W. J. Downes, M.A., B.D., in the Chair.

“Miracle, a Necessary Adjunct of Revelation” (being the Langhorne Orchard Prize Essay, 1936), by W. H. BOULTON, Esq.

R. Duncan, Esq., M.B.E., I.S.O., in the Chair.

3. Council and Officers.

The following is a list of the Council and Officers for the year 1937:—

President.

Sir Ambrose Fleming, M.A., D.Sc., F.R.S.

Vice-Presidents.

(Limited to seven.)

Alfred W. Oke, Esq., B.A., LL.M., F.G.S.

Lt.-Col. F. A. Molony, O.B.E., late R.E.

Lt.-Col. Hope Biddulph, D.S.O., late R.F.A.

Professor A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S.

Trustees.

Alfred W. Oke, Esq., B.A., LL.M., F.G.S.

Lieut.-Colonel Hope Biddulph, D.S.O., late R.F.A.

William C. Edwards, Esq.

Council.

(In Order of Original Election.)

Alfred William Oke, Esq., B.A., LL.M., F.G.S.	Lieut.-Col. T. C. Skinner, late R.E., F.R.Met.S.
Lieut.-Col. F. A. Molony, O.B.E., late R.E.	Rev. Principal H. S. Curr, M.A., B.D., B.Litt.
Lieut.-Col. Hope Biddulph, D.S.O., late R.F.A.	Douglas Dewar, Esq., B.A., F.Z.S.
Avary H. Forbes, Esq., M.A.	Lieut.-Col. L.M. Davies, M.A., late R.A., F.G.S., F.R.S.E.
Prof. Arthur Rendle Short, M.D., B.S., B.Sc., F.R.C.S.	Wilson E. Leslie, Esq.
William C. Edwards, Esq.	Rev. Charles W. Cooper, F.G.S.
Robert Duncan, Esq., M.B.E., I.S.O.	Perey O. Ruoff, Esq.
Louis E. Wood, Esq., M.B., D.P.H., F.R.S.A.	Lieut.-Col. Arthur Kenney-Herbert.

Honorary Treasurer.

R. Duncan, Esq., M.B.E., I.S.O.

Honorary Editor of the Journal.

Rev. Principal H. S. Curr, M.A., B.D., B.Litt.

Honorary Secretary, Papers Committee.

Douglas Dewar, Esq., B.A., F.Z.S.

Honorary Secretary.

Lieut.-Col. T. C. Skinner, late R.E., F.R.Met.S.

Auditor.

E. Luff-Smith, Esq. (Incorporated Accountant).

Secretary.

Mr. A. E. Montague.

4. Election of Officers.

In accordance with the Rules, the following Members of the Council retire by rotation: Lieut.-Col. F. A. Molony, O.B.E., late R.E., Lieut.-Col. Hope Biddulph, D.S.O., and Avary H. Forbes, Esq., M.A., who offer (and are nominated by the Council) for re-election. They also nominate R. E. D. Clark, Esq., M.A., Ph.D.

The following gentlemen are nominated by the Council for election to the office of Vice-President, viz.: Louis E. Wood, Esq., M.B., D.P.H., F.R.S.A., Rev. H. Temple Wills, M.A., B.Sc., and Sir Charles Marston, J.P., F.S.A.

5. Obituary.

The Council regret to announce the deaths of the following Members and Associates:—

Dr. Jas. Knight, Miss Moss, Mrs. Legh S. Powell, Lord Radstock, Rev. Dr. Flournoy, Wilson E. Heath, Esq., Right Rev. Bishop Welldon, W. N. Delevingne, Esq., Rev. Dr. Jesse Sayer, Rev. C. E. Edwards, Rev. H. D. Vater, Andrew Williamson, Esq., E. Hedgman, Esq., Sir Andrew T. Taylor, and Professor M. W. Bigelow.

6. *New Members and Associates.*

The following are the names of new Members and Associates elected up to the end of 1937 :—

MEMBERS : None.

ASSOCIATES : Victor E. G. Hussey, Esq., B.A., Commander K. B. M. Churchill, R.N., Major C. E. Salvesen, J.P., R. S. Timberlake, Esq., Miss A. G. Jacob, Miss F. M. Kent, Albert Eagle, Esq., B.Sc., A.R.C.Sc., H. H. Collette, Esq., B.Sc., Rev. W. E. Dalling, Major H. B. Clark, R.E., E. L. Wilcock, Esq., A. C. Custance, Esq., Rev. Dr. P. Wiseman, Rev. W. H. Fullerton.

STUDENT ASSOCIATES : John W. Wenham, Esq., B.A., B. G. Jayasekara, Constructor Lieut. W. H. Spanner.

7. *Membership.*

Life Members	...	...	...	12
Annual Members	...	...	...	85
Life Associates	...	...	...	41
Annual Associates	...	...	...	261
Missionary Associates	...	...	...	11
Library Associates	...	...	...	41
Student Associates	...	...	...	6
Total Nominal Membership...				457

8. *Donations.*

In Section 8 of the 1936 Report reference was made to a generous offer of £5 by a Member towards a special effort to make the objects of the Society more widely known. The suggestion was accordingly implemented by the Circular Letter dated November 12th, under which Members and Associates were invited to subscribe to the Special Fund (*b*), designated as above, and, all ordinary donations already received being credited thereto, the total (including one most exceptional gift of £200 and one or two late sums received in 1937 from far-distant subscribers) has come to £309 Os. 6d.

By the same Circular was opened also Fund (*a*), to provide a farewell gift to Mr. Montague (retiring at the end of the year after 54 years' devoted, faithful service) to supplement the pension of £52 yearly which the Council had decided to allot from the funds. Thus, Fund (*a*) realising £88 15s., the aggregate of donations for the year under review has reached the handsome figure of £397 15s. 6d.

9. *Finance.*

A synopsis of accounts for the ten years from 1927 to 1937, inclusive, having disclosed the fact that the income deriving from normal sources (*i.e.*, regular subscriptions and sale of publications) invariably falls short of the expenditure required to provide a syllabus of ten papers by an average of about £100 yearly, the year 1937 is found to have fulfilled expectation in this regard. In past years the deficit has been made good by one or other, or by a combination of the following ways, *viz.* :—(a) by realising our investments, now completely exhausted ; (b) by generous help of a lecture and concert by the President and Lady Fleming ; (c) by a clearance sale of “Transactions” accumulated for many years ; (d) by recovery of income tax on guaranteed subscriptions—now disallowed by a recent decision of the Board of Revenue with loss to the Society of about £35 a year ; and (e) by special donations from Members and Associates. Of all these adventitious sources of revenue, the last one, (e), alone remains operative ; it is evident, therefore, that from now forward we must either very largely increase our membership or depend for existence as a Society on continued extra generous help of Members and Associates. In this connection one Member has recently made the interesting suggestion that normal subscriptions be increased by one-half all round, himself adding to his two guineas subscription an extra guinea in anticipation. The Council, while provisionally acknowledging the added sum as a donation, are referring the question for consideration to the Committee on Ways and Means.

In conclusion, though the future offers little prospect of permanent relief from anxiety, the Council are encouraged by many tokens of solidarity to go forward in strong confidence that in continuance of the work of the Victoria Institute the Will of God is being served.

A. W. OKE,
Chairman.

BALANCE SHEET, 31ST DECEMBER, 1937.

LIABILITIES.				ASSETS.										
				£	s.	d.								
				£	s.	d.	£	s.	d.					
SUBSCRIPTIONS PAID IN ADVANCE	....	....	....	15	4	6	CASH AT BANK :—							
SUNDRY CREDITORS for :—							Current Account					353	7	2
Printing and Stationery	166	8	7		"Gunning" Prize Account					37	14	3
Audit Fee	3	3	0		"Langhorne Orchard" Prize Account					24	19	1
												416	0	6
LIFE SUBSCRIPTIONS :—							CASH AND STAMPS IN HAND					4	17	8
Balance at 1st January, 1937	304	19	0		SUBSCRIPTIONS IN ARREAR :—							
Additions	13	10	0		Estimated to produce					26	5	0
<i>Less</i> Amount carried to Income and Expenditure Account	10	10	0	307	19	0	INVESTMENTS :—					
							508	0	0	"Gunning" Fund :—				
"GUNNING" FUND (<i>per contra</i>)					£673 3½ per cent. Conversion Stock at cost					508	0	0
Balance at 1st January, 1937	....	....	78	14	3									
Add Dividends and Interest	....	....	23	13	6									
							102	7	9	"Langhorne Orchard" Fund :—				
Deduct :—							£258 18s. 3½ per cent. Conversion Stock at cost					200	0	0
Prize and Expenses	....	....	64	13	6									
							37	14	3	"Schofield" Memorial Fund :—				
"LANGHORNE ORCHARD" FUND (<i>per contra</i>)					£378 14s. 6d. 2½ per cent. Consolidated Stock at cost					220	0	0
Balance at 1st January, 1937	....	....	15	17	11									
Add Dividends received	....	....	9	1	2									
												928	0	0
							24	19	1					

"SCHOFIELD" MEMORIAL FUND (<i>per contra</i>)	220 0 0	INCOME AND EXPENDITURE ACCOUNT :—	
Balance at 1st January, 1937	4 8 8	Balance at 1st January, 1937	289 19 3
Add Dividends received	9 9 4	Add Excess of Expenditure over	
	<u>13 18 0</u>	Income for the year 1937	146 6 6
			<u>436 5 9</u>
Deduct :—		Deduct :—	
Prize	10 0 0	"Gunning" Fund Contribution to	
	<u>3 18 0</u>	Expenses	10 10 0
SPECIAL APPEAL :			<u>425 15 9</u>
Fund A (Mr. A. E. Montague)	75 7 0		
Fund B :			
Donations received	282 17 6		
Less Amount expended	<u>44 12 0</u>		
	238 5 6		
	<u>£1,800 18 11</u>		<u>£1,800 18 11</u>

I report to the Members of the Victoria Institute that I have audited the foregoing Balance Sheet, dated 31st December, 1937, and have obtained all the information and explanations I have required. I have verified the Cash Balances and the Investments. No valuation of the Library, Furniture or Tracts in hand has been taken. In my opinion the Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the affairs of the Institute according to the best of my information and the explanations given to me, and as shown by the books of the Institute.

E. LUFF-SMITH,
Incorporated Accountant.

143-145, Abbey House,
Victoria Street, Westminster,
London, S.W.1.

9th April, 1938

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1937.

EXPENDITURE.				INCOME.								
				£	s.	d.						
				£	s.	d.	£	s.	d.			
To Rent, Light, Cleaning and Hire of Lecture Room	....	....	....	75	14	7	By SUBSCRIPTIONS :—					
„ Salary	200	0	0	72	Members at £2 2s.	151	4	0	
„ National Insurance	3	16	0	3	„ at £1 1s.	3	3	0	
„ Printing and Stationery	297	4	2	242	Associates at £1 1s.	254	2	0	
„ Postages	42	15	3	16	„ at 10s. 6d.	8	8	0	
„ Audit Fee	3	3	0	Proportion of Life Subscriptions	....	10	10	0	
„ Fire Insurance	12	0		—————		427	7	0	
„ Bank Charges and Sundries	9	16	1	„ INCOME TAX RECOVERED	....	....	8	19	6
				—————	633	1	„ SALE OF PUBLICATIONS	....	....	50	8	1
					£633	1	—————			486	14	7
							„ BALANCE being Excess of Expenditure over Income for the Year 1937	....	....	146	6	6
							—————			£633	1	1
							—————			£633	1	1

SPECIAL GENERAL MEETING.

A SPECIAL GENERAL MEETING of the Victoria Institute to provide for certain necessary amendments of the constitution and by-laws was held, in Committee Room B, 1, Central Buildings, Westminster, at 4.20 p.m., on Monday, May 23rd, 1938, under the chairmanship of A. W. Oke, Esq., M.A., LL.M., F.G.S., when the following matters were discussed and resolutions thereon submitted :—

1. COMMUTATION FOR LIFE MEMBERSHIP, ETC.—The Council have long been of opinion that the fees of 20 guineas and 10 guineas respectively for life-membership and life-associateship, not being framed on an actuarial basis, are unbusinesslike and in practice have operated unfairly both to the Institute and to the great majority of subscribers. They therefore propose to introduce a new rule basing the commutation on the actuarial value of the annual subscription, calculated on a 6 per cent. basis in relation to the applicant's age at date of commutation. They will therefore submit the following Resolution :—

RESOLVED that the last sentences in Rules 8 and 9, of Section 11, Constitution, be deleted, and that a new rule be introduced to read :—“These Annual Contributions may at any time be commuted to life-contributions by the payment in one sum of the actuarial values of such annual contributions, calculated on a 6 per cent. basis in relation to the then ages of the applicants.”

2. NEW CLASSIFICATION.—(a) From time to time the Council have been compelled with regret to decline election of applicants for associateship whom it is clearly in the interests of the Society to enrol, but who, for private reasons, have been quite unable to pay the minimum fee of one guinea per annum. Exceptions have hitherto been made in the cases of missionary-associates and student-associates, who are admitted under special rulings of Council for an annual fee of half a guinea, but there are a great many other equally deserving cases for whom no such provision exists, and the Council are of opinion that the time has come for removal of the anomaly.

(b) It is obviously undesirable to multiply classes indefinitely, and it has been suggested that the simplest way to attain the end in view without creating invidious distinctions, is to amend Rule 1 of Section ii, Constitution, to provide for three classes, viz. : FELLOWS, MEMBERS and ASSOCIATES, all those now classed as members to be called, in future, FELLOWS, those now classed as Associates to be called MEMBERS, and the new class to be called ASSOCIATES, and to include all those, whether missionary-associates, student-associates, or any others, who, in the opinion of the Council, ought to be elected, and who have satisfied the Council that they cannot afford more than an annual subscription of half a guinea.

(c) To empower the Council to amend the Rules and to make any necessary minor adjustments, the following Resolution will therefore be submitted :—

RESOLVED that Rule 1 of Section ii, Constitution, be altered to read : “ The Society shall consist of Fellows, Members and Associates, who in future shall be elected as hereinafter set forth ” ; and that the Council be, and hereby are, empowered to amend as necessary any other Rules : so as to make applicable to FELLOWS, MEMBERS and ASSOCIATES, under the new nomenclature the same respective fees, rights, privileges and obligations as now obtain for MEMBERS, ASSOCIATES and, *e.g.*, MISSIONARY-ASSOCIATES under the existing nomenclature.

N.B.—Half-guinea subscribers will not be eligible for life-commutation, it being expected that if and when a change of circumstances render possible, such will apply for enrolment as guinea subscribers, or for the life commutation appropriate thereto.

The *First Resolution* (Commutation for Life Membership, etc.), proposed by Lt.-Col. A. Kenney-Herbert and seconded by Mr. K. Duncan, on being put to the meeting, was carried unanimously.

The *Second Resolution* (New Classification), proposed by Dr. L. E. Wood and seconded by Lt.-Col. F. A. Molony, on being put to the meeting, was carried unanimously.

(For subsequent procedure and scale for commutation of subscriptions, see circular letter of July 31st, 1938, at end of volume.)

THE ANNUAL BUSINESS MEETING
OF THE
VICTORIA INSTITUTE

WAS HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, MAY 23RD, 1938,
AT 4.40 P.M.

The Chair was taken by A. W. OKE, Esq., M.A., LL.M., F.G.S., in the unavoidable absence of the President, Sir AMBROSE FLEMING, F.R.S.

The Minutes of the Meeting of May 3rd were read, confirmed and signed.

The Reports and Accounts for 1937 having previously been circulated, were taken as read. After some explanatory remarks on the work of the Society and the state of finances the CHAIRMAN called upon Mr. Sidney Collett to move the *First Resolution*, viz. :—

“ That the Report and Statement of Accounts for the year 1937, presented by the Council, be received and adopted ; and that the thanks of the Meeting be given to the Council, Officers and Auditor for their efficient conduct of the business of the Victoria Institute during the year.”

Major H. B. CLARKE then seconded and after discussion, in which several Members and Associates spoke, the Resolution was put to the meeting and carried unanimously.

The CHAIRMAN then called upon Mr. DOUGLAS DEWAR to move the *Second Resolution*, viz. :—

“ That Lt.-Col. F. A. Molony, O.B.E., Lt.-Col. Hope Biddulph, D.S.O., and Avary H. Forbes, Esq., M.A., retiring members of Council, be, and hereby are, re-elected.”

“ That R. E. D. Clark, Esq., M.A., Ph.D., be, and hereby is, elected to the Council. Also that E. Luff-Smith, Esq., Incorporated Accountant, be, and hereby is, re-elected Auditor, at a fee of three guineas.”

This Resolution after being seconded by the Rev. PRINCIPAL CURR was put and carried unanimously

The Rev. C. W. COOPER was next called upon to move the *Third Resolution*, viz. :—

“ That, in accordance with Clause 3 of the Constitution, the President, Sir Ambrose Fleming, M.A., D.Sc., F.R.S.; the Vice-Presidents, Lt.-Col. F. A. Molony, O.B.E., A. W. Oke, Esq., M.A., LL.M., F.G.S., Lt.-Col. Hope Biddulph, D.S.O., and Prof. A. Rendle Short, M.B., B.S., B.Sc., F.R.C.S.; the Chairman of Council, A. W. Oke, Esq., B.A., LL.M., F.G.S.; the Hon. Treasurer, R. Duncan, Esq., M.B.E., I.S.O.; the Hon. Secretary, Lt.-Col. T. C. Skinner, F.R.Met.S.; the Hon. Editor, Rev. Principal H. S. Curr, M.A., B.D., B.Litt., be, and hereby are, re-elected to their office; that Louis E. Wood, Esq., M.B., D.P.H., F.R.S.A., Rev. H. Temple Wills, M.A., B.Sc., and Sir Charles Marston, J.P., F.S.A., be, and hereby are, elected Vice-Presidents, and that Lt.-Col. F. A. Molony, O.B.E., be, and hereby is, elected Hon. Papers Secretary.

Dr. R. E. D. CLARK seconded and the Resolution was put and carried unanimously.

Plans for making the aims and work of the Society more widely known and for increasing membership were outlined by the Hon. Secretary, who also intimated that the Council were to reassemble on June 20th to consider “ways and means” and any proposals put before them for improvement generally and of the financial position in particular.

The CHAIRMAN next announced the name of the winner of the Langhorne Orchard Essay Competition for 1939 as ROBERT E. D. CLARK, Esq., M.A., Ph.D., to whom the prize, a cheque of twenty guineas, was then handed amid applause.

Announcement was next made in accordance with Rule VII, 2, of the appointment by the Council of Mrs. L. L. MALCOLM-ELLIS as Assistant Secretary from January 1st, 1938, at a starting salary of £2 10s. a week in succession to Mr. A. E. MONTAGUE who had retired after 54 years’ service. Covering approval of the appointment was immediately given by the Meeting.

A vote of thanks to Mr. OKE for presiding, proposed by Dr. BARCROFT ANDERSON and carried with acclamation, brought the meeting to a close.

813TH ORDINARY GENERAL MEETING,

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, JANUARY 10TH, 1938,
AT 4.30 P.M.

DOUGLAS DEWAR, ESQ., B.A., F.Z.S., IN THE CHAIR.

The Minutes of the Meeting of May 24th, 1937, were read, confirmed and signed and the HON. SECRETARY announced the following elections :—
As a Member : Lt.-Col. R. L. D. Whitfield ; as a Life Associate : the Rev. W. H. Fullerton ; and as Associates : A. C. Custance, Esq. ; the Rev. P. Wiseman, B.D., St.M., D.D. ; Lt.-Col. P. W. O'Gorman, C.M.G., M.D., M.R.C.P. ; the Rev. W. J. Downes, M.A., B.D. ; E. L. Ward Petley, Esq., L.R.A.M. ; and Constructor Lieut. W. F. Spanner, R.N., as a Student Associate.

The CHAIRMAN then called on Mr. E. L. Grant Watson, B.A., to read his paper entitled " Facts at Variance with the Theory of Organic Evolution."

The Meeting was then thrown open to discussion, in which the following took part : Mr. H. S. Shelton, Mr. R. Duncan and Mr. W. McAdam Eccles.

Written communications were received from Sir Ambrose Fleming and Dr. R. E. D. Clark.

FACTS AT VARIANCE WITH THE THEORY OF ORGANIC EVOLUTION.

By E. L. GRANT WATSON, Esq., B.A. (Cantab.).
(*Being the Dr. A. T. Schofield Memorial Paper.*)

WHEN, in 1859, Darwin's *Origin of Species* was published the new conception of the world of living things which it introduced, and which was soon to become the accepted view of orthodox biology, was welcomed by a large number of educated people as a step forward towards what they considered a wider and more realistic valuation of phenomena than that offered by orthodox religion. To an age which was so largely interested with material things, and whose energies were so much devoted to the controlling of natural forces and their subjugation to human convenience, the theory of evolution which Darwin postulated was a natural expression of its own dominating activities. It characterised a necessary and inevitable phase

of human development, and the imposing array of facts which Darwin so meticulously set forth presented an argument which the contemporary critics were not able easily to put aside. These facts Darwin classified under seven different heads, namely, facts concerning the morphological resemblance of organs, concerning the geographical distribution of species, concerning the geological record, concerning embryological development, concerning variations under domestication, concerning mutations and the presence of vestigial or rudimentary organs. This marshalling of facts, in support of the theory of organic evolution gave to contemporary biology a unifying impulse, and the materialism of the newly orientated science of biology was, for some of its disciples, so inspiring as to partake of the nature of a dogmatic religion. For many years this almost religious, and I consider narrowly religious, attitude adopted by many orthodox biologists has received very little criticism; it has until comparatively recently hardly been challenged, and indeed the Darwinian theory of evolution has received comparatively little progressive criticism of its fundamental assumptions in the years which lie between 1889 and the present day. True, there have always been critics. As contemporaries of Darwin's, Nageli, Romanes and Fabre should not be forgotten. There have been, of course, many others, but the astonishing fact remains that this theory, which has never been proved, should at the present day exist so near to its original form, when so many facts have since come to light which cannot be made to fit into the essential framework.

When I talk to modern biologists and draw their attention to life-histories of animals and the behaviour-patterns which refuse to be accounted for by any possible stretching of the theory of evolution, they either remain silent or laugh and say: "That unfortunately is one of the cases which do not fit in," or else they say: "Well, it doesn't matter anyway about the theory of evolution. No one bothers about *that* in these days but the old stagers who don't count; the interest has shifted to bio-chemistry. The theory is good enough as a working hypothesis, and there is no other to be had without making unjustifiable assumptions."

In the course of this paper I shall hope to hint at some possible assumptions which may not appear too unjustified; but first it is with facts which refuse to fit in with the claims made by the classical theories of evolution that I want to deal.

Before coming to these facts, I will state in the briefest way possible the essential postulates of the theory of evolution. They are as follows. *The species, as they are found living upon the earth to-day, have assumed their present forms as the result of variations through many generations. These variations, either small or large, have occurred by chance in all directions. Through the action of the natural selection by the survival of the fittest, those individuals best fitted to their environment have survived, and in the process of time the existing forms have been derived from common ancestral forms, many of which are now extinct.* As a variant to the above, the neo-Lamarckians say that the variations, which constitute the material by which evolution proceeds, are not entirely determined by chance, but, to a certain extent, are the result of the influence of environment on either the soma or the germ plasm of the parents, this influence being recorded in resulting variations, which adapt the creature to the changing conditions of the environment. With all evolutionists, the essential theory is the same: that ancestral forms have given rise, through countless variations, through countless generations, to the existing species as we know them to-day.

After this preliminary statement, which I think is necessary, I come to some of the facts which in my opinion cannot be made, by any stretching of coincidence, to fit into these comparatively simple concepts.

Sea slugs are brighter coloured and more fantastic in form than those which live upon land. They are to be found in shallow pools when the tide is low. Many of them have brilliantly coloured papillæ or appendages growing from their backs, and in these are found groups of curiously formed stinging-cells, which are believed to function as defensive weapons against attacks from fishes.

The stinging-cells, or nematocysts, are explosive cells which, in their discharged condition, are usually of a long whip-like shape. In its undischarged condition the nematocyst is folded within itself, and, at the least touch, the turgor produced by the tension of the cell-wall will cause the enfolded nettle-lash to fly out and sting any foreign body which is in the near neighbourhood. Many sea-anemones and jellyfish are provided with these protective cells, and when nematocysts were first discovered to be present in the papillæ of sea slugs they suggested a close affinity between the *Mollusca* and the *Cœlenterata*. It was only later discovered that the nematocysts which lie, in

an unexploded condition, in the papillæ of the sea slugs, and which are used by them as a defensive mechanism, have their origin in the cœlenterates on which the sea slugs feed.

The facts of the relation between the cœlenterates and the sea slugs, and the part that the stinging-cells play in these happenings have been carefully worked out by marine biologists. It has been found that only certain species of the sea slugs have the power of overcoming and using for their own purposes the defensive mechanism of the polyps. In these cases, several questions present themselves. How is it that the nematocysts, which explode at the least touch, are not exploded by the sea slug in the process of being devoured? How is it that the harsh, saw-like radula of the slug, with which it tears its food, does not break the thin capsule of the nettle-cell? It has been suggested that the slug, in eating, exudes mucus, which prevents the discharge of the nematocysts, but is this sufficient explanation? Why are not the defensive cells discharged on the approach of the slug? They are discharged in some cases but not in all. Why not? And how is it that the slug is immune from the poison? Mr. O. C. Glaser writes: "It is truly remarkable that these apparently helpless creatures should have selected such a dangerous prey, but since they have, it must be because the danger does not apply to them. Why it does not, I do not know, but it may well be for the same reason the nematocyst does not discharge while being eaten."

Those reasons, whatever they are, remain obscure, and there are other questions we must ask. How is it that the unexploded, and only the unexploded, nematocysts are gathered together from out of the stomach of the slug into narrow ciliated channels, and are swept by the working of the cilia up into pouches which lie near the periphery of the brightly coloured appendages, and how is it that they are there neatly arranged the right way up, and in such a manner that they can be discharged against any creature which threatens the sea slug? How is such a complicated and highly specialised sequence of events to be accounted for?

Is it possible to imagine that this elaborate and complicated pattern of improbable events has come into existence through chance variations or mutations? Let us try. We must suppose that the kinds of sea slugs which can swallow the nematocysts with impunity are derived from some ancestral form, which resembles the majority of sea slugs, which have not this power,

and which are warned off those coelenterates which are armed with nematocysts. In the first place a number of co-ordinated variations must have taken place which enabled the slugs to approach the polyps without exploding the stinging cells. Other variations must have been necessary to allow the slugs to swallow the nematocysts, and yet others, of subtle and complicated nature, which govern the mechanism, which sweeps the nematocysts into the ciliated channels and up into the pouches which lie near the periphery of the brightly coloured appendages; other variations there must be, all composed of unit characters, which govern the arranging of the nematocysts the right way up. All these combinations of variations, must, according to the theory, be the outcome of chance. If these suppositions seem reasonable, then we can still remain upholders of the belief that these sea slugs have been evolved from ancestral types through the process of natural selection.

Is it not simpler and also more reasonable to suppose that this complicated pattern of events is the result of some guiding principle or *entelechy*? The pattern exists as a whole, and as a whole it must have come into existence, for separate parts of the pattern would not function without all parts being present. These complicated, interlocked arrangements must, I submit, exist in their entirety, and in this connection I should like to tell of an incident from my student days at Cambridge, when Adam Sedgwick was Professor of Zoology. On one occasion, when I was turning over the pages of a zoological text-book, he passed and stood behind me when I chanced to have turned up a picture of Archæopteryx, the winged and feathered reptile of the Triassic period. "Precipitated!" he said with a characteristic sniff. I was then in my second year, and a convinced Evolutionist. I turned to him with what might well have been an inquiring look. "Precipitated," he repeated. "We don't say created in our days, it's not the the fashion."

It would need as wise a man to make the same comment after investigating the case of the sea slug.

There are a multitude of cases as remarkable and challenging to facile explanations, which time and space do not allow me to mention; but while dealing with this type of association between either friendly or hostile species I should like to draw attention to the various kinds of small fishes which derive protection from large jelly-fish. The jelly-fish are armed with long, streaming tentacles, and these swaying filaments are richly provided with

nematocysts. They will explode at the least touch, as any bather in a tropical sea will have learnt to his cost. Certain species of fish make a habit of living in, or close to, these jelly-fish. When they are threatened by larger enemies, they retreat inside the bell of the medusa. They are not digested, as other creatures are, by the juices within the pouch, neither are they stung, although they move to and fro and in and out.

Other associations which it is equally difficult to imagine as having arisen as the result of gradual evolution, in the usually accepted sense of the word, are provided by hermit crabs which detach sea-anemones from their rocks, and place them upon their own shells. If such a hermit crab is confined in the same aquarium as an anemone, the anemone will often abandon its position on a rock and, gliding towards the crab, will fasten on its shell. Sometimes the crab is not merely passive, for if the anemone is detached from his shell, the crab will pick it up with his claws, and, pressing it against his shell, will hold it there till such time as the anemone has made itself fast once more. Evolutionists must find it hard to account for such reciprocal actions by chance arrangement of genes, bearing unit characters. Another such instance, perhaps more remarkable, is that of a small crab which frequents coral reefs. This crab is provided with claws or chelipeds of very small size, which are of little use for attack or defence. The fingers of these claws are armed with recurved teeth, enabling them to take firm hold on the slippery bodies of small anemones. With their claws, carefully and without injury, the crabs detach the anemones from their hold on the rocks. They then clasp the anemones, one in each claw, and hold them in close proximity to their mouths. The anemones do not appear to suffer from this rough treatment, and continue to spread their tentacles, and to capture any small creatures that are wafted to them in the water. The crab with his first pair of walking legs removes any tit-bit that he fancies from the tentacles of the anemone, and eats it himself. In this way, life is made easy for him through the functioning of a completely different species. He is seldom met without one or more anemones in his claws, and this association is developed in the species, and not only in individual crabs. Such a behaviour pattern as the above embraces a great number of tendencies. Are we to assume that these have come together through chance mutations, which conveniently correspond with other chance physical modifications? Or are we to assume that the chance

modification of the chelipeds prompted some ancestral crab to detach, for the mere fun of the thing, an anemone, and by chance hold it near his mouth? Again, we must assume that by chance some creature was caught in the tentacles, and the crab was not slow to take advantage of such good luck, and so retained its hold on the anemone; and, if we follow such line of reasoning, we must assume that the crab passed on to its offspring a tendency to use their chelipeds in a like manner, and so, through the action of natural selection, we have the present-day crabs with their close association with sea-anemones. Such assumptions can hardly, I think, recommend themselves to our reason.

Cases as the above are by no means exceptional. Amongst the lower animals, the insects and crustacea, they are typical, and, in the opinion of any unprejudiced observer, will not find a satisfactory explanation in such simple concepts as those put forward by the upholders of the classical theories of evolution.

Much as I would like to give further examples of these fascinating behaviour-patterns and life-histories, time will not allow me to do so, and I will turn to a different aspect of my subject. I will ask you to consider the behaviour of the caterpillar at the time when it changes into a pupa, and the events which then occur. The metamorphosis which takes place in the life cycle of insects, and especially that complete series of transformations within the life history of the lepidoptera, has been taken as a significant expression of the transformative processes of life, and it is here that we may find most clearly marked indications, which may lead us to a better understanding of the formative forces which govern the development of living things. The essential differences in form, size and habit which separate the early phases of the larva from the perfect insect cannot fail to capture the attention of any observer, and to evoke the question: How can the transformations from larva to pupa, to imago, be reconciled with the concept of continuous modification by innumerable, slow variations, or with the concept of uninterrupted evolution by gradual functional changes; and further, how can the phenomenon of histolysis in the chrysalis, by which most of the organs are reduced to an amorphous emulsion, preparatory to the coming metamorphosis, be brought about by purely mechanistic, physico-chemical reactions? Is there not here revealed a testimony, which declares that neither the changes in the larva nor the mysterious solution of the tissues in the chrysalis lead up to, or in any obvious way anticipate, the future

morphology of the perfect insect; and is not the conclusion unavoidable that this testimony reveals the existence of an ideal, proper to and working within (and perhaps without) the organism in question? This ideal or final cause being the determining factor which governs the transformations.

The process of such transformations can be observed in any butterfly or moth. I should like, if time allowed, to give a full description of the life history of *Papilio Machaon*, the English swallow-tail butterfly, with which I have good opportunity of making myself familiar, but as time is limited I will confine my description to the most significant period of that history. I will ask you to consider whether this behaviour-pattern is more likely to have come about as the result of chance mutations or variations, or as the result of an innate and directive tendency governing the life of the species. That you may judge the better, I will describe the process in some detail.

After thirty days from the emergence from the egg, the caterpillar is fully fed, and is ready for the change into the pupa stage. This readiness for change is announced by a restlessness and a desire to walk, which fulfils the purpose of distributing the individual larvæ over wide areas, far from the place where the parent insect deposited the eggs.

The first act is to spin on a reed-stem a firm mat, on which to fix the hind claspers. In an upright position, with the hind claspers fixed on the mat, the larva spins the semi-circular band which is to hold the pupa in an upright position. From side to side the head moves, while the fore-feet guide and fasten the thread as far down the supporting stem as they can reach. When this task is completed, the caterpillar is circled round the back by a strong silk cord. It now rests, and during this period the body becomes noticeably smaller, and towards the later part of the time all the claspers are loosed but the last pair; and the creature leans on the band of silk in a shape which is already suggestive of the pupa.

At the appointed time, usually after about fifty hours of quiescence, rhythmical movements are to be observed. These swell from the posterior to the anterior and, becoming at last sufficiently violent to break the thin larval skin, which splits down the back, while a green, tender body seems definitely to push itself through the widening gap, and at the same time the skin, as though pulled back by some invisible instrument, slips farther and farther towards the tail. It passes the silk cord,

which one would expect to entangle it, and, by the most extraordinary dexterity of wriggling, the now naked pupa works the skin down to the region of the hind claspers. As a penultimate act, it releases its hold on the silk mat, draws up the tail and lifts clear of the skin, pushing it aside, and finally fastens again on the mat, making, as a seal of its accomplishment, a few quick turns to secure its hold.

The empty skin falls, and the pupa occupies the place of the larva, but it has not yet assumed its pupal form. The posterior end is much rounder than it will soon become, and the part where the eyes and the head are to be is still snub and soft. This condition changes within twenty minutes, and the chrysalis takes its final shape, and the outer integument hardens.

I want to draw particular attention to the following fact: the shape and position of the organs of the butterfly which is to be are at this stage already stamped on the pupa. These marks are on the *outside*, and there is nothing yet formed inside to correspond with them. This is a significant fact, and one which, when its significance is grasped, will modify the accepted idea that development takes place always and only from a centre outwards. Invisible forces outside the insect have stamped upon it the shape corresponding to that final-cause which is inherent in its being. I want to stress the idea that this final-cause, which I describe as inherent in its being, is not necessarily contained within its material body. At this stage, when the larva turns into the pupa, the governing ideal declares itself. Although there is within the creature nothing but the old body of the larva, which is in process of breaking down, there is on the outside of the pupa the pattern of the perfect insect, with wings, legs, antennæ, etc., which are later to be occupied by the as yet unformed organs. This pattern is waiting to be filled by organs not yet made but already determined.

The changes which go on within are not less wonderful than those which have been visible from the outside. A breaking down of tissues is taking place. Cells which are comparable to white blood-corpuscles are generated in large numbers at this time, and these devour most of the organs which have functioned in the caterpillar, reducing these to a kind of non-cellular mush. These changes remain, even in their physical aspect, much of a mystery, but it is maintained that the tissues, which are reduced by the phagocytes, comprise the hypodermic cells of the first four segments, the breathing tubes, the muscles, the fatty bodies

and the peripheral nerves. At the time that this change is taking place, the cells of the middle intestine assemble into a central mass, and later a new generation of tissue is formed, partly from this central intestinal magma and partly from the proliferation of special corpuscles called image-bearing discs. Thus it is that the newly formed portions seem to have no direct filiation with the destroyed parts of the larval organism. The creature has in fact died, in so far as it has lost its form, its organs and its habits, and now is experiencing a new orientation towards a quite different form, which is to find expression in a different mode of life.

In this process of metamorphosis we are, I believe, in the presence of the working of a concrete, creative idea upon plastic material. What we have witnessed is the working of a centralising and directive force, which determines the chemical and physical reactions of the organic medium. This principle, which makes itself so clearly manifest in the above instance, is—and there can be no doubt about this—the principle which determines the development of all life. Similar, though less patent metamorphoses occur in all embryological development. When we recognise this fact, the physical forms and the outward behaviour of animals can no longer be considered as constituting their whole being; we become aware of the presence of invisible forces, as yet ungauged and unknown, which lie behind the visible phenomena of life, and we realise that Nature expresses invisible values in visible forms; then it follows that many biological and psychological theories, in so far as they try to explain the phenomena of their sciences entirely in terms of physical matter, are trying to do what is impossible; and are in the same position a mathematician would be in if he attempted to make an equation which involved three arbitrary constants passing through five arbitrary points. More terms have got to be put into the ideas before they can fit the facts. This simile has been used by another writer, but it is such a good one that I do not hesitate to repeat it.

The facts which refuse to be fitted into the old theories are numerous. I have been able to give only a few; this is not because they are rare or not so interesting as those which I have selected. There are many other cases which I might equally well have described, and which would have fitted my arguments just as well.

If we now turn to look at some of the assumptions which have been made to support the classical theories of evolution, we will find that they are not so much in accord with those theories as

at variance. Evolutionists often use the simile of a tree to indicate the relation of the species to each other, and the extinct forms, and to the forms which are assumed to be ancestral forms. They say: Consider the existing species as the terminal twigs of such a tree of life; then the smaller branches would represent the ancestral forms connecting the adjacent twigs; the larger branches would represent earlier ancestral forms of a more general and primitive type; the stem and the root would stand for those ancestors of ours, the most primitive and first developed creatures on the earth. In their earliest use of this picture of a tree, men placed some of the existing species upon the developing branches and regarded the species and genera as leading one into another. True, they recognised that there were many links absent. These absences in the hypothetical sequence they called missing links. That was but an early conception; soon they admitted that few of the existing or extinct species could be placed *on* the connecting branches, but that most occupied the position of terminal twigs. And now, with a more careful study of morphology, it is admitted that *all* existing and extinct species must be regarded as terminal twigs, and at some little distance from the connecting branches and stems. The connecting branches and stems are in fact entirely hypothetical, and furthermore the tree, as it was first conceived, no longer exists as an adequate simile, but there has taken its place a hypothetical growth more like a tuft of rushes than a tree, and the existing species are the terminals of that outbranching growth.

Now the facts to which I wish to draw attention are these: That the existing species or the extinct fossil species do not exist anywhere on the connecting branches, but must all be regarded as terminals; the vast body of the tree of evolution is entirely imaginary, and no material creatures have been found to correspond to it. And yet—and this cannot be contested—there is little doubt that, in the process of time, more complicated animals, and animals of higher development of consciousness, have appeared on the earth than those previously upon it. There is an apparent evolution in time, and the idea of evolution is not by any means one to be lightly thrown aside. All those classes of facts which Darwin collected are to a large extent still valid, though contradicted by other facts. How are we going to get out of this dilemma?

By putting, as I have suggested, more terms into our ideas. If we postulate an invisible but definitely objective environment—

and from many different departments of science inferences are being made which strongly support this postulate—then we shall have opened out to our consciousness a new field for investigation. This invisible, objective environment may well be called, if we so please, a spiritual world. In it exist those invisible values which find physical expression on our earth. In this invisible region, of whose existence science is only just becoming aware, there may well exist, and I believe do exist, the missing portions of the tree of evolution. These portions are represented, not by existing species, or extinct fossil species, or hypothetical ancestral species, but by a more plastic material than that material that is incarnated on our earth. It is this invisible environment, which is already coming within the region of our investigations, in which are activating concrete ideas, centralising and directive forces, as witnessed in the formation of pupa and imago, and in the life histories already described. These forces determine the chemical and physical reactions of the organic medium. It is these which govern the process of evolution, not in material forms, all manifested in a chain of successive lives upon the earth, but in the spiritual universe. Science is becoming increasingly aware of this invisible background which lies behind, and which is responsible for, sensual phenomena. It is of this background that William MacDougal has written : “. . . a great unknown in which great discoveries await the intrepid explorer, a vast region at whose mysteries we can hardly guess, but which we may look forward to with wonder and awe, and towards which we may go on in a spirit of joyful adventure, confident in the knowledge that though superstition is old, science is still young and has hardly yet learnt to spread her wings and leave the solid ground of sense perception.”

DISCUSSION.

The CHAIRMAN (Mr. DEWAR) said : Mr. Grant Watson, who is a trained zoologist, has travelled much, done a great deal of good work in the field and is an independent thinker, has given us a most valuable paper. It is of exceptional worth, because, while most of us who are sceptical about evolution have criticised it on morphological and palæontological grounds, Mr. Grant Watson has concentrated on the habits of animals. He has cited startling cases of habits and metamorphoses at variance with the doctrine of evolution.

For his assertion that there are many others, I, as an ornithologist, can vouch. It seems to me that some of the nest-building habits of birds cannot have evolved gradually. Take the case of the familiar house-martin. Most of you must have watched this little bird, looking very smart in his spotless white trousers and shirt, gathering mud from a puddle. The bird ejects from his beak each mud pellet collected to the spot on the wall to which the nest will be attached. The pellets stick to the wall, and more are added until the cup-shaped nest is completed. I submit that this habit cannot have developed gradually. This is also true of the sand-martin which excavates a nest in a sandbank.

The only criticism I have to make of Mr. Grant Watson's paper is that it seems to me that he is inclined to overestimate the extent to which the facts, or supposed facts, on which Darwin relied are still valid. The facts known to-day are far less favourable to the concept of evolution than they were in 1859. The thousands of fossils since found, with the possible exception of *Archæopteryx*, have not served to bridge any of the gaps between the great groups of animals. That *Archæopteryx*, although a very curious bird, does not bridge the gap between reptiles and birds is shown by the fact that it gives the evolutionist no assistance in determining the group of reptiles from which birds are supposed to have evolved. Recent genetical experiments, contrary to the expectations of evolutionists, have demonstrated the great stability of animal species, and there is no getting away from the fact that they are unfavourable to evolution. Our greatly increased knowledge of comparative anatomy has not revealed the presence of a single structure in a nascent condition in any adult animal; yet, if the evolution theory be true, such structures should be numerous. On the other hand, a number of what were formerly believed to be useless vestiges of ancestral organs are now known to be useful to their possessors. Finally, new discoveries of fossils have tended to throw doubt on the idea that in the course of time animals have increased in complication. As new discoveries are made we have to put back the date of appearance of the higher types of animals in the rocks known to us. Take the case of fishes, using the term in its widest sense. At one time the earliest known fish fossils were Devonian; it is now well established that such fossils occur in the Ordovician, and last year a supposed fish fossil was found in the Cambrian. If this be con-

firmed, then all the great phyla of the animal kingdom occur in the earliest known fossiliferous rocks, so that any complication that has been effected has taken place within the phylum. It is true that the earliest fish known to us are very different from those now living and that the bony fishes (Teleosts) do not appear before the Jurassic. These are supposed to be the highest fish because their bones are ossified, but I do not see that they are more complicated than sharks which appear very early; in any case Stensio has recently shown that some Devonian fish had developed bone. Nor were these early fish puny creatures. The head of the Devonian *Dinichthys* measured more than a yard across, and its neck was jointed, which is more than can be said of any living fish.

In conclusion, I have much pleasure in handing to Mr. Grant Watson the Dr. Schofield Memorial award for his valuable paper. Many of you knew Dr. Schofield personally. Most of you have read his autobiography *Behind the Brass Plate* and are aware that he was a distinguished physician who for many years served on the Council of the Victoria Institute and left the Institute a sum of money, the interest on which is given every year to the author of a selected paper.

I ask you to accord a hearty vote of thanks to Mr. Grant Watson. The meeting is now open to discussion.

Mr. H. S. SHELTON paid a tribute to the interesting facts of Natural History contained in the paper, but remarked that there seemed to be very little connection between the paper and the title. So far as he understood the main trend of the paper (and he confessed he did not find it at all easy to understand), the author contended that some spiritual principle was involved in embryonic development. It was impossible to express an opinion on a theory of this kind unless it was developed in greater detail, but, for what it was worth, it appeared to be neutral between evolution and special creation. If such a principle were involved in embryonic development, it could be applied equally well to evolution.

Mr. Shelton also remarked that the features which the author found difficult to explain by descent with modification were differences within the zoological family, and contrasted this with the idea the chairman had expressed in his well-known book that

evolution took place within the family, but not to such an extent as to join by direct descent groups more widely separated.

Mr. R. DUNCAN said that in the supremacy of death there was a further fact, universal in its scope, that seemed to him inconsistent with the theory of evolution.

In all the beings comprised in animated nature there were basic instincts directed towards the preserving of their own lives and the avoidance of death.

If an evolutionary process, continuously acting throughout untold ages, is to be assumed, then it is only reasonable to assume also that its course could not fail to be profoundly influenced by the ever-present urge of the instincts aforesaid—influenced, that is to say, in the direction of survival power being more and more developed in the units of life as the ages unfolded.

Where, however, can trace be found of the working out of any such tendency? In the reigning conditions to-day, does not the lordship of death remain altogether unabridged?

He (Mr. Duncan) would submit, therefore, that, apart from more potent considerations, the one thus set forth is in itself a bar to accepting evolution as the key to a true understanding of the world of life.

Mr. W. McADAM ECCLES, M.S., F.R.C.S., said: All present are much indebted to Mr. Grant Watson for taking us back again into the realms of the fascinating facts concerning the sea-slugs, and the metamorphoses of the butterfly, but to many of those present these appear to have but little bearing upon the subject before us, as evidenced in the title of the paper read.

It is well to have a clear view as to what is the belief of sincere followers of the Bible.

Can we not affirm that all present —

- (i) Believe in an intelligent creator.
- (ii) Would call that Creator—GOD.
- (iii) That the first chapter of Genesis gives us a concise account of the steps in the creation, including that of man himself.
- (iv) These steps are chiefly the preparation of this globe for man.

- (v) But this is through motion, light, life—vegetable and animal—and these in a definite order, extending over time represented by “six days,” which were unknown periods of time.
- (vi) That the expression used for nearly all is “Let there be,” rather than creative acts for every living thing.
- (vii) There are most interesting animals still existing on the earth which apparently are what some would call “missing links” actually present, *e.g.*, the ornithorhynchus in Australia.

Such a belief as outlined above does not in fact necessitate the giving up of a whole-hearted certainty of “inspiration” of the Scriptures, or that development by “evolution” of living organisms in any way detracts from God’s almighty power of creation.

Sir AMBROSE FLEMING wrote: Although we have had several papers read to the Victoria Institute in the last ten years dealing with the theory of organic evolution, the present paper by a competent naturalist is a welcome addition because it sets out in detail biological facts which are inconsistent with that theory.

The difficulty, however, is to secure attention to them, not merely by the professed evolutionists, but even by the daily papers which are the chief source of information to the general public. The assumption made is that the theory is so fully certified that any apparent contradictions can, or may be, explained away. Moreover, the evolutionists make assumptions which are contradicted by existing knowledge. All definite researches have proved that living matter only originates from previously living organisms, and not from non-living material. The evolutionists attempt to bridge this gap by the improved statement that if we could go back far enough in geological time we should find the transition automatically taking place. Then further, they assume that in connection with living matter there are no agencies or processes concerned which cannot properly be called physical or mechanical, and that there is no reason for assuming any hyper-physical causes.

Thus T. H. Huxley rebuked those who employ the terms *vitality* or *vitalism* in connection with the growth and multiplication of

living cells, saying that there is no more need to use them than to say that something called "horology" is concerned with the movements of a clock. "Both the clock and the cell," he said, "are pieces of mechanism and involve no occult incomprehensible causes." When, however, it is pointed out that there is a *directive power* of some kind concerned with the arrangement of the cells, say in development of the yolk of a hen's egg into a chicken as it is hatched, then evolutionists are content to invoke an agency called "entelechy" or "biotic energy" to account for this directivity. Against this, however, we may contend that all order or ordering involves thought and thought implies and requires a Thinker, and not simply an impersonal causation or the employment of a term which imparts no true explanation but is rather a cloak for ignorance. Then we may note that since Darwin's day some branches of biology have made progress in a direction which does not assist Darwin's fundamental assumption that the germs, ova, or seeds of living organisms vary accidentally in all possible directions. The branch of science called Cytology is concerned with the structure and processes of growth of living cells. It has been advanced since Darwin's time by improvements in the microscope and in staining living tissues. The result has been to show the extremely complicated structure and wonderful actions at work in the growth of the fertilised ovum or seed which is the starting-point for organic life. These all seem governed by exact law and regularity and afford no support to the supposition of a large variety of states occurring by accident. Then when the theory is extended to cover the origin of the human race the all-important psychical differences between the highest animal and the lowest type of man are ignored and only similarities in bodily structure given attention.

Man, from his earliest appearance, had powers of progressive constructiveness of which there is no trace in any animal. Early man used fire, made tools and weapons, had vocal speech, made drawings of animals on cave walls, and by burial customs exhibited a firm conviction that the death of the body was not the end of existence, and exhibited potential or actual religious opinions and emotions, not the slightest germ of which appears in the highest anthropoids. The theory of evolution ignores completely the psychic facts of human life and adherence to it seems to atrophy

not only æsthetic but religious faculties. There is a striking proof of this in Darwin's own confessions as given in a recent biography of him by Mr. Geoffrey West.*

It is there shown that as his ideas and convictions on organic evolution progressed, so also there was a decrease in his higher æsthetic tastes and religious convictions. Once he had pleasure in the beauties of poetry, music, and painting. Then he confesses he became dead to them all. His mind, he said, had become a *machine* for grinding out general laws from a collection of facts. As regards religion, he abandoned doctrinal faith after he was 40 years of age. He said: "The more I think, the more bewildered I become. My theology is simply a muddle. I cannot look at the Universe as the result of blind chance, yet I can see no evidence of benevolent design, or indeed of design of any kind in the details."

If these were the results in the case of the chief author of the theory of organic evolution, we may ask: Is it safe to instil into the minds of students or even those of the general public the improved principles of this theory *without giving them full opportunity to learn the arguments against it?*

This paper of Mr. Grant Watson has, then, a field of usefulness as it furnishes some material for attack against a theory which has unquestionably a destructive influence on religious certainty and conviction.

The best antidote to it is a more extensive study of those Scriptures of truth which reveal to us the true origin, nature and destiny of Man, and a collateral study of the ever-accumulating evidence from archæological research that supports the historical truth of these Scriptures and that they are not a collection of myths and fables but record facts of history which are neither "incredible" nor untrue.

The view sometimes taken that organic evolution may be regarded as a method of Divine operation is open to the objection that if we extend this view to include the human race we are brought at once into opposition to the plainest statements of Scripture; and, moreover, we cannot deny the miracles of creation without also denying the similar miracles of Christ, and to do this involves as a logical consequence that it becomes necessary to throw overboard the

* See *John o'London's Weekly*, Dec. 17th and 24th, 1937.

whole of the historical basis of Christianity and reduce it simply to the inculcation of morality and philanthropy but divested of all doctrinal truth and supernatural power.

WRITTEN COMMUNICATIONS.

Dr. R. E. D. CLARK wrote : Mr. Grant Watson's paper is certainly one of great interest and his suggestion that, instead of repudiating it, we should " add more terms " to the current theory of evolution is worthy of careful thought.

Nevertheless, the view offers great difficulties. Let us draw an analogy from physics. A long time ago the concept of " time " was adopted by physicists and it was supposed that this " time," which is measured by the earth's rotation, was the same as the time which we experience in our minds. But it has turned out that this is not so (*see, for instance, M. E. Cleugh, Time, Methuen, 1937, chap. ii.*). Moreover, Professor Dingle's recent careful examination of the subject (*Through Science to Philosophy, C.U.P., 1937, chap. xi*) makes one wonder whether physical time is time at all!

Now Mr. Grant Watson has outlined the theory of evolution and shown, as a matter of fact, that it has a history very like that of time. It would seem to follow that, if his conclusion is correct, we should also add " more terms " to the physical idea of time and hence hope to make it consistent with the facts with which it will not at present agree. But that is not what the physicists are doing. Rather, they are becoming more and more contented to use their fiction, for the simple reason that " adding more terms " is a counsel of perfection. It requires a genius at least of the calibre of Einstein to think of a new term to add which would be any use to science!

Mr. Grant Watson meets this difficulty by proposing a new " force " which he describes as " an innate and directive tendency governing the life of the species." But almost identical suggestions in almost the same words have been made repeatedly since the time of the Cambridge Platonists (*e.g., R. Cudworth, Intellectual System of the Universe, London, 1678, pp. 179, 190*), but they have never been found useful to science. Surely they are no better than the old functional psychology—a man is very clever because he has a tendency for cleverness! In fact, it is just this type of thinking which all Christians so rightly deplore among sceptics to-day—the

view, for instance, that there is really no need to believe in a God Who created the world because, no doubt, matter has a "tendency" to arrange itself into complex organisms, worlds, etc., of its own accord, providing the conditions are right!

In addition, surely some of the evidence which has been given is quite unconvincing. What ground is there for saying that there is an "amorphous emulsion" inside a chrysalis? There is evidence that the most amorphous looking protoplasm may be quite elaborately organised (see J. Needham, *Order and Life*, C.U.P., 1936, p. 151, etc.). Even among pure chemical substances it is often found that liquids, though they are perfectly fluid, may yet contain a good deal of organisation (the so-called *meso-* or *liquid crystalline* states of matter). Thus a weak solution of ammonium oleate apparently contains fibrils of molecular dimensions, so far as their thickness is concerned, but they often stretch many inches through the liquid. Again, a suspension of bentonite clay which has been shaken is liquid but sets solid on standing a few seconds (*thixotropy*). The solid is not amorphous but organised, yet the behaviour can be adequately explained without postulating a "concrete, creative idea" acting upon "plastic material." Caterpillars are certainly more highly organised than bentonite, but this and other analogies are so striking (see Needham, *loc. cit.*, p. 156, ff., H. Przibram, *Die anorganischen Grenzgebiete d. Biologie*, Berlin, 1926) that the same principles may well be at work.

Invisible "forces" not known to science may, of course, exist, but it is no use speaking of "forces" unless they help to unify our knowledge, and until then science is certain to progress without them. So long as we realise the limitations of science this will not do any harm to religion.

AUTHOR'S REPLY.

In answer to Mr. Shelton, I should apologise for not having called my paper "Facts at Variance with the Classical Theories of Evolution" rather than "Facts at Variance with the Theory of Organic Evolution." The Classical Theories, which are the orthodox and most generally accepted theories, all lay stress on the mechanical nature of evolution. In my paper I think I have made it clear (though this is perhaps not clear in the title) that I believe in an

evolution which is an instrument of a divine spirit. Such a belief in evolution has been held by many philosophers, both ancient and modern, and has little to do with the mechanistic theories against which my arguments have been directed.

I differ from Mr. Duncan in my valuation of the fact of death. I regard death as equally part of existence as life itself. No basic instincts can possibly modify the balance between life and death, for the instinct towards death is the most basic instinct of all. No process of evolution taking place in a material universe could possibly bring about an avoidance of death.

To answer Dr. Clark's criticisms, I would need to write a paper as long or longer than the one I have already read. But to his objection to my plea for adding more terms to our ideas, I will merely drop this brief hint as to the lines of my rejoinder. St. Paul has written in his first Epistle to Corinthians—

“Yea, the things which are not (hath God chosen), to put to nought the things which are.”

I would suggest that scientists, when studying the things which are, should be aware of the possibility of the things which are not. This is, I know, making a fairly stiff demand upon their consciousness, but it is one which the scientists of the future will have to face up to.

With regard to his more particular criticism of my use of the word *amorphous*, I admit the justice of this objection. I should have used the word non-cellular. My point about the metamorphosis of the insect is, that one form of organism breaks down with regard to its most obvious and general structure, and from the resulting non-cellular matrix a new form of organism of a different structure is gradually built up. I believe that the precise and complicated organism of a butterfly, which as the facts tell us arises from this matrix, can best be explained by the working of a concrete creative idea upon plastic material. This belief cannot yet be proved, but it can with justice be put forward as the most probable.

814TH ORDINARY GENERAL MEETING,
HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, JANUARY 24TH, 1938,
AT 4.30 P.M.

SIR FRANK DYSON, K.B.E., F.R.S., IN THE CHAIR.

The Minutes of the previous Meeting were read, confirmed and signed and the HON. SECRETARY announced the following elections:—As Associates: The Rev. Chas. T. Cook, James H. Leask, Esq., M.A., F.R.G.S., and the Rev. Stewart M. Robinson, M.A., D.D.

The CHAIRMAN then called on R. Stoneley, Esq., Sc.D., F.R.S., to read his paper entitled "The Interior of the Earth."

THE INTERIOR OF THE EARTH

By R. STONELEY, Esq., Sc.D., F.R.S.

(With Lantern Illustrations.)

UNTIL comparatively recent times the question of the composition and state of the interior of the earth was open for the wild theorisings of philosophers, scientists and theologians alike, and the acceptance of a theory was liable to be settled largely by the eminence of the propounder, a disability from which scientific hypotheses are apt to suffer even to-day. Borings have been made only to relatively short distances, and modern experimental work, such as geophysical prospecting, touches only the outermost few miles of the crust. Our knowledge of the interior, then, is based mainly on indirect evidence, and this has to be drawn from a very wide range of studies. There is the further difficulty that the high temperatures and pressures that appear to be involved require an extrapolation of the laboratory laws of physics, and although astrophysics has accustomed us to a still wider leap, our lack of knowledge of these laws is a serious drawback.

In choosing problems for attack our interest naturally centres on the occurrence and distribution of elements within the earth, their physical states and properties, and the temperature distribution. We may inquire into the past, and seek to know the

future of the earth, particularly in its relation to the solar system, but, fascinating as such topics are, they involve for the most part some extrapolation, often risky, of the laws whose validity is established over a limited range of conditions only, and any provisional conclusions must be regarded as speculative. The most important sources of information are the geological, astronomical, geodetic and seismological evidence, and especially the last named; observations of earth tides and oceanic tides, of thermal conductivity and radioactivity of rocks are likewise important, and all these data must be examined in the light of the laboratory laws of physics, with quantitative tests as far as possible, such as measurements of the thermal and elastic properties of rocks at high temperatures and pressures, or by "exploring" the outer crust of the earth by artificial explosions. It will be more informative to indicate some of the main lines of attack than to give a catalogue of results.

The value of the constant of gravitation, as determined by delicate experiments on the attraction of two bodies, and the value of the acceleration due to gravity, as found from the period of a swinging pendulum, yield in combination with the radius of the earth given by geodetic measurements the value 5.5 as the mean specific gravity of the earth. Now the meteorites that come from outside the earth's atmosphere consist sometimes of stony matter and sometimes of nearly pure iron. If, as has been suggested, these are representative of planetary matter it may well happen that this mean specific gravity arises from an iron core, of specific gravity 8 or more, surrounded by a rocky shell; geological evidence suggests that the matter lying beneath the continents and oceans may be ultrabasic rock of specific gravity about 3.4.

The question of whether the earth, apart from its outer layers (perhaps some 30 km. in thickness), consists of a chemically homogeneous substance, condensed centrally under its own gravitational attraction, or whether there are changes in composition, continuous or discontinuous, from point to point is answered by an investigation due to Clairaut. In his monumental treatise, *Théorie de la Figure de la Terre* (1743), he showed that if the earth is an oblate spheroid of ellipticity ϵ , mass M and radius a , the difference $C-A$ between the principal moments of inertia is given by the formula $3(C-A)/Ma^2 = 2\epsilon - m$, where m is the ratio of the centrifugal force at the equator to mean gravity and is about $1/288$; geodetic measures give ϵ as about

1/297. The value of $(C-A)/C$ is known from the period of the precession of the equinoxes to be about $1/305.6$, so that C/Ma^2 is 0.334 . Now the moment of inertia about an axis is found by multiplying each constituent mass into the square of its distance from the axis and finding the sum of these contributions; accordingly the moment of inertia is an index of the concentration of matter towards the surface of the earth. For a homogeneous earth the value would be about 0.4 , so that the actual earth must be centrally condensed. Further, the data cannot be satisfied by assuming the earth to be chemically homogeneous and compressed under its own attraction.

There is some latitude in choosing laws of density. It has been shown that any law of density giving the correct mean density and satisfying $C/Ma^2 = 0.334$ will lead to the correct value of ϵ and of $(C-A)/C$, which are, therefore, not independent data. Accordingly, other considerations must be introduced. The so-called "laws" of Laplace and Roche have no geophysical justification, and were introduced illustratively merely to make a certain differential equation integrable; further, they give a value of the density in the upper layers that conflicts with geological evidence. Wiechert's hypothesis that there is a rocky shell of specific gravity 3.2 surrounding a metallic core of density 8.2 and radius 0.78 times that of the earth represented a considerable advance: it was consistent with geological and astronomical evidence, but made no allowance for compressibility.

It is the seismological evidence that is most informative. Earthquakes occur within 20 km. of the earth's surface, and the initial dislocation gives rise to two types of waves, compressional (P) and distortional (S), which are transmitted through the body of the earth and recorded by seismographs at stations all over the earth. In this respect the earth behaves like an elastic solid. By analysing the times of transmission of the pulses to various distances it is possible to find the corresponding velocities at different depths. The direct S waves, however, are not received at angular distances greater than about 103° , and the only explanation seems to be that the central portion behaves like a liquid in not transmitting S waves, a suggestion made by R. D. Oldham, C. G. Knott and B. Gutenberg. The last-named found that the diameter of the liquid central portion must be about half that of the earth; the junction is quite sharp, for waves reflected at the discontinuity can be identified in seismograms.

A further line of evidence is afforded by earth tides, observations on horizontal pendulums, and by determinations of the "variation of latitude." The tides raised in the body of the earth by the sun and moon affect the ocean tides in two ways:—(i) the equilibrium height of the ocean tide is diminished by the tidal rise of the ocean floor and (ii) is increased through the gravitational attraction of this tidal "bulge" in the earth. The effect of the yielding of the earth is thus to alter the height of an oceanic tide in the ratio $1 - h + k$. A similar factor arises when the moon's horizontal attracting force is measured by means of a horizontal pendulum. It was proved by Euler that if the earth is slightly disturbed from a state of steady rotation the axis of rotation will describe a cone in the earth. The actual motion is the same as if a rough cone, fixed in the earth (the "polhode-cone") were rolling on a cone (the "herpolhode-cone") fixed in space. For a completely rigid body the period of movement of the axis of rotation *relative to the earth* should be $A/(C-A)$ days, *i.e.*, about 306 days. This movement of the axis of rotation would give rise to a corresponding fluctuation in the observed latitude of an observatory. The actual observed free period (there is also an annual period, which is ascribed to meteorological causes) was found by S. C. Chandler in 1891 to be about 427 days, and the lengthening is to be attributed (as suggested by Simon Newcomb) to the finite rigidity of the earth; in fact, the number k , which arises through the yielding of the earth, may be calculated from the observed free period, and is about 0.27. Since $1 - h + k$ is about 0.67, h is nearly 0.6.

Now h and k , the so-called "Love's Numbers," may be calculated directly when the density and elastic properties of the earth are known, and so a comparison is possible. When the density is known the elastic constants at any depth may be found from the corresponding velocities of P and S waves. These calculations have been made on various hypotheses concerning the composition of the interior, but as long as it is assumed that the central part of the earth has a rigidity bearing the relation to the compressibility that the term "solid" implies, the calculated yielding is too small. This suggests, quite apart from the fading-out of S at a distance of 10^3 , that the interior of the earth is partly liquid, and the discrepancy was cleared up by Dr. Jeffreys, who showed in 1926 that if the Wiechert discontinuity in density is made to coincide with the surface of the Gutenberg liquid core, then when gravitational compression is

allowed for the data agree extremely well with the tidal observations. The specific gravity of the solid shell would increase from about 3.5 near the surface to 5.5 about half-way down, with a sudden transition there to a material of very low or zero rigidity and specific gravity about 10. At the centre the specific gravity would be about 12. These values are consistent with the existence of an iron core.

Information about the structure of the surface layers of the earth, just below the sedimentary rocks, is forthcoming from the detailed examination of earthquake records. The pulses recorded at stations within 800 km. of an earthquake focus indicate that below the sedimentary rocks of the continents there is a granitic layer some 17 km. thick, and beneath this a layer of basic rock about 9 km. thick. Below these continental layers the material seems to be ultrabasic rock, with no important change in composition down to the core, except possibly for a discontinuity at a depth of about 480 km., which, if confirmed, may correspond to a transition from a rhombic to a cubic form of olivine under high pressure. There are two types of wave that are propagated over the surface of the earth rather than through the interior; these are respectively called after Rayleigh and Love, by whom they were theoretically predicted. Their times of travel confirm in general the above findings in connection with the continents, and they show that there is a marked difference between the continents and the Pacific floor; owing, however, to the dearth of seismological stations on the islands in the Pacific, precise information about the ocean floor is lacking.

Some inferences concerning the viscosity of the earth are possible from the persistence of the free period of the variation of latitude and from the absorption of seismic waves, but these are decidedly precarious, and all that it is wise to say is that for forces of short period (*e.g.*, about a minute) the rocky shell of the earth behaves as an elastic solid, and the core as a liquid, whilst for periods of the order of some thousands of years the earth seems to yield as a whole, after the fashion of pitch, and to behave as a liquid of very high viscosity.

Thermal considerations can only be touched upon briefly. On any reasonable hypothesis concerning the age and thermal conductivity of the earth the "original heat" must have only a small effect on the surface temperature and temperature gradient. The present surface temperature is maintained by solar radiation, and the existing temperature gradient is presumably maintained

by the escape of heat generated by radioactive minerals, such as uranium and potassium. The conductivities and radioactive contents of granitic and basic rocks give an estimate of the thickness of the continental layers that is in general agreement with the seismological determinations.

DISCUSSION.

A hearty vote of thanks to the lecturer was proposed by Dr. F. J. W. WHIPPLE. Dr. WHIPPLE called attention to Dr. Stoneley's reference to the evidence provided by meteors as to the likely constitution of the earth. It was almost certain that solid bodies of the size of meteorites could not have been formed directly by the condensation of gaseous material. Meteorites must be the débris of planets or satellites which had met with disaster, either by coming into collision or by approaching some larger body so closely that fracture was produced by the stress set up by gravitation. Saturn's rings were explained by such a fracture. It was likely that any planet which produced metallic meteorites when it broke up had had a core which was solid, not liquid like that of the earth.

WRITTEN COMMUNICATION.

Lt.-Col. L. M. DAVIES wrote: Since I do not consider myself qualified to discuss the subject of this paper, I would only venture to ask the lecturer a question, which is as follows:

How are the movements of the magnetic pole to be accounted for? These movements seem to be continuous, and the pole itself fairly deep-seated. Would the migrations of that pole not point to something in the nature of convection currents within the earth, thus indicating liquid action of a third kind—*i.e.*, neither very brief nor exceedingly slow, since the location of magnetic north varies materially from year to year?

AUTHOR'S REPLY.

I do not feel qualified to say much about the movement of the magnetic pole. The earth's viscosity is too great for it to be a free precessional motion, and I do not think attempt to explain it as a

forced vibration (like the annual period of latitude variation) has been successful.

The reference to meteors was merely that they provide a sample of matter as found in the solar system : whether it is a representative sample is, of course, a matter for conjecture. I agree with Dr. Whipple that matter in the form of meteorites is more likely to be derived from the break-up of a solid planet than from the condensation of a primitive nebula or star, or even a planet with a liquid core. The disrupted body might well be an asteroid small enough to be solid ; accordingly, the *chemical* constitution of meteors may be a guide to the *chemical* constitution of the earth irrespective of the *physical* state of the meteorites, whether before or after their formation.

815TH ORDINARY GENERAL MEETING,

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, ON MONDAY, FEBRUARY 7TH, 1938,
AT 4.30 P.M.

SIR AMBROSE FLEMING, D.Sc., F.R.S., IN THE CHAIR.

The Minutes of the previous Meeting were read, confirmed and signed and the HON. SECRETARY announced the following elections as Associates :—M. G. Tallach, Esq., M.B., Ch.B., and F. T. Farmer, B.Sc., Ph.D.

The CHAIRMAN then called on Dr. Hart-Davies, M.A., D.D., to read his paper entitled "The First Two Chapters of Genesis Considered as a Basis of Science" (being the Gunning Prize Essay, 1937).

*THE FIRST TWO CHAPTERS OF GENESIS
CONSIDERED AS A BASIS OF SCIENCE*

By The Rev. D. E. HART-DAVIES, M.A., D.D.

(Being the Gunning Prize Essay, 1937.)

IN any attempt to demonstrate the scientifically accurate basis of the first two chapters of the Book of Genesis special regard must be had to three of its marked characteristics, viz., the brevity of the narrative, the simplicity of its diction, and the obviously religious purpose of the record. Precise definition and comprehensiveness of statement cannot easily be accommodated in close quarters. Simplicity of diction is about the last thing we expect to find in a strictly scientific treatise. And it should always be carefully remembered that the outstanding purpose of the Genesis record was not to reveal how the world was made, but the sublime fact that the Maker of the world willed to be regarded as a Father and Redeemer. The Creation stories of Genesis are only a preface to the great theme of the Bible, which is the record of the redemption of mankind.

Notwithstanding, however, the limits imposed by its brevity, its simplicity and its religious purpose, the scientific accuracy of

its statement becomes more apparent the more carefully the record is examined. And this I understand is the subject which this Essay is intended to illustrate.

But the first two chapters of Genesis are much more voluminous in records and references of a scientific nature than many apparently imagine. Within the prescribed limits of this essay exhaustive treatment is not possible. I intend, therefore, to confine myself to what appear to be the most prominent features of a scientific character in the Scriptural record embraced by the two chapters under review. They may be conveniently summarised as follows: (i) The Unity of the Source of the Universe; (ii) The First Fiat: Let there be Light; (iii) The Time of Creation; (iv) The Order and Progressiveness of the Process; (v) Man the Climax and Crown of Creation; (vi) The Formation of Woman out of Man; (vii) The Garden of Eden and the Cradle of the Race; (viii) The Firmament: An Alleged Mistake of Moses; (ix) Evolution or Creation: Which is Reasonable and Scientific? (x) Biblical Anticipation of Modern Discovery; (xi) Conclusion: A Basis of Science for Religion.

I.—THE UNITY OF THE SOURCE OF THE UNIVERSE.

By means of spectrum analysis a new metal was discovered in the sun before its presence had been detected in the earth. It was called helium from the Greek word for sun. That was in 1868. It was not until 1895, however, that helium was found in the earth. Of the ninety or more chemical elements now known to exist in the earth, fifty-seven have already been located in the sun. There is no substantial reason to suppose that the others are absent. Further, there are many stars whose spectra are exact counterparts of the spectrum of the sun. Modern physics, moreover, has shown that an atom is a complicated structure which closely resembles a miniature solar system. The nucleus of the atom corresponds to the sun, and the electrons which move in orbits around it correspond to the planets like Mars and Jupiter in their revolutions around their central sphere.

Now, although these facts may not absolutely prove, they certainly do suggest and point to unity in the realm of nature, whatever be the ultimate source of all that is. Whoever made the earth made also the sun; whoever originated the rise and

fall of the tides of the ocean caused also the planets to travel along certain appointed celestial paths. The same laws which govern the slide of a rain-drop down a window-pane operate in the mutual relationships and majestic movements of mighty orbs in space. There is not, and apparently cannot be, a multiplicity of origins. That fact or supposition seems, in the light of modern science, to be now self-evident and generally admitted.

One very arresting revelation of recent scientific research, when contrasted with prevailing views of a previous generation, is the conclusion drawn by Sir James Jeans that this unity of source presents a manifestation of mind. In his book, entitled *The Mysterious Universe*, he writes: "Only after much study did the great principle of causation emerge. In time it was found to dominate the whole of inanimate nature." Then followed a tendency "to interpret the whole material universe as a machine, a movement which steadily gained force until its culmination in the latter half of the nineteenth century."*

In the meantime there has been a widespread reaction from the mechanistic theory of the universe. After a carefully reasoned argument, based upon the newly acquired facts and ascertained phenomena of the early twentieth century, Jeans reaches the conclusion that "from the intrinsic evidence of his creation, the Great Architect of the universe now begins to appear as a pure mathematician."† He then goes further, and, in reference to the philosophy of a bygone age as propounded by Bishop Berkeley, he affirms: "It does not matter whether objects exist in my mind, or that of any other created spirit, or not; their objectivity arises from their subsisting 'in the mind of some Eternal Spirit'."‡

Later, he proceeds: "To-day, there is a wide measure of agreement, which on the physical side of science approaches almost to unanimity, that the stream of knowledge is heading towards a non-mechanical reality; the universe begins to look more like a great thought than like a great machine. Mind no longer appears as an accidental intruder into the realm of matter We discover that the universe shows evidence of a designing or controlling power that has something in common with our own individual minds." But he concludes with a

* Pp. 15, 16.

† P. 134.

‡ P. 137.

rather melancholy confession of the inability of science unaided to lead to a satisfactory resting-place, when he affirms that "everything that has been said, and every conclusion that has been tentatively put forward, is quite frankly speculative and uncertain."*

We thus realise afresh the limits of scientific investigation. Science can take us so far, but no farther. Jeans' confession recalls the pathetic lamentation of ancient days: "Canst thou by searching find out God?" "Oh that I knew where I might find Him!"† But at this point a forcible reminder reaches us from the *Epistle to the Hebrews*: "Through faith we understand that the worlds were framed by the Word of God, so that things which are seen were not made of things which do appear."‡

Faith can begin where reason and scientific inquiry end; especially if we can assume that there are two volumes of divine revelation—the works of God in nature and the word of God in holy Scripture. One is the complement and supplement of the other. Such faith is not divorced from reason; it is rather the handmaid of reason. Resting its ladder upon the bed-rock of ascertained scientific fact, it seeks to climb by faith to a higher and purer knowledge of the divine Source of things created. It is not a rash but a reasonable step upwards to accept the simple but sublime statement with which the Genesis record opens: "In the beginning God created the heaven and the earth."

If the question be asked, By what power did the world and all that is contained therein come into existence? the Bible answers, by the power of the living God. The creation is repeatedly attributed to the operation of one personal, intelligent, omnipotent Deity, Who sees the end from the beginning, and works out His designs according to His sovereign will. "In the beginning God!" Not less than forty-six times in thirty-four verses is the divine name or the divine activity referred to. He creates, He makes, He appoints, and He pronounces His handiwork to be good. Thus, by the use of one simple, majestic phrase, the Bible repudiates Atheism, which denies the existence of God; Materialism, which assumes the eternity of matter; Pantheism, which identifies God with the universe; Polytheism, which ascribes all nature to a plurality of divinities; and Evolutionism, which traces the development of the cosmos by an impersonal,

* Pp. 148, 149.

† Job xi, 7; xxiii, 3.

‡ xi, 3.

automatic process, operating nobody knows how, from a single cell of protoplasm mysteriously existent in the ooze of a primeval ocean. Genesis affirms that creation was not by chance, but by one God, the high and holy Architect, Whose name or nature is progressively unfolded throughout the realm of Holy Scripture.

Although it may not be included within the scope of the present inquiry it is of interest to add that what natural science suggests and Scripture reveals, both archæology and philology have in recent years abundantly confirmed. The unity of God now appears unquestionably to have formed part of a primitive revelation. It used to be too readily assumed that mankind in its religious conceptions had risen from animism to polytheism, and thence to monotheism. The process, we now discover, has been in the reverse direction.

In 1931, Professor Schmidt, of Vienna, who is regarded as the leading authority on the subject of anthropology and comparative religion, published a volume entitled *The Origin and Growth of Religion—Facts and Theories*, in which he testifies from evidence collected all over the world to a universal belief among primitive races in one supreme Being.

Moreover, Dr. Langdon, Professor of Assyriology in the University of Oxford, who has been in charge of the excavations at Kish, near to the site of ancient Babylon, writes, as a result of his archæological investigations: "In my opinion, the history of the oldest religion of man is a rapid decline from monotheism to extreme polytheism and wide-spread belief in evil spirits. It is in a very true sense the history of the fall of man."*

II.—THE FIRST FIAT: LET THERE BE LIGHT.

The cheap sneer of Voltaire, "And how did the light come before the sun was created?" cannot be repeated by his infidel successors of to-day. For modern scientific investigation is, as we shall presently discover, on the side of Genesis in its record of the first creative fiat.

Not that the mystery has been solved. Sir Ambrose Fleming has related in my hearing the opinion of a brilliant modern scientist that all we can yet say with certainty respecting the

* *Field Museum Leaflet*, 28.

nature of light is that we are completely in the dark! The corpuscular theory, which was generally held in the seventeenth century, had to give way in the nineteenth century to the undulatory theory; and this in turn is destined to be discarded or very seriously modified. For now it appears that light is both corpuscular and undulatory; that it consists of both particles and waves at the same time.

It is a rash proceeding, therefore, to criticise the statement in the third verse of the Genesis record on the assumption that the primeval light of the first day was sunlight. Of what nature it was precisely, the divine Author alone knows. Some think that it may have been akin to the Aurora Borealis or "Northern Lights," which, in all probability, are produced by magnetic disturbance; or it may have been the mysterious product of some kind of radio-activity. For all light is not of the same nature. Light may proceed from combustion or incandescence or phosphorescence. Man, apparently, cannot produce light without heat. The glow-worm and the fire-fly succeed where man has so far failed.

We may be reasonably certain, I submit, that the light which first illumined our planetary sphere was not sunlight. According to the nebular hypothesis, which used to be widely accepted by modern astronomers, the earth, together with the sun, the moon, and the other planets of our solar system, originally formed one vast indistinguishable vaporous mass. Portions broke away from the mass, whirling around the central nucleus, which ultimately became the sun. The earth passed through a prolonged cooling-down process; a skin or crust formed on its surface. During this period there was a time when the earth was itself incandescent. While the planetary condensation was proceeding, immense masses of dense vapour must have encircled the earth, excluding the view of anything beyond or above. Only on the fourth day of the Creation period did the sun and moon appear as luminaries and measurers of time, "like the two hands on the dial of a heavenly clock."

In this connection it should be remembered that earth and sun and moon are all embraced in the creation of the universe, summarily described in the first verse of the chapter, which says: "In the beginning, God created the heavens and the earth." Moreover, the verb בָּרָא (*bara*) "create" does not occur in the description of the work of the fourth day. There the word is אָשָׂה (*asah*) to make or appoint; as the rainbow in the days

of the judgment of the flood was made a sacrament in the sky. Thus verse 16 might quite accurately be rendered: "God appointed the two great luminaries, the greater luminary to rule the day, and the lesser luminary to rule the night."

Mr. E. W. Maunder, F.R.A.S., who was for over thirty years an astronomer in the Greenwich Observatory, writes in this connection: "It has often been the subject of comment that light is mentioned in Gen. i as having been created on the first day, but the sun not until the fourth. The order is entirely appropriate from an astronomical point of view, for we know that our sun is not the only source of light, since it is but one out of millions of stars, many of which greatly exceed it in splendour. Further, most astronomers consider that our solar system existed as a luminous nebula long ages before the sun was formed as a central condensation."*

More recently, in a book written by two devout scientists, the emphatic statement occurs: "Nor is it any great difficulty that light and darkness, and plant life, are spoken of before the sun and moon can be seen from the earth. Any student of astronomy knows that on a young planet there will be a stage when it is covered with water and cloud and that there will be a distinction between light and darkness before the clouds part sufficiently to make the sun and moon visible. If the Nebular hypothesis is to be accepted, there would be a period when the earth would have been formed, but the glowing mass in the centre of the solar system might not yet have consolidated into the sun. It is quite probable that plant life might have begun in this stage."†

III.—THE TIME OF CREATION.

In the consideration of this section of our subject it will be convenient to observe two divisions: (i) The Date of the Beginning of Creation; (ii) The Duration of the Period of Creation. These two divisions need to be carefully distinguished, as indeed they actually are in the Genesis record itself.

(i) Concerning the date of Creation, misunderstanding has frequently arisen through the fact that in certain copies of the Scriptures dates are found printed on the margins. But these

* *The Astronomy of the Bible*, p. 69.

† Colgrave and Short: *The Historic Faith in the Light of To-day*, p. 46.

form no part of the original Biblical writings. They are purely human additions. They may be of value, or they may be misleading. Archbishop Usher's chronology, *e.g.*, has no Biblical authority behind it. When the uninstructed reader sees 4000 B.C. at the top of the first chapter of Genesis, he may be pardoned if he rushes to the conclusion that the Bible affirms that the beginning of Creation occurred only some four thousand years before Christ. The Bible makes no such declaration. The only chronological statement in Genesis in this connection is that with which the record opens: "In the beginning." The only date of Creation for which the Bible is responsible is what has been well called "the dateless date." And all the researches of modern science can add little thereto.

(ii) With regard to the duration of the period of Creation, the Bible has suffered not only from the attacks of infidels without the fold but also from the strain put upon it by earnest but unwise defenders of the Faith within. Some of these maintain that the six days of Creation are of necessity to be interpreted as twenty-four-hour days measured by the ticking of a clock. Those who are out to impugn the accuracy of the Genesis record eagerly embrace this interpretation. But I personally make no such present to our opponents.

For the Hebrew word for day יום (*yom*) is a very elastic term. It is used, of course, to signify a precise period of twenty-four hours' duration; as when we say that a steam-ship can now cross the Atlantic in less than five days. It is used again to signify a period of less than twenty-four hours; as when day and night are contrasted or coupled together. A notable instance of this use occurs in our Lord's saying, "Are there not twelve hours in the day?" (St. John, xi, 9.) Further, there are numerous instances both in the Old Testament and the New where the word obviously connotes a period of indefinite and sometimes prolonged duration; *e.g.*, "The Lord alone shall be exalted in that day" (Is. ii, 11); "Your Father Abraham rejoiced to see my day" (St. John viii, 56); "Behold now is the day of Salvation" (2 Cor. vi, 2).

Moreover, in the Creation story itself, the word is employed in such a way as to suggest a prolonged, indefinite period. In chapter ii, 4, it is used to sum up and embrace the entire period of the creative activity previously described in six stages. Again, in chap. ii, 2, it is affirmed that "God rested on the seventh day." Are we then to suppose that God's Sabbath rest was limited to

twenty-four hours of human reckoning? We have evidence that the Jews and the early Christian fathers were not so restricted in their interpretation of the word. Augustine, in the fourth century, used to point out that for a very considerable portion of the Creation period the sun as a time measurer was not in existence; hence it was difficult to determine the precise duration of the "day."

Dr. Rendle Short, whose opinion as a scientist and student of Scripture ranks very high in this connection, thus testifies: "Many eminent conservative Bible scholars resolve the difficulty, more satisfactorily we believe, by interpreting the "days" as periods of time of indeterminate length. It seems fair to regard them as representations of God's time, periods of rest alternating with periods of activity. The seventh day of rest still continues, in that apparently no new creation of totally distinct classes of animals and plants has taken place during the time of human history."*

I submit therefore that the "days" of these early chapters of Genesis are not man-measured but God-measured days. They should be interpreted in the light of the Apostolic declaration: "Be not ignorant of this one thing, beloved, that one day is with the Lord as a thousand years, and a thousand years as one day." (2 Pet. iii, 8.)

Frequently, however, a question arises concerning the precise interpretation of the statement which reads, according to the A.V., "And the evening and the morning were the first day." Some regard this as an indication of very limited duration. The literal rendering of the Hebrew original reads: "And there was evening and there was morning, day one." Now whatever be the precise significance of the phrase, I submit that it was never intended to suggest the length of the time occupied in creation, but rather the process, which was by an orderly, progressive movement in six distinct stages, proceeding from darkness to light, from chaos to cosmos, from evening to morning, with a definite beginning and ending to each.

Hugh Miller, the devout Scottish geologist, wisely argued in his book, *The Testimony of the Rocks*,† that in the beginning of Genesis as in the end of Revelation we have an apocalypse. In the former it is an apocalypse of the first heaven and earth; in

* *The Bible and Modern Research*, p. 39.

† Pp. 187-191.

the latter of the new heaven and earth. No human reporter was present when the world was created. The challenge which rings out in the book of Job reveals the impotence of the mind of man to account, apart from revelation, for the origin of the handiwork of God: "Where wast thou when I laid the foundations of the earth? declare, if thou hast understanding."* Hugh Miller suggests, therefore, that in Genesis we have a kind of panorama of creation—an apocalypse of its divinely-ordered development in six periods, each period being distinguished in the vision by beginning with an evening, and ending with a morning.

Godet has embraced the same idea. In his *Studies on the Old Testament* he says: "We must acknowledge in the Mosaic record a revelation, but not in the form of a dictation. It is, as we expected beforehand, knowledge given under the form of pictures, analogous to those of the prophetic visions . . . If it was the purpose of God to cause Moses to contemplate in an abridged form the principal phases through which the work of creation passed in its gradual development, would not the best way of giving him an idea of it have been to paint each period in a single picture which should represent in one grand scene the stage which the work had then reached? Each of these pictures was to the eye of Moses one *day* . . . The interval which separated this picture from that which followed it was a night . . . Thus there passed before his eyes these six pictures, representing the most characteristic phases of the entire work. He has preserved for us a memorial of these phases, but without having himself penetrated into their meanings in detail, any more than the prophets were able clearly to understand the intuitions excited in them by the Divine Spirit."†

IV.—THE ORDER AND PROGRESSIVENESS OF THE PROCESS.

An arresting feature of the Genesis record is the gradual and progressive order of development which is delineated therein. This in itself presents a formidable challenge to the unbeliever in its divine inspiration. For the order of the Creation process so exactly harmonises with the ascertained facts of science that some of the most distinguished scientists have reached the belief that the supreme Architect in the realm of nature and the

* xxxviii, 4.

† Pp. 121-2.

ultimate Author of the Genesis cosmogony are one and the same.

The record opens with a simple but profound statement in the first verse which summarily describes the creation of the whole universe: "In the beginning God created the heavens and the earth." Then follows a description of the chaotic condition of formlessness and emptiness and darkness of the earth prior to its gradual construction to become an ordered and beautiful and fruitful habitation for mankind. And this supremely important note is added: "And the spirit of God moved (or was brooding) upon the face of the waters"—a statement which recalls the credo: "I believe in the Holy Ghost, the Lord and Giver of life."

At this point one perhaps should pause briefly to mention a theory which is held by a considerable number of devout Bible students. They maintain that between the first and second verses of the Genesis record we are to understand that some gigantic catastrophe, some destructive cataclysm occurred, which brought about the chaotic condition described in the latter verse. In support of this opinion they translate וְהָאָרֶץ הָיְתָה by "And the earth became" instead of "And the earth was", as in both the authorised and revised versions. I, personally, cannot accept that interpretation. Few Hebraists, I am convinced, would be willing to translate the Hebrew in the manner suggested. My own opinion, which is the one generally held, is that the first verse is a summary statement embracing the creation of the entire universe—the heavens and the earth. In that one verse is summed up the origin of our solar system and of all the worlds in space. There follows a record which concentrates attention upon the formation of the earth to be an abode for mankind. In that record we are told how this transformation proceeded from darkness to light, from formlessness to order, from the inanimate to the animate, from chaos to the cosmos.

Dr. Rendle Short, no mean authority, comments thus upon the theory in question: "When Geology was a young science and these difficulties were perceived, a comparatively easy way of escape was propounded by conservative theologians. They introduced what may be called the catastrophe theory, which seems to have been promoted by Dr. Thomas Chalmers, in 1814. It was suggested that the proper translation of Genesis i, 2, is, 'And the earth became without form and void'; that a great

catastrophe occurred, which put an end to all forms of life known to the geologist, and left an empty world which the Almighty replenished with life in six ordinary days. We do not think the catastrophe theory is likely to commend itself to persons with a scientific education. The suggested new translation, whilst perhaps not *impossible*, is a very unnatural rendering of the Hebrew. The word translated 'replenish' in Genesis i, 28, is simply *male*, 'to fill,' and in the Hebrew has no sense of refilling. The theory creates scientific difficulties greater than those it is intended to solve."*

Now we pass to consider the gradual and progressive order of the creative work of the six days as delineated in the Genesis cosmogony. The process may be briefly indicated as follows :—

First : "And God said, Let there be light : and there was light." The darkness of the chaotic condition of the earth is dissipated by the introduction of light—from what source is not revealed. Our attention is at once arrested by the fact—no mere coincidence—that the first creative word in the Bible harmonises with the last explicit word of modern astronomical science, as expressed by Sir James Jeans : "The tendency of modern physics is to resolve the whole material universe into waves, and nothing but waves. These waves are of two kinds : bottled-up waves, which we call matter, and unbottled waves, which we call radiation or light. If annihilation of matter occurs, the process is merely that of unbottling imprisoned wave-energy and setting it free to travel through space. These concepts reduce the whole universe to a world of light, potential or existent, so that the whole story of its creation can be told with perfect accuracy and completeness in the six words : 'God said, Let there be light'."†

Second : "And God said, Let there be a firmament (or expanse) in the midst of the waters" (v. 6), to divide the waters resident in the clouds above from the waters of the oceans below. In this fiat the creation of the earth's atmosphere is indicated together with the laws which govern the suspension of the vapours therein. A phenomenon in the realm of nature most wonderful is that mysterious blending of oxygen, nitrogen, and other elementary gases which constitutes the earth's envelope of air ; a substance apparently so light that on certain days we

* *The Bible and Modern Research*, p. 38.

† *The Mysterious Universe*, pp. 77-78.

are scarcely conscious of its presence, yet so powerful as to be able to bear upon its bosom billions of tons of water evaporated from the ocean, to be conveyed across the continents and distributed in the form of rain. To quote the Astronomer Royal, Dr. H. Spencer Jones : " Water-vapour plays a part of great importance in the atmosphere. It is present only in the lower layers, clouds rarely being found at heights greater than about 6 miles. If the atmosphere contained no water-vapour, there would be neither clouds, dew, rain, hail, snow nor thunderstorms, and neither plant nor animal life would be possible."*

Third : The record proceeds to relate the separation of the land from the water and the appearance of the continents. The earth's crust is ridged up ; the waters are gathered into one place : and the beginnings of vegetation make their appearance. Thus we read : " And God said, Let the waters under the heaven be gathered together unto one place, and let the dry land appear : and it was so." (v. 9.) " And God said, Let the earth put forth grass, herb yielding seed, and fruit tree bearing fruit after its kind, wherein is the seed thereof, upon the earth : and it was so." (v. 11.) In this relation we note how the appearance of grass, herb and tree corresponds to the threefold order of primeval vegetation, as represented by modern science.

Fourth : There follows the formation of the luminaries of the sun and moon, and their appointment, in relation to the earth, as measurers of time and regulators of seasons, as distributors of light and dividers of the day from the night. " And God said, Let there be lights in the firmament of the heavens to divide the day from the night ; and let them be for signs, and for seasons, and for days and years : and let them be for lights in the firmament of the heaven to give light upon the earth : and it was so." (v. 14, 15.) It should here be carefully remembered, as previously explained, that the Hebrew word *אֵלֶּם* "created" does not occur in this record of the work of the fourth day. It is the verb *אָצַק* which is here employed—a word which might be rendered "made" or "appointed"—as distinct from "created," which connotes the production of something entirely new.

Fifth : By what must surely appear to be a remarkable conjunction in a document so ancient, the creation of fishes and fowls is next related, animals so formed as to be able to inhabit the water and the air. In this creative day the gigantic Saurian

* *Worlds Without End*, p. 12, 13.

reptiles must be included ; for the complete account contained in the two verses (20 and 21, R.V.M.) must be read together : “ And God said, Let the waters swarm with swarms of living creatures, and let fowl fly above the earth on the face of the expanse of the heaven. And God created the great sea-monsters, and every living creature that moveth, which the waters brought forth abundantly, after their kinds, and every winged fowl after its kind : and God saw that it was good.”

Sixth : On the last creative day the mammals appear ; and, after a significant pause, man the climax and consummation of the whole creation. “ And God said, Let us make man in our image, after our likeness : and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth.”

Thus the method in creation which Genesis reveals was gradual and progressive, from the inanimate to the animate, from the lowest forms of life to the more highly developed and complex. A fourfold division of the order would be : first, the mineral kingdom ; second, the vegetable kingdom ; third, the animal kingdom ; fourth, the human kingdom. If the narrative were only a product of human invention or speculation we should hardly expect that in the animal kingdom the order of creation would be thus delineated : first, creatures to inhabit the sea ; second, creatures to fly in the air ; and third, creatures to live on the land. Yet such is the strictly biological sequence which modern science demands.

Further, from the purely anatomical standpoint, having regard to the proportion of brain to spinal cord, the Genesis order of progression of fishes, reptiles, birds, mammals, man, is again surprisingly concordant with the accredited results of modern scientific investigation.

To sum up, we have in this first chapter of Genesis a record which is itself, because of its antiquity and its amazing accuracy, a challenge to every sincere scientific inquirer. For here is a cosmogony so detailed as to present the possibility of error in a thousand-fold degree. And, moreover, it is a document which has been in the possession of mankind for some thirty centuries at least. What changes in the realm of natural philosophy have those centuries witnessed ? Every thoughtful scientist is aware that the history of science is largely a record of the mistakes of one generation corrected by the discoveries of the

next. The late Professor Huxley used to say that the ever-recurring tragedy of science is that of a beautiful hypothesis killed by an ugly fact. And quite recently, at the British Association Meeting in 1935, Sir James Jeans is reported to have said: "The theoretical physicist must admit his own department looks like nothing so much as a building which has been brought down in ruins by a succession of earthquake shocks. The earthquake shocks were new facts of observation, and the building fell because it was not built on the solid rock of ascertained fact, but on the ever-shifting sands of conjecture and speculation."

But while science has radically changed during the past four millenniums of written history, this ancient story of creation has proved itself true to millions of mankind, rearing itself above the mists like a Matterhorn, pointing man upwards and Godwards to the only solution of the problem of origins that can satisfy the mind, comfort the heart, and inspire the soul with blessedness of hope for the future. All that we have a reasonable right to expect is a general correspondence between the Biblical cosmogony and the ascertained facts of science. And this correspondence exists to such a degree that Sir J. William Dawson, a former President of McGill University and a world-renowned geologist, did not hesitate to affirm: "We have here a consistent scheme of the development of the solar system, and especially of the earth, agreeing in the main with the results of modern astronomy and geology. It would not be easy even now to construct a statement of the development of the world in popular terms so concise and so accurate."*

V.—MAN THE CLIMAX AND CROWN OF CREATION.

It is sometimes said that in the Genesis record there are two distinct stories of Creation. That is a statement which will not bear the test of precise examination. It is a theory hastily arrived at which proceeds from an inadequate conception of the object which the author of Genesis, whoever he was, had before him. For the Bible is concerned primarily and persistently with man's relationship to God. It is not out to teach science; it is out to show how mankind can live in fellowship with the

* *Eden Lost and Won*, p. 50.

Eternal. It is in the light of that fundamental fact that the relationship of the first two chapters of Genesis can be truly apprehended.

In chapter one all nature is in the ascendant : in chapter two man is supreme, and nature is referred to only as it touches nature's lord. The two chapters are not contradictory ; they are complementary. One prepares the way for the other. Together they illustrate the Hebrew law of recurrence. A characteristic of Hebrew narrative is repetition with addition. A fact is first recorded in barest outline ; then it appears to be repeated with some illuminating addition ; presently it will reappear with added details which complete the picture.

In the first chapter of Genesis there is delineated the story of creation as a whole ; in the second chapter is described the creation of man as the starting-point of the great Biblical theme of human history with its revelation of the need of a divine redemption.

The creation of man is recorded in brief space but in very significant terms. Three verses sum up the story—two in the first chapter and one in the second. According to the Genesis record, man is compounded of two elements—dust and Deity. His body is formed of the materials of the earth ; his soul or spirit is the product of the breath of God. Thus he has at the least a twofold nature and origin. He is connected as to his physical structure with the animals that preceded his creation ; but he is absolutely differentiated from them by reason of his spiritual nature which has its origin not from earth but from heaven.

That man is regarded in the Genesis narrative as the climax and the crown of Creation, with a nature distinct from and superior to all the creatures which preceded his appearance upon the earth, is indicated in a fourfold manner.

First, by the solemn terms which preface the record of the act of his creation and the nature assigned to him as the divine masterpiece—the “image and likeness of God.” “And God said, Let us make man in our image, after our likeness : and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth. So God created man in his own image, in the image of God created he him : male and female created he them.” (i, 26, 27.)

Second : Man's distinction from the rest of earth's creatures is

further indicated by the particular verb employed in the context : "God *created* man." (i, 27.) The verb בָּרָא (*bara*), "created," occurs only three times in the creation story. It appears first in the creation of matter (i, 1) ; second in the creation of animal life (i, 21) ; and third in the creation of man (i, 27). Man is thereby represented as a new creation. The word indicates that in him there is that which is not a mere evolution or development, but something essentially new and distinct.

Third : A further statement which emphasises man's uniqueness is conveyed in the solemn terms : "And God breathed into man's nostrils the breath of *lives* ; and man became a living soul." (ii, 7.) It is because his innermost self is the product of the inbreathing of the Spirit of God that man is distinguished from all other creatures of earth, occupying a unique position in the realm of nature. The Hebrew phrase literally rendered is "the breath of lives." It is convenient to regard man's constitution as twofold, consisting of body and soul. But, as St. Paul indicates in I Thess. v, 23, man has properly a tripartite nature, consisting of body, soul and spirit. He lives in three realms : the physical, the psychical and the spiritual. Through his body he has world-consciousness ; through his soul self-consciousness ; and through his spirit God-consciousness. In the physical realm he has the life of sensation ; in the psychical realm he has the life of intelligence ; in the spiritual realm he enters the life of Divine communion. It is surely significant that the word *bara* (created) occurs in the creation story just at the appearance of these three modes of being, the physical, the psychical and the spiritual.

With respect to the duration of time and the process of operation which resulted in the formation of man as he is, the Bible is significantly reticent. We only know in part. The question is sometimes asked, Are we to understand that the Almighty God formed man's body out of the dust "in a moment, in the twinkling of an eye," and then breathed into the material organism thus formed the "breath of lives" ? Or did He take some pre-existent animal shape which was not human to inspire it with his divine breath ? Tennyson suggested this when he wrote : "The Lord let the house of a beast to the soul of a man." All such questions are extremely speculative, and no completely satisfying answer is possible. It is, perhaps, of some significance that in chapter ii, 7, we read that the Lord God *formed* man of the dust of the ground. The word יָצַר (*yatzar*) translated

“formed” might be rendered “shaped” or “moulded.” Man’s body is said to be formed from materials which the earth already supplies. The ancient record thus states, what modern chemistry confirms, that all the elements which compose our physical structure are of the earth. At its dissolution in death the body returns whence it came—“earth to earth, ashes to ashes, dust to dust”; but the spirit returns whence *it* came—to God Who gave it.

The Genesis record, however, is obviously not concerned with man’s physiological origin; it is concerned to tell us his distinction, and his capacity for fellowship with the Divine. How precisely the Almighty God made man, nobody can say. But divine revelation asserts, what experience confirms, that He created him to be distinct, sovereignly superior, uplifted to a place of pre-eminence in the earth by reason of his kinship with his Creator.

Fourth: The differentiation of man and his absolute superiority in the realm of nature are further indicated by the divine beatitude which followed the act of creation, as recorded in the words: “And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.” (i, 28.)

Here, then, is the question: Can the above Biblical representation of man’s origin and nature be accepted as reasonably scientific, viewed in the light of the phenomena of nature and the facts of history? I submit that what the Genesis record presents, science, philosophy and history confirm. Man is unique, distinct from and immeasurably superior to all other creatures associated with him as inhabitants of earth. Universal experience of a fourfold order might be cited as evidence of the fact.

First: Man everywhere acts as from a deep-seated conviction that he is the sovereign lord in the earth. The zoological garden in every metropolis testifies to his mastery and control. The beasts are to minister to his needs. They are and were created to be his servants. This is universally assumed.

Second: The marvellous creative capacity of the human mind testifies to man’s kinship with the divine. Moderns point with pride to the locomotive engine and the steamship, to wireless telegraphy and television, to the aeroplane and the submarine, and a thousand and one other illustrations of man’s inventive genius and capacity for utilising nature’s forces—some of which,

like electricity, he only vaguely understands. The ancients, likewise, have left behind in the Pyramids of Gizeh, and the colossal temples and sculptures of Thebes, witnesses that remain as wonders of the world to the amazing potentiality of the engineering, designing, and creative capacity of the human mind.

Third: Man's universal religious instinct and yearning for contact with the unseen is ample evidence to confirm the Genesis record that he has a nature which is not wholly from the earth below. There is in him that which does not exist in any other earthly creature—a capacity for spiritual communion. "As the hart panteth after the water-brooks, so panteth my soul after Thee, O God,"* expresses the longing of the human spirit throughout the universe, however crudely manifest in regions where the light of the Gospel has not yet penetrated. Two thousand years ago, Plutarch, the Roman historian, referred to the universality of the religious instinct in the words: "If you travel through the world, well may you find cities without walls, without literature, without kings, not peopled or inhabited, moneyless and such as desire no coin, which know not what theatres or public halls of bodily exercise mean; but never was there, or ever shall be, any one city seen, without temple, church, or chapel, without some god or other; nay, methinks a man should sooner find a city in the air without any plot of ground whereon it is seated, than any commonwealth altogether void of religion."

Fourth: The consciousness of Immortality creates a gulf between man and all the inferior inhabitants of earth, which only the Genesis record can fully explain. The death of the body does not mean the end of life—so mankind has believed down the ages. For the pyramids are really only gigantic tombs erected to protect the mummies of Egyptian pharaohs, in anticipation of a resurrection from the dead and the life of the world to come.

A summary description of man's high and transcendent qualities is found in the eloquent lines of Shakespeare: "What a piece of work is man! How noble in reason; how infinite in faculty! in form and moving how express and admirable! in action how like an angel! in apprehension how like a god!" And I submit that the Genesis record alone, in all the literature of the ages, satisfactorily accounts for that phenomenon.

* Ps. xlii, 1.

VI.—THE FORMATION OF WOMAN OUT OF MAN.

This section of our subject is by no means the least difficult. It is obvious that we are here on the edge of an ocean of mystery. For the record thus reads: "And the Lord God caused a deep sleep to fall upon the man, and he slept; and he took one of his ribs and closed up the flesh instead thereof; and the rib which the Lord God had taken from the man builded he into a woman, and brought her unto the man."*

There are three departments of this stupendous problem which need to be carefully examined. There is first of all the precise content of the Genesis record. What exactly does it say? Widespread misunderstanding requires to be removed. And secondly, there is the obvious problem of the origin of the sexes in general, and of the human sexes in particular. Thirdly, there remains the question of the *modus operandi* briefly but suggestively described.

With respect to the precise content of the Biblical statement, I suggest that the word "rib" is too specific as a rendering of the original Hebrew צֵלָע (*tsela*). The Hebrew word is never translated "rib" except here. In the Latin Vulgate it is rendered *costa*, which again may be translated "side," as evidenced by the French "côté" and the English word "coast." Further, the Hebrew word is used not less than seventeen times to describe the "side" of the tabernacle or the "side" of the ark of the covenant. In 2 Sam. xvi, 13, it occurs in the statement, "Shimei went along on the hill's side"; and in Job. xviii, 12, "Destruction shall be at his *side*." The only other occurrence of the word in the Old Testament is in the passage under review, where unfortunately the misleading rendering is "rib." The word "flank" would, I suggest, convey more clearly the idea involved. That a bare "rib" is not meant follows from the exclamation recorded in verse 23, "This is now bone of my bone, and flesh of my flesh."

Woman is one side of man. That, undoubtedly, is the idea which is intended to be conveyed. This interpretation may account for the fact, which Eusebius records, that certain Jewish rabbis had adopted the Platonic notion that man and woman were originally united in one body until the Creator separated them. Further, in the description of woman's formation,

neither the word "created" nor "formed" is used. A new verb בָּנָה (*banah*) which means "buidled" is now introduced. God, we are told, buidled up that which He took from the man in making man's counterpart and complement. The word "buidled" suggests a gradual formation by the hand of the divine Artificer.

Here is a revelation, though enshrined in a mystery, which meets a modern need. A pressing social problem to-day is that of the relationship of the sexes, and the sanctity of the marriage tie. In Genesis we are told the true relation between man and woman. They are not absolutely equal; one is but the complement of the other. One without the other is incomplete. Woman was created to be man's helpmeet. Her part is not to compete but to co-operate. In the Genesis story we read that when the woman was brought before him the man said, "This is now bone of my bones and flesh of my flesh; she shall be called אִשָּׁה (*issah*) because she was taken out of אִשׁ (*ish*)." The inseparable relation is revealed in the Hebrew as it is not in the English. Man needs woman because she has that which he lacks; the two together make a perfect unity.

No more serious social problem has arisen in our time than that which is associated with the increasing disregard of the sanctity of the marriage tie. Divorce is alarmingly on the increase. Human laws do not suffice to preserve the marital bond. Legal statutes can never prove a barrier against the lusts of the flesh. It is surely significant that Jesus Christ, the greatest social reformer whom the world has seen, in dealing with the problem of divorce, went back for His authority to this revelation in Genesis, when in answer to a question of the Pharisees He said: "Have ye not read that He which made them from the beginning made them male and female, and said, For this cause shall a man leave his father and mother and shall cleave to his wife: and the twain shall become one flesh? So that they are no more twain, but one flesh. What therefore God hath joined together, let not man put asunder." In such solemn terms did the Master describe the unity and indissolubility of the marriage bond, beginning with the Genesis narrative as the fount of Divine revelation and authority.

Second: We may clear some ground by asking Science the question, By what process in the realm of nature were the sexes differentiated? I refer to sex in general. Apparently, we are here confronted with an insoluble problem. Professor Julian

Huxley, in his *Essays of a Biologist*, writes: "The biology of sex is a vast subject . . . Of its origin we can only say that it is veiled in complete obscurity."*

The mystery of sex was deeply impressed upon my mind quite recently in a very unexpected manner. In August of this year (1936) I spent a fortnight in Prince Edward Island, in the Gulf of St. Lawrence. While there I paid a visit to the Laboratory and Testing Station, on the shore of Malpeque Bay, which has been established by the Canadian Government for the promotion of oyster culture in a district formerly renowned for the production of that particular shell-fish. There I was informed on the highest expert authority that an oyster which is male during one season may become female in the next, and *vice versa*!

The only approach towards an explanation of the Genesis statement concerning the origin of the human sexes lies, it seems to me, in certain analogies in the realm of nature. In the insect world male and female are frequently found joined together in one body; and it is well known that many minute creatures, such as the infusoria or animalcules, can sub-divide themselves by the method of "spontaneous fission", and increase thereby with marvellous rapidity.

A medical practitioner of high repute has said to me that he himself finds no insuperable difficulty in the Biblical record, especially when viewed from the standpoint of modern embryology. He proceeded to explain that every human body as it comes into the world passes through three stages. There is a stage in the development of the human embryo when it is non-sexual; there is a further stage when it becomes bi-sexual; and there is a final stage in the embryo when a sexual distinction takes place by some means absolutely unknown. Further, it is well known that in certain individuals this distinction or separation somehow fails to take place, with the result that there are human beings living on the earth to-day who are in part both male and female. Their condition may be said to represent the persistence of the second stage of embryonic development.

All this is merely suggestive; but it is not for that reason of little value. There is certainly a parallelism in nature which demonstrates that the Genesis record concerning the original distinction of the human sexes need not be regarded as unreason-

able or scientifically impossible. As to the method adopted at the first to produce such a division as that described in the Biblical text we know nothing, save that it is recorded that the operation was performed after the Lord God had caused "a deep sleep" to fall upon the man. That statement, at least, does not conflict with modern surgical experience.

VII.—THE GARDEN OF EDEN AND THE CRADLE OF THE RACE.

Half a century ago it was generally believed by historians that Egypt was the original home of civilisation. To-day, in the light of the most recent archæology, the source of culture and civilisation is traced rather to some district in Mesopotamia, where the Bible locates the cradle of the race.

According to the Genesis record, the original home of mankind was a garden eastward in Eden (ii, 8). "Eastward in Eden" does not mean in the eastern portion of Eden, but that Eden itself was to the east of the territory known to the Israelites. Its actual locality can, of course, only be vaguely determined. For we are dealing with a condition of things prior to the great catastrophe of the Flood (the historicity of which can no longer be questioned), which probably so altered the confirmation of the ground as to make precise identification impossible. Four rivers—themselves connected with one main stream—are indicated as boundaries of the district. Their names are Pison, Gihon, Tigris and Euphrates. The last two can be certainly identified. The characteristic products of the region, other than fruits and vegetable foods in abundance, were gold and pearls and precious stones.

Three eminent scholars, Rawlinson, Delitzsch, and Sayce, are at one in suggesting that the site is to be sought in Babylonia. Delitzsch placed Eden just above the site of ancient Babylon, where the Tigris and Euphrates approach to within a short distance of one another. On the other hand, some would identify the district with Armenia. The name of Eden used to be interpreted as being equivalent to Paradise—a place of pleasantness. But Eden was not Paradise. It is a mistake to speak of the Garden of Eden; the Bible refers only to a Garden *in* Eden. Eden was a district, and the "Garden" was a reserved enclosure therein. The Hebrew word *Gan*, translated "garden," means primarily a fenced-in portion. Modern Assyriology further

indicates that the Sumerian *Eden* or *Edin* means an elevated plateau or steppe; and it is thought that all the indications taken together point to a district in the mountainous plateaux of Central Asia, probably the land which is now called Armenia, where the Tigris and Euphrates, together with two other important rivers, find their source. Quatrefages, the distinguished French anthropologist, has affirmed that the study of peoples and languages has led scientists of authority, after due deliberation, "to place the cradle of the human race in Asia, not far from the central mass of that continent, and in the neighbourhood of the region where all the principal rivers which plough their way to the north, to the south, and to the east, take their rise." That statement should suffice to authenticate the Genesis record.

Man's innocence, immortality, and intimacy of communion with his Creator are conditioned by obedience to divine law explicitly expressed. There are trees in the garden of which man may freely eat; but there is one—the tree of the knowledge of good and evil—of which he must not partake; for to quote the command recorded, "In the day that thou eatest thereof thou shalt surely die." (ii, 17.)

Science makes no serious attempt to explore such a region as this. What interpretation, for example, can be suggested concerning the trees of the garden?

A helpful principle to recollect in Biblical interpretation is that a problem at the commencement of a revelation can often be best solved in the light of the truth which appears at its consummation. The Tree of Life in the Book of Revelation is described as bearing not "twelve manner of fruits," as the A.V. translates, but "twelve crops of fruit," as the R.V. renders. Thus it is a tree upon which abundant nourishment for the redeemed children of God will always be found—a guarantee of their immortality. Can we interpret such a source of Life everlasting as literally a kind of fruit tree? If not, then a literal interpretation need not be required concerning the Tree of Life, or the Tree of Knowledge of Good and Evil, in the garden in Eden. If the trees are symbolical in the N.T. Apocalypse, it is not difficult to believe that they were symbolical in this O.T. apocalypse in Genesis. Let it suffice to say that by partaking of one, perennial life was assured, while by abstaining from the other, purity of life was preserved, without dogmatising concerning the precise character of each.

Was man originally a savage? To that question the Genesis record certainly seems to return a negative answer. For we read that "the man gave names to all cattle, and to every beast of the field." (ii, 20.) To give names indicative of nature is what is now generally described as scientific classification, demanding a considerable degree of knowledge and intelligence. According to Genesis, then, man was not originally a savage, beast-like creature, roaming in the jungle, seeking his food by stealth and ferocity, as many apparently are pleased to imagine; but a being pure and innocent, placed in a rich environment, provided with a task suited to his condition. "To dress it and to keep it" describes the duty and responsibility placed upon man in the garden. There is undoubtedly a reference here to the arts of agriculture. According to Sir Ambrose Fleming, in a book recently published, "there is no evidence that Neanderthal or Palæolithic man had any knowledge of these arts."*

But this statement of the veteran scientist introduces two problems both closely associated with the Bible record. I refer to the alleged extreme antiquity of mankind, and to the undoubted remains of tools of a primitive kind which go back to a far distant past. To attempt a fully reasoned reconciliation in this sphere of our inquiry would demand much more space than the prescribed limits of this essay permit. But at least I can suggest a profitable line of investigation.

The genealogical tables of the fifth and eleventh chapters of Genesis are admittedly difficult of interpretation, as they were undoubtedly compiled upon principles only vaguely understood by us; and in all probability there are big gaps and omissions which make precise calculation impossible. The story of the Garden of Eden may be thousands of years older than Archbishop Usher's estimate.

But the supremely important consideration lies in the question, What is a man? Can we be certain merely by measuring the parts of a bony skeleton, which has been preserved from ancient days, that it represents man (*Homo sapiens*) as we know him? Dr. Rendle Short asks: "Are we quite sure that the geologists' flintmaker of Palæolithic times was a man in the Genesis sense?" And he proceeds to suggest, "There might conceivably have been pre-Adamite creatures with the body and mind of a man, but not the spirit and the capacity for God and eternity. If so,

* *The Origin of Mankind*, p. 138.

certain obscure references in Genesis become clearer. The old problem as to where Cain got his wife might be solved, also the strange reference to the sons of God marrying the daughters of men. (Gen. vi, 2.)"*

This line of inquiry concerning the existence of a pre-Adamite race of beings, not truly human, has been carefully pursued recently by Sir Ambrose Fleming. In his book referred to above he writes: "Let it be accepted, then, as a most probable or even certain deduction that a race of beings with faculties entitling them to be called 'Men', superior to the animal races, existed on this globe in and during a Palæolithic period. We have evidence in the remains so far found of Neanderthal Man that a race of such beings did exist; . . . But this race with its low mentality and psychical nature were unable of their own initiative to make any progress . . . We have seen that the appearance of animal forms on this earth took place by stages passing by degrees from the simplest forms of invertebrata to vertebrate types of fish, reptile, bird and mammal. If the method of Divine Creation is to proceed by stages from the simple to the complex, might it not apply also to the human as well as to the animal and vegetable kingdom, and that an initial stage in this work of the creation of man might have been a being, human in the sense of not being a product of the animal races, or generated from them by merely some automatic process, but with psychic powers superior to any animal?" And thus he concludes: "It is evident, then, that the Adamite was a new type of man made especially in the likeness of God, that is endowed with a spiritual nature having creative or constructive initiative power, and power of choice or free will, and greatly advanced intelligence and powers of language, as compared with any previous 'man'; able therefore to examine and understand and enjoy something of the work of his Creator, and able to hold communion with Him."†

Whether the suggestions of these two eminent scientists, who are both Christian believers, will be acceptable to the majority of my readers, it is difficult to say. They are assuredly worthy of careful consideration in the light of the fact that the Bible nowhere attempts to give us a complete record of Creation, or even a complete account of the origin of mankind. What it does profess to give is a sufficiently complete account of the

* *Ibid.*, pp. 56-7.

† Pp. 131-134.

story of the divine redemption of man made in the image of God. The limitations of the Biblical records must never be forgotten.

What is indisputable, however, is that the Genesis representation of man's original state is confirmed by universal tradition. Practically all the nations of mankind point to a golden age in the past. Greek and Roman literature is pervaded with the idea that there has been not an ascent, but rather a descent from a primitive condition of goodness, and happiness, and concord with the divine. Sir William Ramsay, after many years devoted to the study of classical antiquity, testified to the profound impression made upon him that the history of the Mediterranean world was mainly a sad story of degeneration and decay.

With all the available evidence before us the conviction grows that the great civilisations of the ancient world fail to present traces of an earlier period of barbarism, but rather the reverse. "In Egypt," wrote Rawlinson, "it is notorious that there is no indication of any early period of savagery or barbarism. All the authorities agree that, however far we go back, we find in Egypt no rude or uncivilised time out of which civilisation is developed." And, with reference to Babylon, he adds: "In Babylon there is more indication of early rudeness. But, on the other hand, there are not wanting signs of an advanced state of certain arts, even in the earliest times, which denote a high degree of civilisation and contrast most curiously with the indications of rudeness here spoken of."*

Since Rawlinson's time, moreover, the weight of testimony to the high culture of ancient days has greatly increased. Recent archæological discoveries have gone to show that cities such as Kish were founded in the central Mesopotamian Valley before 4000 B.C., and that pictographic writing, revealing a considerable degree of culture already attained, belongs closely to that period. Sir Leonard Woolley, in reference to his work on the site of Ur of the Chaldees, states definitely that "already, in 3500 B.C., the Sumerians had evolved a culture which was not only materially rich but as fully advanced as anything that was destined to replace it in Mesopotamia during some thousands of years."

Likewise, Dr. Stephen Langdon, Professor of Assyriology at the University of Oxford, in two letters to *The Times* in January and February, 1927, under the heading, "Wheat in

* *Origin of Nations*, pp. 13-14.

3500 B.C., a Discovery at Kish," described what he found in a fine red and black jar in a Sumerian house. "It proves," he wrote, "that wheat was one of the oldest cereals grown by early man, and can be dated at about 3500 B.C. from the pottery and pictographic tablets." Small quantities of this wheat were submitted to different expert authorities with the result that it now appears that "the most ancient Sumerians had succeeded in growing the finest kind of bread-making wheat and were far in advance of the agriculturists of pre-dynastic Egypt."

These testimonies serve to illustrate the weighty opinion of the eminent archæologist, Professor Sayce, which has been endorsed by a leading Canadian scientist, Dr. W. Bell Dawson, F.R.S.C., in the words: "Neither in Egypt nor in Babylonia has any beginning of civilisation been found. As far back as archæology can take us, man is already civilised, building cities and temples, carving hard stone into artistic form, and even employing a system of picture writing; and of Egypt it may be said, the older the country the more perfect it is found to be. The fact is a very remarkable one, in view of modern theories of development, and of the evolution of civilisation out of barbarism. Whatever may be the reason, such theories are not borne out by the discoveries of archæology. Instead of the progress we should expect, we find retrogression and decay; where we look for the rude beginnings of art, we find an advanced society and artistic perfection. Is it possible that the Biblical view is right after all, and that civilised man has been civilised from the outset?"*

VIII.—THE FIRMAMENT: AN ALLEGED MISTAKE OF MOSES.

A generation ago there were certain supposed inaccuracies in the Genesis record which formed a kind of perennial stock-in-trade for the critic and the sceptic. Three of these in particular were the creation of light before the appearance of the sun, the brief duration of the six-day period of creativity, and the formation of the firmament. With the first two of these I have already dealt. It now remains to examine the last of these alleged inaccuracies, based upon the statement in verses 6-7 of the first chapter which reads: "And God said, Let there be a firmament in the midst of the waters, and let it divide the waters

* *The Bible Confirmed by Science*, p. 141.

from the waters. And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament : and it was so.”

The Biblical narrative, so the critics declare, represents the sky as a hard, metallic vault, in which the sun, moon and stars are fixed like electric globes attached to a ceiling. One might have thought that this assumption would immediately be dissipated by the statement which occurs later in the record, in verse 20, “Let fowl fly above the earth in the open *firmament* of heaven.”

But, as a matter of fact, the idea expressed by the English word “firmament,” from the Latin *firmamentum*, which does denote something strong and solid, is not found in the original Hebrew. The word there is רָקִיעַ (*raqia*), which means that which is stretched-out, attenuated, or extended. The verbal form of the root was used to describe the beating-out of gold into thin wires or threads fine enough to be sewn into the priestly garments.* The extremely thin gold-leaf which remains after the goldsmith has finished his task represents the *raqia* of the piece of pure metal with which he began. The noun, therefore, denotes extension. Hence, the R.V. rendering is “expanse,” which is correct. The Hebrew is a strictly accurate term. The word “firmament” is a mistranslation due to the false astronomy of Alexandria in the third century B.C. The Greeks believed that the sky was a solid crystalline sphere. Hence the *raqia* of the Hebrew was rendered in the Greek Septuagint version by the word στερέωμα (*stereoma*), which was again translated in the Latin Vulgate by *firmamentum*, from which the A.V. word “firmament” was derived. Thus, what has been frequently exhibited as a blunder in the Biblical narrative proves to be the product of a mistake in the realm of science.

In verse 14, which reads, “And God said, Let there be lights in the *firmament* of the heaven,” the Hebrew word is extended to embrace the whole region of the sky—that which we commonly call the ether—a substance, if we may so term it, which refuses to be precisely defined. Our own comprehensive use of the word “heaven” corresponds ; as when we speak of the birds of heaven, or the clouds of heaven, or the stars of heaven.

The Genesis description, therefore, is not inaccurate but marvellously precise. The Hebrew word *raqia* is an apt term

* e.g., Ex. xxxix, 3.

to describe either the ether, or that atmospheric expanse around our globe which so wonderfully separates the water vapour in the clouds above from the liquid water in the oceans below. This verbal exactitude in so ancient a document deserves respectful recognition.

IX.—EVOLUTION OR CREATION : WHICH IS REASONABLE AND SCIENTIFIC ?

This section of the subject has been dealt with so comprehensively in papers read before the Victoria Institute in recent years* that it would seem to be superfluous for me to do more than summarise the arguments advanced, especially as this essay is now approaching its prescribed limit. My endeavour is to demonstrate that the Genesis record of Creation is more worthy of credence than the modern theory of Evolution so widely presented as a substitute.

But what is meant by the term Evolution ? For the word is used with a variety of connotations, some of which are misleading. In the *Daily Telegraph* of 15th January, 1935, the writer of the leading article, commenting upon Sir Ambrose Fleming's vigorous challenge to the upholders of the unproved theory of man's evolution from the ape, wrote as follows : " He takes evolution to involve rejection of the idea of creation by Divine will and power. That has certainly been the contention of many raucous apostles of Darwinism. But it is quite illogical . . . Any rational belief in evolution demands the admission that under it, just as much as under the Mosaic cosmogony, organisms and electrons and the spirit may owe their existence to a Creator."

To realise the confusion of thought possible in this area, it is only necessary to compare that statement with the pronouncement of a distinguished naturalist, Professor D. S. M. Watson, which he made at the Meeting of the British Association in the year 1929, in these words : " Evolution was a theory universally accepted, not because it could be proved but because the only alternative, Special Creation, was clearly incredible."

Now that dictum has this value that it clarifies the issue. Dr. Watson sets Creation and Evolution at opposite poles ; so that if you accept one you *ipso facto* reject the other. Attempts are sometimes made to construct a kind of *via media* called

* *Vide* a list of these on p. 28, vol. lxxvii, *Journal of Transactions*.

Creative Evolution; which recalls the saying of that most brilliant scientist Clerk Maxwell, "I have looked into most philosophical systems and have seen that none will work without a god."

But for the present purpose we can accept Prof. Watson's alternative. My own response would be this. To declare that Special Creation is clearly incredible is just a piece of special pleading, which can never be conceded. On the contrary, it is far easier to believe that this wonderful cosmical order of things, which stirs the mind of man to wonder and admire, is the product of the thinking, planning, purposive Mind of an Almighty God than that it is the product of a series of accidental variations working impersonally, automatically, unguided from within, but how originated or maintained nobody knows.

When we descend from the contemplation of the universe as a whole to concentrate upon examination of some one particular part we realise how incredible is the theory of an evolution which is automatically directed. Who formed the eye? What made the ear? Darwin himself confessed that when he studied the marvellous construction of the eye he felt a cold shiver down his spine. "How the eye, with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection" caused him to wonder. But to such questions believers in a divine creation have a ready reply. The eye and the ear are the work of an all-seeing and all-hearing and all-powerful Deity. For it is written: "He that planted the ear, shall he not hear? He that formed the eye, shall he not see?" (Ps. xciv, 9.)

But recent scientific discovery is compelling many to retrace their steps in the direction of Creation. Now that the Nebular hypothesis of Laplace is being discarded, what theory concerning the origin of our solar system remains, if belief in a divine creation be rejected? Briefly this: The whole of our solar system was once just a vast spherical mass of matter. But a wandering star of great magnitude chanced to pass near it, with the result that a large lump or tidal wave was created in the solar mass. Then by gravitational attraction a long finger-like projection of matter broke off into various portions, which ultimately were formed into the planets, Earth, Venus, Jupiter and the rest. Could such an *accident* occur? Or is it easier

to believe that our system of a central sun, with moon, earth and planets revolving in precise orbits, has resulted from the operation of the directing intelligence of an Omnipotent Creator, by some manner and means altogether beyond our comprehension ?

An astronomer, speaking as representing his fellows, says : " To an astronomer the most remarkable and interesting thing about the part of the physical universe with which he has become acquainted is not its vast extent in space, nor the number and great masses of its stars, nor the violent forces that operate in the stars, nor the long periods of astronomical time, but that which holds him awestruck is the perfect orderliness of the universe and the majestic succession of the celestial phenomena. From the tiny satellites in the solar system to the globular clusters, the galaxy, and exterior galaxies there is no chaos, there is nothing capricious. The orderliness of the universe is the supreme discovery in science."*

Order, Design, Beauty, are manifest throughout the realm of nature. In human, terrestrial affairs order, design and beauty are not self-manufactured. Their existence demands intelligence. Can we really believe that they are automatically produced by chance, in the universal cosmos, without Intelligent Direction ?

Passing from the infinitely great we recognise that the Genesis record has received additional confirmation, in recent years, in the realm of the infinitely small. An arresting statement in that record reads : " The earth brought forth grass, herb yielding seed after its kind, and tree bearing fruit wherein is the seed thereof after its kind." (i, 12, R.V.)

According to Genesis, reproduction proceeds according to kind. The theory of Evolution, on the other hand, demands a perpetual process of reproduction *not* according to kind, but with continual variation, resulting in the transmutation of species in an ascending scale from the lowest forms of life to man the highest.

It is necessary to be on guard when we try to define a species. What, however, appears increasingly evident is that Nature has erected fences around certain orders of living organisms. Variation within the fence is possible ; but transmutation by gradual variation of the order of life within one fence to correspond to the living organism in the next fence has not yet been achieved.

* F. R. Moulton, *The Nature of the World and of Man*, p. 30.

Darwin himself confessed that he had never known one instance of transmutation of species to occur.* And as recently as May, 1933, Professor Fleischmann, in a paper read before the Victoria Institute, said, "No one can demonstrate that the limits of a species have ever been crossed."

Mendelism, which some affirm gave the death-blow to Darwinism, demonstrates that considerable variation can be produced, but always within the type. De Vries, the Dutch botanist, declares, "The constancy of Species is a demonstrated fact: their transmutability is still a matter of theory."†

The examination of what are called chromosomes in the cells of living organisms seems to indicate why it may not be possible for transmutation of species to take place. The chromosomes are rod-like bodies contained in the nucleus of the cell which determine the nature of the living organism to which they properly belong. A definite number of chromosomes can be found in each individual of a particular species. They are composed of bead-like elements called *genes*, strung as it were on a string. Thus the determinative principle of a living organism is deeply embedded within its structure. Hence there are many thoughtful students of science to-day who refuse to accept that theory of evolution which assumes the transmutation of species, until it can be verified that the chromosomes in the cell of one living organism can be gradually changed into the chromosomes which are characteristic of another entirely different organism.

Mr. Douglas Dewar, accordingly, writing as a zoologist, says: "By combining to make various molecules, the elements carbon, hydrogen, oxygen and nitrogen form a vast number of different compounds, but these all contain only the above elements, and no amount of reshuffling of these will give rise to a compound that contains any element other than the above four. We should expect to find the same results from the rearrangement of the parts of chromosomes and genes, and this is precisely what we do find. If a species be defined as a freely interbreeding community, no new animal species has yet been bred by any experimenter . . . There appears to exist no mechanism whereby a new type of organism can arise from an existing one."‡

When we consider the origin of the human species we recognise the superlative value of the Biblical revelation. According to

* *Life and Letters*. vol. iii, p. 25.

† *The Mutation Theory*, p. 205.

‡ *Man: A Special Creation*, pp. 108-9.

Genesis, there is an unbridgeable gulf between man and the rest of the animal creation. The reasons I have already stated.* During the past half-century, however, persistent attempts have been made to demonstrate man's descent from the ape or from a common ape-like stock. With what result? Professor Virchow of Vienna, the renowned anthropologist, said not long before his death: "Twenty years ago it was hoped that the idea of Descent in its extreme form would be victorious. There was a great expectation that man's descent from the ape or some other animal would be demonstrated. In vain have the links which would bind man with the apes been sought. Not a single one has been recorded." That such gaps actually exist Sir Arthur Keith admits when he says: "The fossil forms which represent this stage in the evolution of anthropoid and of man have not been found; their existence is inferred."

It was in reference to the lack of substantial evidence for the theory of man's kinship with the apes that Sir Ambrose Fleming made the spirited protest, which occasioned such widespread comment in January, 1935. To quote from his book, *The Origin of Mankind*, he said: "It is entirely misleading and unspeakably pernicious to put forward in popular magazines or other publications read by children pictures of gorillas or chimpanzees labelled 'Man's cousin' or 'Man's nearest relative,' or to publish perfectly imaginary and grotesque pictures of a supposed 'Java man' with brutish face as an ancestor of modern man, as is occasionally done . . . Neither is it justifiable for preachers in the pulpit to tell their congregations that there is general agreement amongst scientific men as to the evolutionary origin of man from an animal ancestor."

In support of his contention he adds: "Mr. H. F. Osborn, the learned Director of the Natural History Museum of New York, U.S.A., not long ago contributed an article to an American review entitled *Human Biology*, under the title 'Is the Ape-Man a Myth?' and he answers the question in the affirmative." Further, he quotes the opinion of Dr. Albert Fleischmann, Professor of Zoology in the University of Erlangen, that "Darwin's scheme remains to this day foreign to scientifically established Zoology, since actual changes of species by such means are still unknown."†

In his Presidential address to the Victoria Institute, the subject

* *Vide* pp. 43-47.

† Pp. 75, 82.

of which was "Modern Anthropology versus Biblical statements on Human Origin," Sir Ambrose issued a challenge, which was widely reported, in the question: "If, then, there is such a sharply-marked difference between the animal mind and the human mind, the problem the evolutionist has to face is to explain how it comes to pass that if man and the anthropoid apes have a common ancestor, all the above astonishing powers and faculties should be present in ever-advancing degree in man, and totally absent in the collateral animal the ape."

The response was illuminating since it illustrated the lack of substantial evidence on the other side. Two notable replies were reported. One was from Sir Arthur Keith. In an interview with the correspondent of the *Daily Telegraph* he said, "I do not know. Why is a Sir Isaac Newton born in one family and an idiot in another? What light has Sir Ambrose to throw on that?" As a biologist Sir Arthur should know that there is no true analogy between aberrations within a particular species and the marked differences which characterise two entirely different species.

The other reply was from Sir Grafton Elliot Smith, Professor of Anatomy at University College, London. He said: "When Sir Ambrose comes out with all his dogmatic statements it is difficult to answer them straight away, but he is evidently quite unaware of what has happened in recent years. . . Some of my own assistants at University College Hospital carried out vitally important experiments to determine visual discrimination of the baboon. They were able to show that the baboon has powers of visual discrimination of exceptional precision. The creature could pick out colours that a good many shop people could not distinguish—subtle shades of grey not appreciated by ordinary salesmen. It is difficult to say where these experiments might have stopped, but the baboon eventually killed itself by twisting a chain round its neck!"

It is now plainly evident that evolution can only be presented as a philosophical theory: it is not an accredited scientific fact. Sir J. Arthur Thomson has declared that "the naturalists of to-day are not so intellectually comfortable as their fathers were in declaring a result to be 'the outcome of evolution'." And Professor Bateson, in the Darwin centenary volume, wrote that "no one can survey the work of recent years without perceiving that evolutionary orthodoxy developed too fast, and that a great deal has got to come down."

The final question then is this: Which is more reasonable and more truly scientific, Chance or Design: Evolution or Creation? This is not a case of science versus religion. On the contrary, Lord Kelvin, a master mind in the realm of science, once said in words which may now be regarded as prophetic: "I feel profoundly convinced that the argument from design has been greatly too much lost sight of in recent zoological speculations. Overpoweringly strong proofs of intelligent and benevolent design lie around us, and if ever perplexities, whether metaphysical or scientific, turn us away from them for a time, they come back upon us with irresistible force, showing to us through nature the influence of a free will, and teaching us that all living things depend on one everlasting Creator and Ruler."

X.—BIBLICAL ANTICIPATION OF MODERN DISCOVERY.

The creation of light before the appearance of the sun; the beginnings of vegetation in the absence of sun-light; the fixity of species; the biological order of creation in the vegetable and animal kingdoms; these are some of the details in the Genesis cosmogony which not only reveal the scientific exactitude of the record but illustrate how it has anticipated the findings of modern discovery.

The Greeks, who may be said to represent the flower of the culture of the ancient world, believed both in the spontaneous generation of life and in the eternity of matter—two beliefs directly opposed to the Biblical revelation. Aristotle taught that fleas and worms, mice and frogs were engendered spontaneously from the moist earth. Virgil believed that bees were produced by the putrefaction of the entrails of a young bull. And such false notions have long persisted. A celebrated French physician in the reign of Louis XIV, Van Helmont, taught that herbs could be transformed into scorpions. Even in our own generation eminent scientists have been keen to embrace the idea of spontaneous generation, some declaring it to be "a philosophical necessity" of the doctrine of evolution. T. H. Huxley, misled by Haeckel, at one time was prone to believe that life was spontaneously generated in a slimy substance which he termed *Bathylbium*, supposed to exist at the bottom of the ocean. Others claimed to have developed life from non-living matter; but Pasteur exposed the falsity of their experiments.

“There is no circumstance,” said he, “known to us to-day which justifies us in affirming that microscopic organisms have come into the world without germs, without parents like themselves. Those who make this assertion have been the playthings of illusions or ill-made experiments invalidated by errors which they have not been able to appreciate or to avoid.”*

The Greeks, likewise, believed that matter was eternal. The cosmos was produced by a fortuitous concourse of atoms, but the atoms apparently had never a beginning. How vastly different from the concepts of modern physics! We are being told that “electricity is now known to be molecular in structure.” And, moreover, Jeans, Eddington and others are demonstrating that the universe is growing old, and cannot last for ever. “Energy,” says Jeans, “cannot run downhill for ever, and like the clock-weight, it must touch bottom at last.” The obvious inference, of course, is that at some time in the remote past the clock-weight must have been wound up; that there has been a creation.

How marvellous is the Genesis record! How did the writer escape the pitfalls of the scientists and philosophers who have investigated and theorised down the centuries from his time to ours? In the Mosaic cosmogony there is nothing absurd or grotesque, like the representation of the earth resting on the shoulders of an Atlas, or supported by an elephant resting on the back of a tortoise!

The Genesis relation has stood for over three millenniums. It was written a thousand years before Herodotus “the father of history” was born. What changes in the realm of science have meanwhile been recorded! This monument of eternal truth—that there has been a divine creation in the beginning, that life has proceeded from life and is not spontaneously generated, that man has a nature partly from above and partly from below—has remained erect above the changing mists of human philosophy—a miracle in the realm of literature, and a perpetual challenge to scepticism and unbelief.

XI.—CONCLUSION: A BASIS OF SCIENCE FOR RELIGION.

If I might venture to expand the title of this essay, I would say that in Genesis we have a sure basis of science *for religion*,

* Quoted by Price, *A History of Some Scientific Blunders*, p. 64.

Bearing in mind the simplicity of its diction and the brevity of its narration, all we have a reasonable right to expect is a general correspondence between its content and the accredited results of modern science. He would be a bold man who would dare to deny that such a correspondence exists. The discoveries of the past quarter of a century have undoubtedly tended to confirm the declaration of the renowned geologist, Sir J. William Dawson: "The order of that vision of the creative work with which the Bible begins its history is so closely in harmony with the results worked out by geological investigations that the correspondences have excited marked attention and have been justly regarded as establishing the common authorship of nature and revelation."

To that might be added the testimony of Cuvier, Dana, Guyot, Stokes and other masters in the realm of science. W. E. Gladstone took double first-class honours in the University of Oxford. Through many arduous years he occupied the responsible position of Prime Minister. He was a voluminous reader and a profound thinker. In the maturity of his powers he wrote a book called *The Impregnable Rock of Holy Scripture*, in which he referred to the Genesis cosmogony in these terms: "For myself, I cannot but remain impressed with the profound and marvellous wisdom, that has guided the human instrument, whether it were pen or tongue, which was first commissioned from on high, to hand onwards for our admiration and instruction this wonderful, this unparalleled relation . . . an inestimable treasure."*

In the welter of nineteenth-century agnosticism Gladstone found there a foundation of "impregnable rock" upon which to rest his ladder of faith by which to rise to the highest exercise of which the human soul is capable—fellowship and communion with God. And for that purpose alone was the Genesis revelation divinely given.

DISCUSSION.

The PRESIDENT (SIR AMBROSE FLEMING) (in the Chair) said: I feel sure that all present will desire to express to Dr. Hart-Davies our cordial thanks and appreciation of his kindness in coming to us once more with one of his very interesting and informing papers.

His address comes indeed at the present time very appropriately and on a subject of vast importance. Some of those present have

* P. 77.

no doubt seen the remarkable document called The Report of the Commission on Christian Doctrine appointed by the Archbishops of Canterbury and York in 1922. At any rate probably most here to-day have seen the copious correspondence in The *Daily Telegraph* called forth by it. This report is signed by twenty eminent men, bishops and laymen, and professes to give an epitome of opinions that are held, or may be held, by members of the Church of England concerning the verities which constitute the Christian faith. This is not the time to enter into any criticism of the Report as a whole, but one statement in it merits our attention because it deals with the subject of the paper of Dr. Hart-Davies under discussion. After an assertion that the Universe depends on the Creative Will of God, the report says (p. 45): "It is to be recognised that the Christian doctrine of Creation as thus generally stated leaves abundant room for a variety of theories as to the evolution of the world. . . . No objection to a theory of evolution can be drawn from the two Creation narratives in Genesis i and ii since it is generally agreed among educated Christians that these are mythological in origin and that their value for us is symbolic rather than historical."

This is a most astonishing statement to be issued by those who at their ordination have confessed their unfeigned belief in all the canon of Scripture and especially have expressed their readiness to banish and drive away all erroneous and strange doctrines contrary to God's word.

It amounts to saying that we may dismiss the plain statements in Genesis i, 27 that God created man in His own image, or that in Genesis ii, 7 that the Lord God formed man of the dust of the ground and breathed into his nostrils the breath of life as literally true and replace them by the Darwinian or any other theory that man has been evolved from the animal races by natural processes of development.

It is to be hoped that the members of this Commission would not deny to the Members and Associates of the Victoria Institute the right to be called "educated Christians"; yet in the last ten years we have had many papers here from competent authors which have carried conviction to our members that spontaneous evolution of either animal or man is an improved theory.

It is a most astonishing thing that the eminent signatories to this Report have not found time in the fifteen years they have been sitting together to read up at least a little of the abundant anti-evolution literature.

It is not merely a question of religious faith. Eminent naturalists such as Sir J. W. Dawson and his son, Dr. Bell Dawson, Sir Charles Bell, St. George Mivant, Professors Vialaton, Fleischmann, Geddes, D'Arcy Thompson, W. Bateson, McCready-Price, L. S. Berg, Mr. Etheridge, and many others have dissented from the Darwinian theory on scientific grounds only and no other theory has been stated in such detail as to secure wide support.

Darwin himself did not believe in his complete demonstration of it. In his *Life and Letters*, published by his son, Francis Darwin, Vol. III, p. 25, is a letter of C. Darwin replying to a request of Mr. G. Bentham for proof of it. He says: "In fact the belief in Natural Selection must at present be grounded entirely on general considerations; when we descend to details we cannot prove that a single species has changed."

A. R. Wallace, a contemporary of Darwin, denied that evolution could account for man's mental, ethical or spiritual qualities, and T. H. Huxley gave a reluctant consent. Hence to offer to the public any choice of evolutionary theories of man's origin in place of the definite statements of Divine Creation is to offer them a stone in place of bread.

The instantaneous creation of Man or of Woman is not to be dismissed as "incredible" or "impossible" in view of many acts of immediate Creation in the miracles of Christ. But if the former are held in doubt it weakens faith in the latter. Accordingly the treatment of the subject of miracles in the Report "is sicklied o'er with the pale cast of thought," and the Virgin Birth, the bodily Resurrection, and the Ascension of our Lord are all mentioned as if belief in their literal truth could be suspended. St. Luke tells us in the preface to his Gospel that his object was "that thou mightest know the certainty of those things wherein thou hast been instructed." There is much, however, in this Report which seems to encourage uncertainty.

At the present time the effort seems to be to couple the words Evolution and Creation together in such phrases as "Evolution is a method of Divine Creation."

But this involves hypothesis. We do not know whether the acts of Creation in Genesis i and ii were instantaneous or gradual. Nor is any definition given in the above statement as to the nature of such assumed evolution. These narratives were not intended, as Dr. Hart-Davies has said, to give us detailed information as to Creative acts. Indeed, we might not be able to understand them if given. They give us absolute truth on certain great facts of man's creation and fall and the promise of a redemption by the seed of the woman and the coming of a second Adam, who is the Image of the Invisible God, who would triumph where the first had failed.

I will ask you therefore to signify your agreement with the vote of thanks to Dr. Hart-Davies I have now the pleasure to propose. I can then declare the subject open for discussion and will ask those who desire to speak to come up to the table and give their names in writing to Colonel Skinner.

Mr. SIDNEY COLLETT said: Mr. Chairman, it seems almost ungracious to criticise such a paper as we have just listened to. But I humbly suggest that our learned lecturer and many other scientists fall into two errors over this first chapter of Genesis. First, they speak of the six "days" mentioned in that chapter as the Days of "Creation." Secondly, they say those "days" were not natural days of twenty-four hours such as we know them, but that they represented long periods of time.

Now, not only are those "days" never called Days of "Creation" in Scripture; but, on the contrary, the very first verse of Genesis i tells us plainly that the "Creation" of the heavens and the earth took place "in the beginning"—a timeless date which no man can measure. And there our scientists may have as many millions of years as they like. But that word "created" is never used again in the whole of that chapter in relation to the earth: it is only used in relation to animal life, v. 21, and man, v. 27, which of course God did then "create."

Verse 2, however, which describes the earth as being "without form," etc.—"waste"—is the real word, see R.V.—clearly indicates that some great catastrophe must have occurred after the original "creation" mentioned in verse 1, for the two following reasons:—

First, the Holy Scripture in Isaiah xlv, 18, distinctly declares that "He (God) created it (the earth) *not* 'waste.'" R.V. the exact word that is used in Genesis i, ii. Indeed the earth must surely have been most beautiful when God first created it.

Second, that the word "was" in verse 2 should be rendered "had become" or "became." It is precisely the same word in the original as that used in Genesis xix, 26, where we read that Lot's wife "became" a pillar of salt. She was not originally a pillar of salt, but became such after the catastrophe that occurred owing to her disobedience in "looking back." So with the earth. It was not created without form or waste, but "became" so afterwards.

Hence, the rest of the chapter deals not with "creation," but with what may be described as the reconstitution of the earth from that condition of waste, to make it suitable for the dwelling-place of man.

All this seems to be made quite clear in verse 9, where it does not say that God "created" the waters—they were already "created," but merely that "God gathered the waters together into seas, and the dry land (or earth) appeared." The earth, like the waters, had already been "created" as stated in verse 1. So with the sun. Genesis i, 17, tells us that on the fourth day God "set" the sun in its relation to the earth. He did not then "create" it; it was there already. But on the fourth day He "made" it (Genesis i, 16) in a fit condition to give light and heat to this earth.

A careful observance of the way in which the Holy Spirit uses the words "created" and "made" throws much light upon this question. To "create" is to make something out of nothing; but a thing is "made" out of some existing material.

Now, the "period theory" held by the learned lecturer lands us into very troubled waters. I have collected a list of the calculations of eleven of the most eminent scientists as to the length of the period supposed to be covered by the six days mentioned in Genesis i, and I find that no two of them agree! Professor Ramsey, who gives the longest time, makes it 10,000 million years! And Professor Tait, who gives the shortest time, makes it 10 million years!—a somewhat staggering difference of more than 9,900 million years! While the latest figures are those of Professor Sollas and Sir George Darwin, who calculate those six "days" to have lasted about 60 million years, making 10 million years for each "day."

Now, I wish to call special attention to the following: There are six things said about those days of Genesis i. There was "evening and morning"; there was "day and night"; there was "darkness and light"; and I ask what meaning could such words have unless they referred to ordinary days such as we know them. Moreover, we read: "God divided the light from the darkness"; and "God called the Light, day, and the Darkness called He, night." (Genesis i, 4 and 5.)

Is it conceivable that the Holy Spirit would use words and expressions in the Bible describing, in the most minute detail, the constitution of ordinary days and nights exactly as we know them, while all the time meaning something entirely different, viz., vast periods, lasting many millions of years? Moreover, as I have shown, according to the period theory, each day, lasting 10 million years, one half of which God called "Day," must have had 5 million years of unbroken light, and the other half which God called "Night," must have had 5 million years of unbroken darkness!

Seeing that we read of trees and herbs on the third day, fish and fowl on the fifth day, and animals and man on the sixth day, I ask how could life of any kind exist under such conditions? But after all, does not the Bible explain itself in this matter? In Genesis ii, 3, we read of the work which God "created" and "made," or literally "created to make." Does this not clearly imply that the Almighty foresaw that, after His original "Creation," as recorded in Genesis i, 1, which must have been perfect, a great disaster would occur, which would bring the earth into a state of "waste," as mentioned in Genesis i, 2, necessitating its being reconstituted or "made" fit for the dwelling-place of man?

This I believe is the true interpretation of Genesis i.

I therefore agree with G. H. Pember when he says: "*It is clear that we must understand the six days to be periods of twenty-four hours.*"

Mr. H. W. BRYNING said: Dr. Hart-Davies is to be congratulated on his able and interesting paper. But I submit that his exposition of the ordinance, "Let there be light," as the first creative fiat, teaches that light itself was created.

Light, as an emanation from the sun (or central incandescent mass), existed when the earth was enveloped in the thick darkness

referred to in Job xxxviii, 9—where Job is put a pertinent question connected with the making of the earth. The question (in verse 4) is, “Where wast thou when I laid the foundations of the earth?” and the descriptive reference reads: “When I made the clouds the garment thereof, and thick darkness a *swaddling*-band for it.” The italics are given here to stress the expression “swaddling,” which obviously indicates the period when the earth was very young, and compares it to the infant stage in man.

I quote the testimony of Job, as it is a Divine exposition of the stage in the making of the earth when it was figuratively born and literally brought from darkness into light. For it is written, “And the Spirit of God moved upon the face of the waters. And God said, Let there be light.” (Note the conjunctions here, as well as those all through the narrative of the Creation, which should point to the unity of the whole as a single and singular work, in the preparation of a world for the sons of God.)

To my mind the second and third verses of chapter i are as inseparable as chapters i and ii. Because the words quoted above indicate that a cataclysm was ordained to prepare the way for the passage of light to the *face of the waters*. Hence the fiat, “Let there be light.”

On page 34, Dr. Hart-Davies refers to the stage when a planet is covered with water and cloud, and there is a distinction between light and darkness, before the clouds part to make the sun and moon visible from the earth. But his conclusions regarding the state of the glowing mass which is now the sun, are unsupported by the text and are incompatible with the Nebular hypothesis. For the text states that the sun was the greater of the two great “lights,” the other being the moon. So that both were fully formed as orbs. This agrees with the Nebular hypothesis, while the activity of solar radiations are obvious in the earliest geological formations.

It is therefore evident that the light of the first three “days” was diffused sunlight, which has continued ever since to distinguish day from night, and enabled plants to grow during the third “day” of Creation before the advent of direct sunshine. Nature demonstrates the possibility of germination in the absence of sunshine in many places upon the earth to-day, notably Cherrapungi and

the dense tropical forests, where there is always vegetation among the mists and shadows.

Dr. Hart-Davies holds the common belief that the first verse of Genesis relates to a remoter beginning than the genesis of the earth which is clearly indicated in the juxtaposition of the words " heaven " and " earth " in the text. I venture to say here that this belief is not in keeping with the purpose of the revelation, which is clearly an introduction to the Creator of this world, and the narrative which details the order in which every thing, visible and invisible, was made by Him.

In his introduction to this essay, the learned doctor remarks that there are three marked characteristics in the narratives of the first two chapters of Genesis, viz., brevity, simplicity, and religious purpose. Taking these into consideration, it may be perceived that there is no warrant for the assumption of any other beginning than that of the genesis of the solar system, within which man is shown the genesis of the sun and moon and the earth, while the purpose of his existence upon the latter is told in the second chapter of Genesis.

The heaven and the earth which God created in the beginning is appropriately described as the Nebular Theory, which is the most valuable contribution ever made by science in support of the Bible as a basis of science and religion. Why does modern science reject it for the Planetesimal Theory ?

The Nebular Theory is justified by the Genesis record and a warrant for this conclusion may be read in the significant statement at the foot of verse 16, where the two great lights are brought into the narrative of the fourth " day." Thus we learn that the other lights are for signs and for seasons, and for days and years are grouped under the simple but very illuminating remark,

HE MADE THE STARS ALSO.

Dr. J. BARCROFT ANDERSON said : It is not clear to my mind that this book (of which Moses is stated to have been the amanuensis in II Chronicles, xxxiv, 14) was given, or intended to be given, to the world.

It is now a treasured source of information to the Ecclesia of God. To such as are of that ecclesia I desire to say a few words.

“Who the Son is, knoweth none save the Father,” are words our Lord uttered on earth. (Luke x, 22.) John knew that he was Son of God (builder-up of God). But who the Son of God was, he did not know. After His resurrection our Lord opened the understanding of His disciples. Then John knew that He Who expired upon the Cross was the same Who in six days made the heaven and the earth, the sea and all that in them is. (John i, 3.) Knew that it was He whom Isaiah beheld in the Temple when Isaiah said: “Mine eyes have seen Jehovah of Hosts.” (John xii, 41.) After the resurrection Paul knew that the Creator of all things had nearly (paraplesios—Heb. ii, 14) partaken of blood and flesh, in order that by the death He might destroy him that had the power of the death.” It was then he knew that He Who expired on the Cross, as stated in Colossians i, 15, was “Image of the God, the Invisible, First Formed of all formation, because by Him were formed all things.”

We are now considering in these two chapters the words of Him, Who afterwards taking-hold-upon-for-Himself of a seed of Abraham (Heb. ii, 16), expired from it upon the Cross. Words He dictated to Moses in the Wilderness. They contain fourteen quotations of words He actually spoke on earth, before Adam was. A language exclusively divine. That language from which all others at Babel generated and degenerated. Nor can I detect that this language was altered as spoken through the latest of His Hebrew prophets, or by the angel in the last chapters of Daniel.

But by the human translations of God’s Word written, we have all been misled. Some of the consequent misbeliefs were not serious. The garden God planted was BY, not IN, Eden. Eden means “Inlet” עֵדֶן—ODN. It was the Persian Gulf, out of which went a river to water the garden, and having watered the garden, it spread out to be four heads. (Gen. ii, 10.)

The mistranslation of Genesis ii, 4 was caused by accepting as authoritative the letter E which the scribe inserted בְּהִבְרָאם—BEBRAM. But he made his inserted letter smaller than any other letter in the book, and left a marginal note to indicate what he had done. Yet even with this added letter the verse should read: “These origins—the Heaven and the Earth by their being brought into physical existence. By day shaping them, Jehovah Elohim, earth and heaven, and every bush of the field before it was existing by earth,

and every herb of the field before it grew." Before I studied this verse I thought some of our Lord's work was done by night. I have taken the word עֲשׂוּת—OSUT as Davidson takes it in Ezekiel xiii, 18, active participle, feminine plural.

As a result of the stimulus Dr. Hart-Davies' paper has given to my study of the question, I have come round to the conviction that in Scripture the word DAY is always used as in chapter one, verse five, as the equivalent of LIGHT, meaning a period of light following darkness. In John vi, 40, we read: "every one who perceiveth The Son, and placing his trust in Him, should have life eternal, and I will raise him up with the last day." That day is last, because it endeth not. (Rev. xxii, 5.)

The length of the fifth and sixth days must have been determined by the rotation of the earth, for the sun was then in the sky. And if in the earlier days it was the earth which divided between the light and the darkness, then also its rotation decided their duration.

After twelve years' research into the subject I have been unable to find any proof, or attempted proof, that has been put forward to prove the physical matter of this earth to have been existing for as long as eight of our days prior to Adam's creation. There have been mountains of insinuation, but proof none.

Isaiah xlv, 18, appears to have always been mistranslated by placing a stop after "He established it" and by transposing the words "not in vain" and "He created it."

The lecturer has referred to things which are outside the scope of these two chapters. The presence of fleas on earth is explicable by a more exact translation of Genesis iii, 17 and 18. The presence of saurian reptiles by Genesis vi, 12. And of anthropoids, by crossing, such as that referred to in Jude, verse 7. None of these forms of animal life can we understand to have been pronounced GOOD, as were those detailed in verses 22 and 26 of chapter one.

Mr. G. BREWER said: I am sure we must all feel very much indebted to Dr. Hart-Davies for his interesting and instructive paper, with his support to the scientific and historical accuracy of the first two chapters of Genesis; and to such an excellent paper, one naturally hesitates to sound any discordant note. But lacking

the advantage of a scientific education, I find a difficulty in accepting his view that the first verse of the first chapter is a summary of the events recorded in the subsequent verses of that chapter.

Verse 2 states : And the earth was without form and void (*tohu* and *bohu*). Dr. Young in his literal translation renders this passage "hath existed waste and void." The same words in the original are used in Jer. iv, 23, "I beheld the earth, and lo, it was without form and void." The word "*tohu*" is rendered in Isaiah xxiv, 10, xxxiv, 11, and xli, 29, as "confusion" and in Deut. xxxii, 10, as "waste." In Isaiah xlv, 18, we read "He created it not in vain" (*tohu*). If therefore God created the earth perfect, how did it come to be waste and confusion, except as the result of severe judgment ? The 28th chapter of Ezekiel would appear to supply the reason in the fall of Satan. Job ix, 4-7, probably refers to this overthrow and the resulting darkness, when he speaks of God removing the mountains in His anger, shaking the earth in its place, speaking to the sun that it rise not, and sealing up the stars.

This catastrophe would confirm the truth of the suggestion on page 39 of the paper, that there might conceivably have been a race of pre-Adamite creatures. These being involved in the rebellion of Satan, would have perished in his overthrow.

With regard to the suggestion on pages 35-38 that the six days represent vast periods of time, each divided into two long intervals, one all darkness and the other all light, the question arises, what became of the grass, plants and trees created on the third day, when the evening, or darkness of the fourth day, set in ? To have passed through such a period of darkness would have destroyed completely the vegetable creation. Yet we find that it not only survived but was on the sixth day appointed to be the food of man and animals. After the fourth day, when the sun and moon were visible, we read that they were appointed to divide the day from the night ; and to be for signs, and for seasons, and *for days* and years. Thus, I see no reason why we should suppose *these days* to have been longer than the present day of 24 hours.

On page 52, paragraph 3, the suggestion is made that the trees of the garden were symbolical. That truths are here symbolized will, I think, be generally admitted ; but as the fruit of these trees, with the exception of the Tree of the Knowledge of Good and Evil,

were given to man for food, it is difficult to see how they could be merely symbolical.

Mr. W. H. DRURY YULE wrote: This is a paper marked by considerable scholarship and breadth of understanding, but I am somewhat dismayed to find that it does not apparently deal with the subject mentioned in the title, but rather its reverse aspect. Instead of considering the first two chapters of Genesis as a "basis of science," it expounds their "scientific accuracy" (para. 2), an operation which involves the interposition of an external standard—the very negation of a satisfactory "basis of science." Only in one short and not very enlightening section (X) does the writer really deal with his subject.

There are many points in this paper that call for criticism or comment, but I can only refer here to a few of them briefly.

The remark that "all light is not of the same nature" is not clear; surely there is no fundamental difference save that of wavelength. The arguments regarding "sunlight" are a little incongruous when אור is used of lamps (Jer. xxv, 10), the "sneezings" of leviathan (Job xl, 18), and of a person's face (Job xxix, 24)!

In the paragraph dealing with יום, it is remarkable that for a word occurring nearly 2,300 times in the O.T., and in a wide variety of contexts, recourse has to be had to examples from modern life and the N.T. (where the words used are *Greek*, not Hebrew).

I am glad that attention has been drawn to the slender basis on which the "catastrophe" theory rests. This theory does violence both to the Hebrew (if some such sense as "became" were really intended, we should at least expect the *niphil* form of the verb) and to all that we know from scientific researches, nor has it any clear support elsewhere in the Scriptures, except by a strange manipulation of the Greek *καταβολῆς κόσμου* in the N.T.

Does not the key to these opening verses lie in the various verbs that are used in the original? The author of this paper has evidently appreciated the distinction between ברא and עשה, but he would have done well to have carried the principle of discrimination further. I feel sure that much real light would result from a careful study of the diverse Hebrew terms employed in this chapter.

The argument from "breath of *lives*" (ii, 7) is rather far-fetched. The learned writer must surely know that the Hebrew noun "life" is never singular! The selfsame expression is applied to fowls and creeping things at i, 10. It should also be noted that vi, 17 and vii, 22 imply that others than man possess "spirit."

In connection with the remarks on ii, 23, it seems to me that the narrative implies a feeling that אִשָּׁה is derived from אִישׁ by a formative akin to הֶ-*locale*, giving the primary meaning of "towards-man"—a very natural affinity for one "taken from" man.

The explanation given of the differentiation of the sexes is interesting, but it must be remembered that analogy is the least certain or valid of arguments; nor must it be overlooked that sex is a chromosomic function, determined at the moment of conception, and that all available evidence points to the respective sexual glands being mutually inhibitory in their influence, so that a bisexual individual would be functionally asexual, and would probably also be an emasculated travesty of mankind. I believe that I am correct in saying that insects, which Dr. Hart-Davies instances, have no endocrine system controlling bodily development as have mammals, but that "sex" is present in each individual cell of the body, so that "mixed sex" in such cases is not surprising. This is a field where we must tread warily, and refuse to form premature conclusions.

With reference to Eden and the "home of civilisation," no mention is made of the recent reaction by the Smith-Perry school of ethnologists in favour of an Egyptian origin, nor to Dr. Yahuda's researches. The statement that "the Bible refers only to a garden *in* Eden" is singularly original. How would the author of this paper venture to translate גִּיְעָרַן at Gen. ii, 15; iii, 23, 24; Ezek. xxxvi, 35; and Joel ii, 3? I deplore the growing tendency among expositors, of which this is but a glaring example, to set one passage against the plain statements of many; the Scriptures can be made to mean or say anything by this method of exegesis. A question that all Bible students should ask themselves is whether עֵדֶן is necessarily to be understood as a place-name. The meaning of the word is "luxury" or "delight," and the Septuagintal translators have rendered it by τρυφή in Ezek. and Joel, and by παρὰδείσος in Isaiah. I feel that there is much to be gained

by understanding it as a reference to the *nature* of the "garden eastward." The supposed connections with an Assyrian *edinu* are not at all convincing. (This does not, of course, apply to the occurrences at II Kings xix, 12, Isa. xxxvii, 12 and Ezek. xxvii, 23, where the Masorettes have in any case pointed the word slightly differently.)

To say that Adam gave "names indicative of nature" is surely a gratuitous assumption, and even so, do not savages call things by names?

It is worthy of note, in support of the archæological evidence advanced, that according to the most reliable authorities, civilised man as we understand him is (so far) unknown prior to about 5000 B.C., after which he tends to fill the picture.

With regard to chromosomes and the "transmutation of species," it ought to be noted that protracted experiments with *Drosophila* indicate that chromosomic changes *do* take place, and are sudden and spontaneous, the survival of the resultant mutations being conditioned by the circumstances in which they arise—usually unfavourable under natural conditions.

In conclusion, might it be suggested that those who seek to expound the Scriptures should first address themselves to the all-important task of discovering exactly what those Scriptures themselves actually say, rather than overlaying them with a mass of subjective, and often speculative, scholarship.

WRITTEN COMMUNICATIONS.

Lt.-Col. L. M. DAVIES, M.A., F.G.S., F.R.S.E., F.R.A.I., wrote:—I hold that the first two chapters of Genesis cannot be taken apart from the third when studying nature as we find it to-day. The first two chapters describe the production of an ideal world which no human being but Adam and Eve ever saw—one in which all creatures were vegetarians (i, 29–30), death with suffering and strife did not exist, and God could call everything "very good." The third chapter introduces the Curse and all those aborted and offensive structures, typified by serpents in the animal world and thorns and thistles in the vegetable, which characterise the inter-necine strife of nature to-day.

As to present conditions, Scripture says that "the whole creation groaneth and travaileth in pain together" (Rom. viii, 22), and bids us look forward to days when "the wolf shall dwell with the lamb, and the lion shall eat straw like the ox" (Is. xv, 6-7). In other words, the Curse will be removed and life will return to conditions like those that existed before the Fall. So far as I can see, Scripture indicates that a stupendous reorganisation of nature took place at the Curse; as great a work as anything which God did during the Six Days, since animal and vegetable structures were modified to antagonise each other in countless ways not originally intended or finally approved.

If we refuse to believe this, we should equally refuse to believe the prophecies about the Millennium, and should also deny that millions of long dead Christians will really rise from their graves at the Second Advent; for the latter not only involves quite as great a work of God, but implies that the death of the body results from the Curse and held no place in Creation prior to the events described in the third chapter of Genesis.

I mistrust all attempts to treat the Six Days of Genesis i as geological epochs instead of as literal days. All such attempts arise from, and aim at supporting, the idea that the fossiliferous rocks were laid down *during the Six Days*; and I find fatal objections to this idea in the fact that those rocks are packed with evidences of death, disease, fear, pain, abortions and internecine strife, just as these same Scripturally-deprecated things characterise nature to-day. How could God have called such things "very good" during creation Days, if He regards them as abominable now?

As a geologist and as a Christian I see only one way of reconciling Scripture with the testimony of the rocks, and that is by taking the Six Days of Genesis i as *literal* days, during which a previously ruined world was restored and provided with an (unfortunately only temporarily) ideal population. If this view makes large demands upon our faith, it is at least free from contradictions, and leaves us our Bibles intact. We can believe that Scripture means what it says; we can logically deny that God approves of suffering and internecine strife in nature; and we can reasonably expect both the physical resurrection and the millennial conditions of which the Bible speaks.

It signifies nothing that the word "day" was sometimes used in a broad sense. We have to consider the sense intended in Genesis i; and that is settled from the very beginning by the fact that the first "Day" is specifically defined as being a period of *light* separated from darkness called "Night" (Gen. i, 5). Thus "day and night are contrasted," just as our author himself says (p. 35) is done when the word "day" is meant to be taken literally! Indeed, since all commentators—including our author—agree that *this first light was literal*, the "Day" which it constituted must also have been literal. Light did not simply appear *during* the First Day but WAS the First Day; and since the following Days are treated as resembling it, with similar evening and morning to each, it is clear that each was a period of literal light alternating with literal darkness. It will not help our author to deny that they were ordinary days and suppose that they were colossal epochs of light separated by equally colossal epochs of darkness; and I would remind him that the existing Sabbath is blessed because God rested upon IT, not upon something represented by it.

The author talks (p. 36) about days being "measured by the ticking of a clock." As it happens, clocks are adjusted to days, not days to clocks; and creation Days, like all others, are defined by alternating light and darkness. These alternations are the only criteria known to science, and their appearance—so significantly insisted upon in Genesis i—is not to be brushed aside.

The author's mental confusion on this point is obvious. He asks us to regard these as "not man-measured, but God-measured days" (p. 37); as if man, and not God, made days what they are! He says that they "should be interpreted" in the light of the statement that a thousand years are as one day to the Lord; and apparently does not realise that a hundred thousand times a thousand years would not suffice if these really were geological epochs. In one breath he tries to dispose of the references to evening and morning as indicating nothing but "orderly, progressive movement," and in the next breath he adopts Hugh Miller's suggestion that they indicate that Moses actually saw six visions "beginning with an evening, and ending with a morning" (p. 37). He sees nothing incongruous in the argument that because the last book of the Bible professedly describes visions, the first book must open with a vision described

as cold history. To such passes does unsound exegesis lead its advocates.

As to the second verse of Genesis, I have obtained ample admissions—some unwilling—from Hebrew scholars to the effect that its opening words are best rendered “and the earth BECAME *tohu va bohu*.” We also have Isaiah’s assurance (xlv, 18) that God did NOT create (*bara*) the earth *tohu*. Indeed the word *tohu* seems always to indicate something obnoxious—and usually accursed—in Scripture; so its appearance in Gen. i, 2 is incompatible with the idea of a newly created world. Even a critic like Skinner, after studying Jeremiah’s vision of a *tohu va bohu* earth (iv, 23–26), says that the “safest” exegesis would take Gen. i, 2 to indicate not a state of primeval chaos, but “a darkened and devastated earth from which life and order have fled” (*Crit. & Exeget. Comm. on Gen.*, p. 16–17). He also reminds us that the very idea of “chaos” comes from Pagan, not Jewish, sources.

The earth was not “formless” in the second verse of Genesis, as Dr. Hart-Davies asserts (p. 39). It is a striking fact that the story of the Six Days mentions no work whatever upon the solid earth, which is treated throughout as existing in an already finished condition and requiring only to have its surface cleared and populated.

I also deny that any true parallel can be drawn between the events of the Fifth and Sixth Days and the geological record. Our author seems to take the land animals of the Sixth Day to be mammals—I suppose he means placental mammals, for others go back far into the Mesozoic. But the Bible makes no limitation since it includes “everything that creepeth upon the earth”; and terrestrial creepers go back to the Palæozoic. Land reptiles were contemporary with the marine reptiles to which the author refers, just as land mammals are contemporary with marine mammals to-day. It is an unquestionable fact that land forms appear in the rocks long before any birds. Indeed, the very fact that Genesis talks of “every winged fowl” being created before anything whatever on land, shows that its account is no epitome of the geological record.

Much more could be said to similar effect, which space forbids my mentioning here. I will only remark that attempts (p. 39) to disparage the “catastrophe” theory (of a disaster between the first two verses of Genesis) as recently propounded to escape the geolo-

gical difficulty, are unfortunate, since the "period" theory (that the Days of Genesis each consisted of myriads of real days) was propounded at much the same time to escape the same difficulty. Indeed, the former is really much the senior theory of the two, since the existence at least of a measureless GAP between the first and second verses of Genesis was pointed out by early Church fathers many centuries before geology began to exist as a science. All that Chalmers did was to show that the geological epochs might go into that gap, as the significant opening words of Gen. i, 2 suggest, I think that I, as a geologist, am sufficiently "scientifically educated" to judge of the respective difficulties of the "catastrophe" and "period" theories; and I unhesitatingly regard the former as the easier one to defend ON ALL ACCOUNTS.

Lt.-Col. A. G. SHORTT, late R.A., wrote: In criticising this paper, I propose to confine myself to two points among many.

The mere quoting of authors which appeals to the lecturer is not proof. It gives a one-sided attitude to the question, for there are plenty of other authors who take a different view. The quotation from Quatrefages, on p. 52, and the comment which follows is a case in point.

It is not easy to grasp the meaning of the title, for these chapters can never be the *basis* of science. Science and religion work from opposite ends, and all that can be urged is that Genesis is or is not contrary to the laws of Nature.

But even so, it surely is necessary, before anything else, to find out what these chapters do mean, or in other words, what portion of them is reality and what portion symbolism, for it is the reality that matters in this connection.

Dr. Hart-Davies has not attempted to separate the two. He does suggest that the Tree of Life is symbolic, but the grounds given for this would equally apply to the formation of Eve.

He does not question the meaning of "the earth" as applying to the whole world. And yet, it was not so applied, even in Genesis, as in Gen. xix, 31 ("there is not a man in the earth"), and "the earth," which was covered by Noah's flood, was certainly local, *vide* Joshua xxiv, 2, 3, 14, 15 ("the other side of the flood").

No doubt it was believed that God made "everything," and "the earth" in i, 1 would imply the world as such. But they did not in the least know what was the extent of the world in those days.

May I add a reminder that the Persians, in the Zendavesta, made the Creation to be six unequal periods, totalling 370 days.

Mr. THOMAS FITZGERALD wrote: While there is much of real value in Dr. Hart-Davies' essay, the method adopted in his treatment of the subject is open to criticism. From the title of the paper it might be expected that his first consideration would be to carefully examine and expound the first two chapters of Genesis, and then explore and point out how those chapters may be considered as a basis of science. Instead of that, the order has been reversed, and the writer has started off with an attempt "to demonstrate the scientifically accurate basis" of Gen. i and ii, using the discoveries of science as a basis for a right understanding of those chapters.

The writer of the essay, *Mosaic Cosmogony*, in *Essays and Reviews*, wrote that he was urged to put pen to paper because he believed "that if the value of the Bible as a book of religious instruction is to be maintained, it must be not by striving to prove it scientifically exact, at the expense of every sound "principle of interpretation, and in defiance of common sense, but by frank recognition of the erroneous views of nature which it contains."*

This view has long been held, and is more widely held to-day than ever. It constitutes a challenge which must be met, and the only way to meet it is first to ascertain the true meaning of the words used by Moses in his narrative. Surely it may be claimed that Moses, as a historian, would write so as to be understood, and that he himself possessed an intelligent understanding of the meaning of the words he used.

We may learn even from our opponents on this point, for Sir Robert Anderson quotes the dictum of the late Professor Huxley, "that it is vain to discuss a supposed coincidence between Genesis and science unless we have first settled, on the one hand, what Genesis says, and on the other hand, what science says."† We are still a

* *Essays and Reviews*. Second Ed., p. 211.

† *The Bible and Modern Criticism*, p. 120.

long way from settling what science has to say, while it is now taken for granted by very many that what Genesis says is quite understood, and can no longer be accepted as a "strictly scientific" account of the origin of the universe.

I hold tenaciously to the view that "The duty of the biblical student, as such, is to give the meaning of the original narrative in its plainest terms, *quite irrespective of what scientific consequences may ensue*,"* and as to creating "scientific difficulties greater than those it is intended to solve," I must confess that I am not much disturbed about "scientific difficulties." As a biblical student, I am profoundly concerned about the Scriptural difficulties raised by the interpretation of the "days" of Gen. i and ii, as signifying vast, indeterminate periods of time.

The author, on page thirty-nine, says that he cannot accept the interpretation (? translation) of those who hold that the Hebrew words of Gen. i, 2 should be translated, "and the earth became," instead of "and the earth was." He states that "Few Hebraists, I am convinced, would be willing to translate the Hebrew in the manner suggested," and in support he quotes from *The Bible and Modern Research*.

That quotation is regrettable, because it perpetuates a charge which has again and again been refuted. To repeat it at this time of day either indicates ignorance of the literature on the subject or a biased mind which ignores what has been written by learned men in the past.

Not "when geology was a young science," but *centuries* before geology or biology were thought of, learned men translated Gen. i, 2, in the English words, "And the earth became without form and void." Not Dr. Chalmers in 1814, but the learned Dathe in 1781, gave the translation, "In the beginning God created the heaven and the earth. But afterwards the earth became waste and desolate," and he expressly distinguishes the condition of the earth in verse two, from that referred to in verse one. Dr. Pusey, Regius Professor of Hebrew, Oxford, says: "The belief that creation, at least, dated backward for countless ages, was current in the Church some 1,400 years before geology."†

* *V.I. Trans.*, vol. ix, p. 149.

† *Daniel the Prophet*. By Rev. E. B. Pusey, D.D., Pref., p. xvii.

The charge that such a translation was "a comparatively easy way of escape" from the difficulties geological researches had raised against its being accepted, should be abandoned for all time, for there is ample evidence that this translation was anticipated by some of the early Fathers, and therefore could not possibly have been suggested by geology.

Dr. Eadie stated long ago that "The length of time that may have elapsed between the events recorded in the first verse (of the first chapter of Genesis) and the condition of the globe, as described in the second verse, is absolutely indefinite. How long it was we know not; and ample space is therefore given to all the requisitions of geology. The second verse describes the condition of our globe when God began to fit it up for the abode of man. The first day's work does not begin till the third verse. . . . This is no new theory. It was held by Justin Martyr, Basil, Origen, Theodoret and Augustine—men who came to such a conclusion without any bias, and who certainly were not driven to it by any geological difficulties."

The names of several scholars of high repute can be cited in support of the translation which Dr. Hart-Davies finds it impossible to accept. The whole question has been very thoroughly argued in the works of John Harris, D.D., *The Pre-Adamite Earth*, and *Man Primeval*. *The Principles of Geology*, by the Rev. David King, LL.D. (Second Ed.—Revised and Enlarged). *The Bible and Modern Thought*, by the Rev. T. R. Birks, M.A. *Neology Not True*, by the Rev. Chas. Hebert, M.A. (Second Ed.). *Daniel the Prophet*, by the Rev. E. B. Pusey, D.D., Regius Professor of Hebrew, Oxford; and Jamieson, Fausset and Brown's Commentary (Genesis). There is also a valuable paper on the subject by the Rev. A. I. McCaul, M.A., Lecturer in Hebrew at King's College, London, published in the *V.I. Trans.*, vol. ix. On page 167 of that volume, the Rev. A. I. McCaul states his belief "that the more physical science advances, the more will the literal sense and accuracy of the Mosaic account be indicated."

AUTHOR'S REPLY.

Dr. HART-DAVIES said: It is physically impossible to read even half of the Prize Essay, consisting of some 15,000 words, in the space allotted; and it is equally impossible, in the few minutes set apart for reply, to attempt to answer the various criticisms presented. I

must confine myself mostly to two of these. One has reference to the length of the creative days. I personally do not object to those who interpret these as consisting of twenty-four hours, as we reckon time ; but I am convinced that they have no manner of right to force that interpretation upon others as the only one permissible. All the real evidence in my judgment goes against that interpretation. The same remark applies to those who, out of their own imagination demand that we shall assume, what the Bible nowhere affirms, that there was a gigantic cataclysm between the first and the second verses of the first chapter. The oft-quoted buttress text in Isaiah xlv, 18, just provides, in my opinion, an illustration of wresting the Scriptures apart. The whole statement in that verse should be quoted in full to obtain its real significance.

I am persuaded, however, that these are very minor points in comparison with the grand revelation contained in the first two chapters of Genesis. Taken as a whole it presents a stupendous problem to the scoffer and sceptic. Having in mind the many centuries that have elapsed since it first appeared before the eyes of men, remembering also how precisely it has anticipated the exact findings of modern science, we have every right to affirm that it could only have been produced by the finger of God ; that such a composition bears upon its surface the marks of a divine inspiration ; that it could only have emanated when at some far distant period holy men of old were moved to write as prompted by the inspiration of the Holy Ghost.

816TH ORDINARY GENERAL MEETING,
HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, FEBRUARY 21ST, 1938,
AT 4.30 P.M.

BRIG.-GEN. W. BAKER BROWN, C.B., IN THE CHAIR.

The Minutes of the previous meeting were read, confirmed and signed, and the HON. SECRETARY announced the election of Mrs. F. Moser as a Member.

The CHAIRMAN then called on Wing-Commander P. J. Wiseman, R.A.F., to read his paper entitled "The Significance of the 'Six Days' in Genesis I."

*THE SIGNIFICANCE OF THE "SIX DAYS" IN
GENESIS I.*

By WING-COMMANDER P. J. WISEMAN, R.A.F.

IS it possible after centuries of discussion to say anything new about the meaning of the "six days" which divides the narrative of Creation into six sections? I think it is. I shall propose for your consideration the evidence or the following explanation of these six days. *The phrase "and there was evening and there was morning day . . ."* has no reference to any act or process of creation but indicates the days on which the successive parts of the story of creation was revealed and recorded. Consideration is first given to the history, contents, and interpretation of the Mesopotamian Creation tablets. Next we review the theological interpretations of the "days." Thirdly, the structure of the Genesis narrative is examined, and in IV the Biblical and archæological evidence solves the problem.

I.

Nearly seventy years ago Mr. George Smith was deciphering some clay tablets in the British Museum when he noticed on one (K 36) a reference to "creation." Thereafter he concentrated his attention on searching for further tablets

which might throw light on the early narratives of the Book of Genesis. The clay literature at his disposal was immense; it consisted of nearly 20,000 tablets and fragments of tablets which had been discovered nearly twenty years before in the ruined library of Asurbanipal, at Nineveh, by Layard, Rassam, and Loftus. Although little more was found referring to "creation," several fragments relating to a "deluge" were deciphered. On December 3rd, 1872, Mr. Smith read before the Society of Biblical Archæology his translation of these tablets; Col. Sir Henry Rawlinson, who had been the first to recognise the value of several of the larger fragments, presided. The place was crowded with archæologists, theologians and other scholars, including the Prime Minister. This distinguished company is described as "listening breathlessly" while the able archæologist detailed the finding and deciphering of the early Babylonian Legends.

The paper read that day became famous and was enthusiastically discussed in Europe and America. It produced a confident expectation that further archæological research would reveal the source from which the Genesis narratives had been derived, or at least show that the Babylonians had similar accounts. Consequently, a sum of money was placed at his disposal by the *Daily Telegraph* so that he could himself go to Assyria in search of the missing parts of the "Genesis narratives." Some fragments of the Deluge account were soon discovered in the same ruined library at Kouyunjik. Smith thus describes the finding of a piece of a "Creation tablet." "My next discovery here was a fragment evidently belonging to the creation of the world; this was the upper corner of the tablet, and gave a fragmentary account of the creation of animals. Further on in this trench I discovered two other portions of this legend, one giving the Creation and fall of man; the other having part of the war between the gods and evil spirits. At that time I did not recognise the importance of these fragments, excepting the one with the account of the creation of animals, and, as I had immediately afterwards to return to England, I made no further discoveries in this direction." When two years later he summarised the results of his efforts to discover the Assyrian account of Creation, he wrote: "the tablets composing it are in mutilated condition, and too fragmentary to enable a single tablet to be completed, or to give more than a general view of the whole subject. The story as far as I can judge from the fragment

agrees generally with the account of Creation in the Book of Genesis, but shows traces of having originally included very much more matter. The fragments of the story which I have arranged are as follows :—

“ 1. Part of the first tablet, giving an account of the Chaos and the generation of the gods.

“ 2. Fragment of subsequent tablet, perhaps the second, on the foundation of the deep.

“ 3. Fragment of tablet placed here with great doubt, probably referring to the creation of land.

“ 4. Part of the fifth tablet, giving the creation of the heavenly bodies.

“ 5. Fragment of seventh ? tablet, giving the creation of land animals.

“ 6. Fragments of three tablets on the creation and fall of man.

“ 7. Fragments of tablets relating to the war between the gods and evil spirits.” (*Chaldean Account of Genesis*, pp. 7 and 62.)

I have cited this great Assyriologist, who first occupied himself with the Genesis narrative, in order that we may see the origin of the expectation that a parallel account to that in Genesis i would be recovered from the soil of Mesopotamia. Notwithstanding the fact that for sixty years numerous scholars have been unremitting in their search, that expectation has never been realised. On the contrary, as more and more of the missing parts have been recovered, the greater has been the chasm between the Babylonian and Genesis records.

Subsequent researches have gradually filled in the blanks in the Babylonian story. In 1888, Dr. Sayce translated tablet No. 93016, and in 1890, Dr. Jensen, of Marburg, published an up-to-date text in his *Die Kosmologie der Babylonier*. Five years later Dr. Zimmern gave a still more complete translation in Gunkel's *Schöpfung und Chaos*. Dr. King added twice as much material to that hitherto published, when, in 1902, he issued his *Seven Tablets of Creation*. Up to that time only a few lines of the sixth tablet had been recovered, but so long as parts were missing the hope remained that, when found, the tablets would contain matter similar to that in the Creation narratives of Genesis. This prevailing view may be seen, for instance, in Dr. Ryle's *The Early Narratives of Genesis*, p. 18 : “ The sixth tablet which

has not yet been found must have recorded the formation of the earth and the creation of the vegetable world, of birds and fishes."

The search for the missing fragments continued during the earlier part of this century. In 1899, the Deutsche Orient-Gesellschaft commenced the immense task of thoroughly excavating the city of Babylon, but nothing was discovered there which added materially to our knowledge of the Babylonian story of the Creation. However, the German excavators at the old capital of Assyria, Ashur (Kalah Sherghat), were in this respect more successful, for they found some copies of the Creation series, including the long-missing sixth tablet. These new Assyrian texts were published in 1919 by Dr. Erich Ebeling in *Keilschrifttexte aus Assur religiösen Inhalts*; but the newly discovered sixth tablet did not contain any of the matter which Dr. Ryle said it "must have recorded."

Over sixty tablets and fragments have been recovered and, except for the astronomical poem (tablet V), the "Creation" series is now sufficiently complete to make a full comparison with Genesis i. The two accounts are as follows:—

Bible.	Creation tablets.
1. Light.	1. Birth of the gods, their rebellion and threatened destruction.
2. Heaven.	2. Tiamat prepares for battle, Marduk agrees to fight her.
3. Earth, Vegetation.	3. The gods are summoned and wail bitterly at their threatened destruction.
4. Sun and Moon (Regulating lights).	4. Marduk promoted to rank of "god"; he receives his weapons for the fight, these are described at length, defeats Tiamat, splits her in half like a fish and thus constructs heaven.
5. Sea and winged creatures, sea monsters.	5. Astronomical poem (only 22 complete lines).
6. Land animals, creeping things, man.	6. Kingu who made Tiamat rebel is bound, and as a punishment his arteries are severed and man created from his blood. The 600 gods are grouped; Marduk builds Babylon where all the gods assemble.

I submit that a comparison of the two accounts shows clearly that the Bible owes nothing whatever to the Babylonian account. Perhaps it is not surprising to find that as the various fragments were discovered, pieced together, and deciphered that the newer knowledge of the actual contents of these tablets did not overtake the old false conjectures and expectations. At first many archæologists agreed with Smith that the origin of the Bible narrative was the Babylonian Legend ; but when these archæologists were in possession of the facts, they made it quite plain that the Genesis account was not derived from the Babylonian. Thus we find in *The Babylonian Legends of the Creation and the Fight between Bel and the Dragon*, issued officially by the Trustees of the British Museum, that "the fundamental conceptions of the Babylonian and Hebrew accounts are essentially different." Sir Ernest Budge said : "It must be pointed out that there is no evidence at all that the two accounts of the Creation, which are given in the early chapters of Genesis, are derived from the seven tablets." (*Babylonian Life and History*, p. 85.) It is more than a pity that theologians, instead of keeping abreast of modern archæological research, continued to repeat the old disproved theory of Hebrew "borrowings." For instance, we find the following paragraph even in the late editions of Dr. Driver's *Genesis* (p. 27) : "The more immediate source of the Biblical cosmogony, however, there can be little doubt, has been brought to light recently from Babylonia. Between 1872 and 1876 that skilful collector and decipherer of cuneiform records, the late Mr. George Smith, published, partly from tablets found by him in the British Museum, partly from those he had discovered himself in Assyria, a number of inscriptions containing, as he quickly perceived, a Babylonian account of Creation. Since that date other tablets have come to light ; and though the series relating to the Creation is still incomplete, enough remains not only to exhibit clearly the general scheme of the cosmogony, but also to make it evident that the cosmogony of the Bible is dependent upon it." The newer information we now possess emphatically contradicts Dr. Driver's final statement, and I submit that there was no evidence whatever to support it when it was made. But this theory, rejected by archæologists, remains a popular impression to this day, as may be seen from the report just issued on "Doctrine in the Church of England," where it is stated (p. 44) that "it is generally agreed among educated Christians that these (Gen. i and ii) are mythological in origin."

In order that we may test this widespread assumption that the Genesis record is based on the mythological Babylonian accounts, I select from nearly 800 lines of crude polytheistic and mythological matter, *those lines which most closely resemble* Genesis i. I use Dr. Langdon's translation. (*Epic of Creation.*)

Line.

Tablet I.

1. When on high the heavens were not named,
 2. And beneath a home bore no name,
 3. And Apsu primeval, their engenderer,
 4. And the "Form," Tiamat, the bearer of all of them,
 5. There mingled their waters together ;
 6. Dark chambers were not constructed, and marshlands were not seen,
 7. And they were not named, and fates were not fixed,
 9. Then were created the gods in the midst thereof ;
 81. In the midst of the nether sea was born Asur,
 95. Four were his eyes, four were his ears,
 132. Mother Huber the designer of all things,
 133. Added thereto weapons which are not withstood ; she gave birth to the monsters.
 135. With poison like blood she filled their bodies,
- Colophon.—First tablet of "when on high" according to its original it was written.

Tablet II.

Colophon of K 292.—Second tablet of "when on high," etc.

Tablet IV.

128. Unto Tiamat whom he had bound he returned again.
 129. The lord trod upon her hinder part.
 130. With his toothed sickle he split her scalp.
 131. He severed the arteries of her blood.
 132. The north wing carried it away into hidden places.
 133. His fathers saw and were glad shouting for joy,
 134. Gifts and presents they caused to be brought to him,
 135. The lord rested beholding the cadaver,
 136. As he divided the monster, devising cunning things.
 137. He split her into two parts like a closed fish.
 138. Half of her he set up and made the heavens as a covering.
 139. He slid the bolt and caused watchmen to be stationed.
 140. He directed them not to let her waters come forth.
- Colophon.—Tablet IV, "when on high," not finished.

Tablet. V.

Colophon on K 3567—Fifth tablet of “when on high.”

Tablet VI.

1. When Marduk heard the words of the gods, his heart prompted him as he devised clever things.
2. He opened his mouth speaking unto Ea, that which he conceived in his heart, giving him counsel.
3. Blood will I construct, bone will I cause to be.
4. Verily I will cause Lilu (man) to stand forth, verily his name is man.
5. I will create Lilu, man.
6. Verily let the cult services of the gods be imposed, and let them be pacified.
7. I will moreover skilfully contrive the ways of the gods.
8. All together let them be honoured and may they be divided into two parts.
9. Ea replied to him, speaking to him a word.
10. For the pacification of the gods he imparted to him a plan.
11. Let one of their brothers be given. He shall perish and men be fashioned.
12. Let the great gods assemble. Let this one be given and as for them may they be sure of it,
13. Marduk assembled the great gods,
23. It was Kingu that made war ;
24. That caused Tiamat to revolt and joined battle.
25. They bound him and brought him before Ea. Punishment they imposed upon him, they severed the arteries of his blood.
26. With his blood he (Ea) made mankind. In the cult service of the gods, and he set the gods free.
27. After Ea had created mankind and (?) had imposed the cult service of the gods upon him.

Colophon.—Sixth tablet of “when on high.”

I submit that the continued propagation of these legends as the source from which the Genesis narrative is derived is entirely unjustifiable. Surely it is not reasonable to imagine that these crude accounts of gods and goddesses plotting war among themselves, smashing skulls, getting drunk, etc., as the basis of the first chapter of the Bible. From the fragment which Smith had discovered he imagined that it referred to the creation of animals;

now we know the animals were the "monsters" created in order to fight Tiamat. The old theory of the supposed similarities between the Bible and Babylonian tablets was founded on the "expectation" that discoveries would prove it true; excavation has proved it false.

Neither is there any evidence for the assertion that the Genesis record is the old Sumerian or Babylonian account stripped of all its mythical and legendary elements. It must be obvious that if this "stripping" had taken place there would be nothing left from which to construct a narrative.

Until recent years it was thought that the account was written on seven tablets; but the more recent discoveries have clearly shown that this was not the case. In his *Semitic Mythology* (p. 289), Dr. Langdon states: "The Babylonian Epic of Creation was written in six books or tablets, with a late appendix added as the seventh book, as a commentary on the fifty sacred Sumerian titles of Marduk. No copies of the Babylonian text exist earlier than the age of Nebuchadnezzar. The epic had immense vogue in Assyria, where the national god Ashur replaced Marduk's name in most of the copies, and it is from the city of Ashur that all the earliest known texts are derived. These are at least three centuries earlier than any surviving southern copy. Since traces of the influence of the epic are found in the Babylonian iconography as early as the sixteenth century, it is assumed that the work was composed in the period of Babylon's great literary writers of the first dynasty." Smith and others had conjectured that the Assyrian tablets had been copied from Babylonian sources. The finding of tablet 45528 proved this, for the colophon read:—

"First tablet of *Enuma elis* (when on high) taken from . . .
A copy from Babylon according to its original it was written."

The closest resemblance, and certainly the most significant one, is that throughout a period of 1,500 years, which is as far back as can at present be traced, the Babylonians always recorded the "Creation" series on six tablets. Although there is this agreement in the number six, it is quite evident that the division of the record of Creation in Genesis into six days cannot be traced back to Babylonian sources. Long ago Schrader wrote in his *Cuneiform Inscriptions and the Old Testament*, vol. i, p. 15: "Neither the cuneiform Creation story nor that of Berossus gives any hint that the Babylonians regarded the creation of the universe as taking place in seven days."

II

Theological literature concerning the Creation narratives is immense. Only restricted references can be made to the interpretations of the six days. It is very noticeable that before any expositor can explain the chapter he must first determine the meaning of the "days"; and not a small part of the literature on the subject is occupied with attempts to account for them. The efforts to solve the meaning of these six days have been numerous, and I suggest, not very successful—the days are explained away rather than explained. A clear statement of the problems with which expositors are confronted, and of the explanations which are current among those who accept the narrative as historical, may be cited from Anstey's *Romance of Bible Chronology*, p. 63: "The length of time described by the Hebrew word *Yom*—day, as used in this chapter, cannot be definitely determined. The word itself is frequently used to express a long period, an entire Era. The time occupied by the whole process of the six days' work is referred to in Genesis ii, 4, as the day that the Lord God made the heavens and the earth. The use of the expression "and evening came and morning came day one" (Gen. i, 5; repeated Gen. i, 8, 13, 19, 23, 31) seems to suggest a literal day as measured by the revolution of the earth on its axis, but it cannot be said to be proved that the writer is not here using the words "evening and morning" in a figurative sense, for the commencement and the completion of whatever period he intended to mark by his use of the word "day." In the same verse (Gen. i, 5) the word "day" is used to mark a still briefer period, viz., that portion of the day when it is light.

"The attempt to parcel out the six days' work into the six geological Eras, to which they somewhat roughly, but by no means accurately, correspond, cannot be regarded as a satisfactory explanation of the writer's intention and meaning. There may be certain analogies between the order of Creation as described in the first chapter of Genesis, and the order of the formation of the various strata of the crust of the earth as read by the geologist, and in the order of the occurrence of the fossil remains which are found embedded in the stratified layers of the earth's crust, for God's works are all of a piece; but there are also great and manifest divergencies, and these are so great and so manifest that the two series cannot be said to run absolutely parallel with each other, or to perfectly correspond. The natural

interpretation of the narrative, to one who recognises the greatness of the power of God, is that which understands the chapter as a record of the creation of the world in six literal days; but it cannot be denied that the word "day" may have been used by the writer in a figurative sense, and intended by him to indicate a more extended period corresponding to a geological Era of time.

"The creation of Adam took place on the sixth day after the creation of light. Whether this sixth day is to be interpreted as the sixth literal day, as measured by the space of time required for the revolution of the earth upon its own axis, or as a sixth geological Era, must remain uncertain, as there is nothing in the Hebrew text to decide between the more precise and the more extended connotation of the term."

From this it will be seen, that among those who regard the narrative as historical there are two main systems of interpretation. The first is the theory that verse one refers to a completed creation, which (in verse 2) became a desolation; while the remaining part of the chapter is stated to be a record of a re-creation or restoration in six actual days of twenty-four hours each. The second explanation is that the days are long periods of geological time. A writer who holds the first view states that as a result of the ruin referred to in verse 2 "the earth became inundated with the ocean waters, its sun had been extinguished; the stars were no longer seen above it . . . there was not a living being to be found in the whole earth"; he then suggests that a glacial age succeeded. Of the remaining part of the narrative he states: "It is therefore clear that we must understand the six days to be six periods of twenty-four hours each . . . these days are mentioned as comprising an evening and a morning." It is usual for those who adopt this point of view to grant the long period required by geologists for the existence of fossil remains, by placing this as having occurred in a previous creation, which they suggest is implied by verses 1 and 2.

On the other hand, those who hold that the narrative is continuous, without a chasm in verse 2, allot a "day" to each period of geological time. Such an able geologist as Sir J. W. Dawson felt it quite legitimate to give the days this interpretation.

III.

While it is obvious that the above-mentioned theories discredit each other, they do not discredit the text of the

narrative itself. In this instance I submit that there is a clear distinction between what men have said about scripture and what scripture says. This first narrative is written in a most exceptional and remarkable manner. It has a unique framework of repeated phrases; each of the six sections commencing and ending alike, except that the days are numbered one to six. This framework is constructed as follows:—

1. v. 3. God said . . . let there be . . . and there was . . .
4. „ saw . . . that it was good.
- „ divided between . . .
5. „ called . . .
- And there was evening and there was morning
day one.
2. v. 6. God said . . . let there be . . .
7. „ made . . .
- „ divided between (Sept:) . . . and it was so.
8. „ called
- „ saw that it was good (Sept:)
- And there was evening and there was morning
day second.
3. v. 9. God said let . . . let . . . and it was so.
10. „ called . . .
- „ saw that it was good.
11. „ said . . . let . . . and it was so.
12. „ saw that it was good.
13. And there was evening and there was morning
day third.
4. 14 God said, let there be . . . let . . . let . . . and
it was so.
16. „ made . . .
17. „ set . . .
18. „ saw that it was good.
19. And there was evening and there was morning
day fourth.
5. 20. God said let . . . and it was so (Sept.).
21. „ created . . .
- „ saw that it was good.
22. „ blessed . . .
23. And there was evening and there was morning
day fifth.

6. 24. God said let . . . and it was so.
 25. „ made . . .
 „ blessed . . .
 „ saw that it was good.
 26. „ said let . . . let
 27. God created . . .
 28. „ blessed . . .
 „ said . . .
 31. „ saw that it was very good.
 And there was evening and there was morning
 day the sixth.

Apart from the repetition of these phrases, the words used are few and simple ; but they are important, for they give the order in which the creative events were *revealed*. While the complete narrative extends from chapter i, 1, to chapter ii, 4, this special framework is confined to vv. 3-31. The first two verses are evidently a superscription, and the last four (chapter ii, 1-4) are a subscription or colophon. Even so, I cannot accept the view that verse 1 refers to a creation earlier than the one described in the remaining verses of the chapter. I suggest that no one would have read so much into verse 2 had there not been a need to find an explanation of the "six days."

It is therefore apparent that the mode of explaining the "days" dominates the exegesis of the record. Whatever meaning the word "day" may have elsewhere in the narrative, or in scripture, surely the phrase "and there was evening and there was morning day one," etc., must refer to an ordinary day of twenty-four hours. Although the Hebrew words translated "evening" and "morning" are doubtless a translation from an older language, there can be little doubt that the words used are intended to indicate a normal day. For בֹּקֶר is used for "morning" and עֶרֶב for "evening." Words with a wider meaning, חֹשֶׁךְ "darkness" and אֹר "light," are not used. It is apparent from the narrative itself that the creations mentioned in the first three sections are not stated to have been accomplished in three days of twenty-four hours each ; for in the fourth section it expressly states that the appearance of light from the sun and moon was "for seasons and for days and years." It was not until then that the solar system made a natural "evening and morning" possible. Neither did the writer, by dividing the account up into six sections by the use of the phrase "and there was evening and there was morning . . .," intend

to imply that the preceding acts of creation had occupied an evening and a morning. To those acquainted with ancient literary methods, there is no suggestion, for instance, that within the same twenty-four hours the earth which was covered by the sea made its appearance, the grass, and the fruit tree yielding fruit after its kind, which God saw was good, was immediately fully grown, so that three days later cattle eat the grass and man the fruit.

Those who adopt the alternative view that the six days represent geological ages are likewise confronted with overwhelming difficulties of interpretation, as may be seen from the following extract from *Essays and Reviews* :—

“ It is evident that the bare theory that a day means an age or immense geological period might be made to yield strange results. What becomes of the evening and morning of which each day is said to have consisted ? Was each geologic age divided into two long intervals, one all darkness, the other all light ? And if so, what became of the plants and trees created in the third day or period, when the evening of the fourth day—the evenings be it observed, precede the mornings—set in ? They must have passed through half a seculum of total darkness, not even cheered by that dim light which the sun, not yet completely manifested, supplied on the morning of the third day. Such an ordeal would have completely destroyed the whole vegetable creation, and yet we find that it survived, and was appointed on the sixth day as the food of man and animals. In fact, we need only substitute the word period for day in the Mosaic narrative to make it very apparent that the writer at least had no such meaning, nor could he have conveyed any such meaning to those who first heard his account read.”

When we examine the record itself the difficulties seem to vanish, for nowhere does it state that any creative act or process took place either before or after the use of the phrase “ and there was evening and there was morning.” These words are not exegetical of that which has been recorded previously. Neither the “ geological period theory,” nor the theory of a restoration in six days of twenty-four hours each, explains the use of the mornings and evenings.

Still another explanation — the vision theory — has been adopted to explain the “ days.” It is said that the narrator

had visions of each stage of the Creation on each of the six days. This explanation at least has the merit that it does not involve the use of the phrase "evening and morning" to indicate a long geological period. But can it be sustained? I think not. Because one significant thing about this first narrative is that all the marks of a vision are absent. We do not read "I heard," "I saw," etc. On the contrary, *the whole account looks at Creation from God's point of view and not man's*; we read "God saw," "God called," "God said." The difference between a normal narrative and a vision may be seen when we compare this record with such a passage as Jeremiah iv, 23-24, which has been used in order to illustrate verse 2. "And I beheld the earth, and, lo, it was without form and void; and the heavens, they had no light. I beheld the mountains, and, lo, they trembled, and all the hills moved lightly. And I beheld, and, lo, there was no man, and all the birds of the heavens were fled." It is also said that the earlier chapters of the Bible are like the last chapters. They are, but with this significant difference, the one is a narrative, the other a vision. A comparison shows the difference of style. John says: "I saw a new heaven and a new earth, for the first heaven and the first earth were passed away and I heard a voice out of heaven saying . . ." Such phrases as, "I turned to see," "after this I looked and lo," the constantly repeated "I saw," are entirely absent from the Genesis account. Instead, we find "God saw," etc. Dr. Driver (*Genesis*, p. 23) stated: "the narrative contains no indication of its being the relation of a vision (which in other cases is regularly noted, *e.g.*, Am. vii-ix; Is. vi.; Ez. i, etc.); it purports to describe not appearances ('And I saw and behold . . .'), but facts ('Let the earth . . . And it was so'), and to substitute the one for the other is consequently illegitimate." I entirely agree with his statement that "it purports to describe not appearances but facts." But Dr. Driver has his own solution of these "days." It is given on p. 35 of *Genesis*. "Gen. ii, 1-3, it will be observed, does not name the sabbath, or lay down any law for its observance for man: all that it says is that God 'desisted' on the seventh day from His work, and that He 'blessed' and 'hallowed' the day. It is, however, impossible to doubt that the introduction of the seventh day is simply part of the writer's representation, and that the sanctity is in reality ante-dated: instead, *viz.*, of the seventh day of the week being sacred, *because* God desisted on it from His six days' work of creation, the work of creation was

distributed among the six days, followed by a day of rest, *because* the week, ended by the sabbath, existed already as an institution, and the writer wished to adjust artificially the work of creation to it. In other words, the week, ended by the sabbath, determined the 'days' of creation, not the days of creation the week." Of course, this is exactly the opposite to that which the writer of Genesis i says: but Dr. Driver wishes to make some unknown writer responsible for this alleged artificial attempt to ante-date the sabbath. In that case would such a writer omit the word sabbath?

Some years ago when it was the practice to seek the origin of all Scripture institutions in Babylonian beliefs and practices, it was asserted that the Hebrew sabbath had been borrowed from them. This assertion was made because a British Museum lexicographical tablet (K. 4397, in *Cuneiform Texts from Babylonian Tablets*, etc., in the British Museum, Part XVIII, pl. 23, 17), contained the following equation:—

ûm-nûh libbi shabattum

and the literal translation of "shabattum" is "Day of the rest of the heart." It was assumed at once by many that this was a definite indication that the sabbath was of Babylonian origin. But Dr. Pinches subsequently found a tablet giving the Sumerian and Babylonian names for the days of the month. It was then found that "shabatti" was the Babylonian name for the fifteenth day of the month, not the seventh. It was known that the Babylonians observed the seventh, fourteenth, fifteenth, nineteenth, twenty-first and twenty-eighth days of the month. However, the fifteenth day, so far from being a "sabbath," was regarded as an evil, unlucky, or inauspicious day. It is now abundantly clear that the seventh or "hallowed" day referred to at the end of the Creation narrative in Genesis had nothing to do with the Babylonian "evil" day, and that the sabbath did not originate in Babylon.

The concluding words of the narrative states that God did something for six days and "desisted" on the seventh, therefore "hallowing" it. What does Genesis say that God did on these six days? and what did He cease doing on the seventh? I submit that the solution of this problem is to be found in the first four verses of Genesis ii. The actual account of the Creation is complete when, at the end of the first chapter, we read "and there was evening and there was morning day six." The ap-

pendix to the account reads: "And were finished the heaven and the earth and their host." *The fundamental mistake which has been made, is the assumption that this sentence states that God finished the work of creating the heaven and the earth in six days.* The next sentence does say that God finished something after the sixth day, for it tells that "God finished on the seventh day His work which He had made," or, as Dr. Driver renders it, "And God finished His business which He had done." The use of the word "finished" at the end of Babylonian tablets is not uncommon. An instance may be seen in Dr. Langdon's *Sumerian and Babylonian Psalms*, where he reproduces a series of liturgical tablets. These are often composed in sets of six. The last tablet of one series reads: "Tablet six of the goddess of . . . which is finished." This liturgical composition was written on a series of six tablets, and this note about finishing on the colophon to the sixth tablet indicates that the series of tablets was finished or completed. Another instance of this may be seen on the colophon of Tablet IV (No. 93015) which reads: "Tablet IV of Enuma Elis not finished." Thus the scribe indicates that there are further tablets to complete the series; this latter tablet is one of the Creation series which was completed in six tablets. I submit, therefore, that this Babylonian literary usage throws light on the meaning of this "finishing" in six days. *It indicates that what was finished was the recording of the narrative, and this is precisely what the Septuagint version of chapter ii, verse 4, states.*

It has been assumed that the reference in chapter ii, 1 and 2, to "finishing" of the work refers to the acts or process of creation. The Bible statement is simply "And the heavens and the earth were finished." It does not say that God finished creating the universe on the sixth day, as is so constantly assumed. Expositors have found difficulty with the wording of the final sentence of verse 3, which the A.V. has translated "which God had created and made." But it will be seen from the margin of the R.V. that the correct translation is "created to make." God "finished" the revelation He had made and "desisted" (translated "rested" in the A.V.) on the seventh day. Attempts have been made to interpret this "seventh" day as continuing until the present. But as it expressly states that God "hallowed" the seventh day, and Exodus, ch. xx, referring to this seventh day in connection with Creation, relates it to the sabbath, I suggest that we are not justified in giving the seventh day an unnatural interpretation. So on the seventh day—a day as normal as the other six—God

ceased from doing something He had done on the previous six literal days. Thus the narrative is separated into six sections by its statement "and there was evening and there was morning day one," second, etc., according to the events which were revealed and recorded on each of those six days. The numbering of the days would indicate that the original record was written on six tablets on six days. I suggest that this is the reason why the Assyrians and Babylonians clung so tenaciously throughout the centuries of their history to this particular number of tablets on which to record their Creation story.

The "finishing" was the completion of the revelation, it was recorded stage by stage on each of the six days. Throughout the Bible we have instances of God speaking to man, but in the whole of Scripture we find nothing comparable with the statements made in these early narratives, where we are told that God was in direct communication with man. I have shown elsewhere* that these narratives in Genesis bear all the marks of being written contemporaneously, even in the earliest times. This first narrative contains evidences of extreme antiquity; it is remarkable in that it has nothing nationalistic or local in it. It would seem that it was written before myths and legends had corrupted the knowledge of the One God, and the order of His creation. Moreover, we have noticed that the record is given from God's point of view, not man's. It is a universal account containing things which no scribe would ever have thought of inserting. It is not a conceived account but a received record.

Dr. Langdon has said that "There is no evidence in the extensive Sumerian literature that they had any considered theory of the creation of the world" (*Semitic Mythology*, p. 277). Yet there are many references to the manner in which original things were revealed. Thus Berossus represents Oannes teaching Alorus, the first ruler, "By day he companied with men . . . but when the sun went down he sank again into the sea, and tarried by night in the ocean." Though such Babylonian ideas as these are crude, they moulded their beliefs. As Mr. Gadd states in his *History and Monuments of Ur*: "Of this story as to the origin of culture no version has yet been discovered in the native literature, but it would be no very hazardous opinion if this were ascribed to chance only. For not only is it very evident that Berossus disposed of excellent material at present unrecovered,

* *New Discoveries in Babylonia about Genesis.*

but the story itself is so characteristic of the Babylonian outlook that it could not be a late fiction."

In the epilogue to the seventh tablet of the *Enuma Elis* (Creation) series, we read: "Verily the First One (Mahru) taught them." In his *Old Testament in the Light of the Ancient East*, vol. i, p. 51, Dr. Jeremias, referring to the tablets of Destiny, repeatedly mentioned in this Creation series, says that these tablets "are a concrete representation of the idea of revelation."

Until recent years the theory which gained considerable acceptance, and which underlies so much of the criticism of the Genesis narratives, was that man's first religious beliefs were animistic, that gradually he struggled through polytheism to a pure faith in God. So far from this assumption being proved, the reverse has been found to be true. The early narratives of Genesis imply that man, though created from the "dust of the earth," was a unique creation, "God breathed into his nostrils the breath of life and man became a living soul." Or, as we read in Matthew i, "Adam which was the son of God." He possesses an intellect, is represented as using language to name the things he saw about him. He is the Crown of Creation. No doubt the language he used was simple; it would be as simple as early pictographic writing.

The concluding words of this first narrative expressly claims that it is a written record. The Septuagint version reads: "This is the book (lit. record) of the generations of the heaven and the earth." Psalm cxiv, 160, says: "The beginning of Thy word is true."

DISCUSSION.

The CHAIRMAN (Brig.-Gen. W. BAKER BROWN, C.B.) said: The subject of this lecture as originally advertised was "Genesis and Archæology," the lecture as delivered is called "The Significance of the Six Days in Genesis i," and this has a much more limited scope.

The first part of the lecture is devoted to rebutting the suggestion that the story as told in Genesis is a development or summary of an account of the Creation, which has been handed down from an early period through Sumerian and Babylonian traditions. He seems to have made this point on which I would only comment that he is merely proving a negative. The fact that this theory of development may be wrong does not contribute anything towards

the correct appreciation of the account as handed down to us. The lecturer then goes on to what is an analysis of the words used in the latest translation of our English Bible, following much the same ground as our lecturer of a fortnight ago. Into the details of this I am afraid I cannot follow him, though I hope some of the experts here this evening will join in the discussion.

I should, however, like to add a few remarks not from the technical aspect, but as a representative of the large number of people known as "The Man in the Street," many of whom, like myself, have been too busy with practical work (in my case in many parts of the world) to study the exact meaning of Hebrew words. To satisfy us it is necessary not only to give a clear explanation of the meaning of the words used in Genesis, but to reconcile these words with the facts which have been established by the evolution of science and the labours of explorers and great thinkers.

I will only refer briefly in illustration to three branches. First archaeology, or the investigation of ancient remains, many of which are buried beneath the surface of the earth, has helped enormously in the understanding of the Bible record and in the identification of places and people mentioned in Genesis and Exodus. Of the facts so revealed in recent years, the most striking is perhaps the dating of the fall of Jericho. Is it too much to hope that further search may reveal some record of the Exodus, perhaps in the form of a tablet from a high official in Egypt to the governor of a town in Palestine, warning him of the escape from Egypt of a turbulent tribe of serfs and slaves under a leader named Moses. But while we accept such confirmation of the narrative, we must also recognise that the same methods of research have revealed the existence in many parts of the earth before the earliest days of Babylon of groups of men or manlike beings with many of the attributes of man. This fact must be taken into account in explaining the Bible story.

Or take geology. This has confirmed the Bible story in a remarkable way as regards the order of the creation, the gradually drying up of a wet and formless earth and the successive appearance of fish, reptiles, birds, animals and man. But against this we must put the facts of the great periods of time which must have been required for each geological epoch.

Finally take astronomy. This is an older science. It confirms in a remarkable way the statement that the earth was formed from

chaos, but the fact that the sun and not the earth was the centre of our universe was apparently quite unknown or suspected by the ancient writers and obliges us to reconsider many of their statements. We know for a practical certainty that the sun was created long before the earth, and the statement in Genesis i, 14, that "God made the two great lights" cannot refer to an act of creation but only to the sun and moon becoming visible on the earth. Our lecturer of a fortnight ago read this verse in the same way, but in explaining the first act of Creation in Genesis i, 3, he said that he could not say where the light came from. The simple explanation is that as the sun was there all the time, the gradual drying up of the earth was due to its influence.

These, however, are all points which will be familiar to you and for which we have got to find a solution. That such a solution exists is certain; whether in this life we shall arrive at the whole truth is much less certain. When it comes it will not be by revelation, but by the accumulation of the actions of many individuals in many different fields, and in that spirit I personally welcome the lecture we have heard this evening.

Rev. ARTHUR W. PAYNE warmly thanked Commander Wiseman for his most valuable paper, recognising that his acquaintance with Mesopotamia, viz., the scene of the Garden of Eden, the Flood, the call to Abraham, gave him special advantages to deal with its particular topic.

He (the speaker) asked himself three questions with regard to the question of a 24-hour six day, viz., creation as has been suggested, as being stated in this first chapter of Genesis:—

- 1st. *Could* Almighty GOD do this ?
- 2nd. *Did* Almighty GOD do it ?
- 3rd. *Will* Almighty GOD do it again ?

There was no doubt about the answer to the first query.

The reply to the second seems to be clear in reading carefully the Hebrew, Isaiah xlv, 18, that after the first Creation, of verse 1, Genesis i, there was a re-formation after a fall, or a catastrophe—a *replenishing* (v. 28), as Jehovah distinctly says He did not create it. *Tohu*, though it became (Genesis i, 2) *Tohu* and *Bohu*.

The fact of the *Erev* and *Boker*, the evening and the morning, being repeated six times, and the mention of numerals one to six days, seemed clear proof that it was not a question of a long period, viz., 1,000 years for the day and night, for that would surely mean what was created in the first 500 years of light would be destroyed in the next 500 years of darkness.

The fact of failure that had come in through Satan was indicated in Isaiah xiv, and Ezekiel xxviii, and the possibility of such a creation in so short a space of time was seen in the regeneration by the Holy Spirit of the individual soul when it became a new creation, or the new birth, and also in the marvellous change that will take place, in the beginning of the Millennial Day in Palestine and the whole world, in a very short period of time. Creation (that we were dealing with, in this opening chapter of Holy Writ) is a matter of Divine Revelation and not of human speculation or philosophic subjective conjecture and discovery.

Mr. WM. C. EDWARDS said: I have greatly enjoyed this lecture. Laymen free from the forms and rules of the Schoolmen—which were produced in the gloomy cells of monasteries—seem able in a few words to explain, as Commander Wiseman has done, the results of years of patient investigations in the simplest terms. I wonder what we can do to get these “over” to the misleading leaders of the Modernistic clergy. Some years ago I took exception to a sermon of a leading Modernist and wrote offering to send to him the book that proved him wrong. He replied somewhat as follows: “I have read all I want to read and my mind is made up on the subject.” He, not so long after, appeared as the co-respondent in a case and for me he seems a solemn warning of I Cor. ix, 27. Some years ago I saw some of these tablets in Berlin, as well as our own Museum, and it is a matter of supreme amazement how any reasonable person can pretend to see in them any likeness to the sublime Creation-chapters of our Holy Bible. I could as well believe that my nursery rhymes or the street ballads like “Simple Simon” or “Mother Hubbard” could be the source of the sublimities of Milton and his *Paradise Lost*. Under what condition did the early chapters of the Holy Bible appear? When the Children of Israel came out of Egypt they were a mixed multitude of ex-slaves and few, if any,

could read or write. We know by the study of the so-called Egyptian *Books of the Dead* that those who wrote them could not read what they copied. Forty years later, when the Children of Israel stood on the eastern bank of Jordan, Moses addresses them as a LITERATE people, for he bids them READ (Joshua i, 8); he commands that they WRITE these words on the doorposts of their houses, to bind them on their hands and make phylacteries of the same, and TEACH them to their children. When a husband would divorce his wife he was commanded to WRITE a bill of divorcement, thus enabling a virtuous woman to defend her honour in the courts of law. I think that it is certain that during these forty years' wanderings the people attended desert schools, no doubt taught by appointed teachers, probably Levites. But for such schools you need text-books and in Genesis I feel perfectly certain that you get such a text-book. INSPIRED by God to give the story of creation, the fall as well as the flood, and the history of the races (*e.g.*, Gen. x). Here we can see God's dealings with men in Judgment and Salvation. I would undertake with this one book of Genesis to educate, as Adams Christian did on Pitcairn Island, a people like those that were in the wilderness. I think that it is safe to affirm that this education continued in the Promised Land. In the Targums we are told the word NAIOTH (I Samuel xix, 18) is always rendered as "house of learning," and I make bold to suggest that in many places the Schools of the Prophets were such, and that all the cities of refuge had such schools for the priests, or any who would come for religious education to them.

The lecturer had some interesting things to say about the word FINISHED (Hebrew KALAH). It reminds me of the old books and MSS. that used to finish with the Latin word FINIS. The word occurs in several places, *e.g.*, Deut. xxxi, 30, and reminds one of the ending of the 2nd Book of Psalms, which closes with the words: "The prayers of David the son of Jesse are FINISHED" (Psalm lxxii, 20). But most of all, we may recall with solemn joy that they were in the last words of our atoning Lord and Saviour upon the cross (John xix, 30), when He triumphantly cried with a loud voice, "IT IS FINISHED."

Mr. H. W. BRYNING said: I have always been interested in the literature of the story of the Creation and cannot understand how

any critic could entertain the notion that the record may have been adapted from the pagan myths of Babylonia, rather than the reverse. Why not conclude that the polytheistic literature of legend originated after the Confusion of Tongues, when superstitious ignorance may have become widespread? For science admits that the evidence points to Monotheism as the original religion.

There is so much to be learnt from the concise and pithy statements which are of scientific interest in the narrative of Creation that it is difficult for any one exponent to perceive all their implications.

For example, I have heard the question put as a poser, Why is "*evening*" placed before "*morning*" in these texts? I have never heard a satisfactory reply, but on studying the subject I perceived the philosophy in the statement,

"And there was evening, and there was morning,"

which is significantly reiterated in closing the record of God's work for each of the six "days" or stages into which His revelation is divided.

Now, it is obvious from the narrative (v. 1 to 5) that the first day upon this planet began when its surface emerged from darkness and received the diffused light of the sun; and as the rays from a great distance (many millions of miles) may be regarded as parallel and tangential to the longitudes of the earth 180 degrees apart, there began to be an evening and a morning simultaneously, so that, as the earth rotates, there is always evening on the eastern "limb" of the lighted hemisphere, while there is morning to the part of the earth which emerges from its shadow. The words quoted above therefore describe accurately what happened after God said, "Let there be light."

It follows from this explanation that the hemisphere that received the light experienced its first evening as it passed into the earth's shadow before any part of it emerged into the light and saw the dawn of another day. To my mind this would suggest the reason for the order, "*evening morning*."

The logical conclusion is, therefore, that the reference to "*evening*" and "*morning*" has no bearing upon the "DAYS" in the narrative of Creation.

Mrs. MAUNDER said: I am sorry that you did not find room for the 5th tablet—the astronomical one—for on that one I can speak with some small measure of authority. I can give you limiting dates between which it must have been composed; it could not have been so early as 800 B.C., it must have been composed within a score (or so) years of 600 B.C.

Some four years ago I was asked to trace the origin of the symbols given to the sun, moon, and the five planets—such symbols as are figured on p. 786 of the *Nautical Almanac*. I need only refer here to three of them—Venus, Jupiter and Saturn. All seven had got essentially their present form by about the second century of our era. Venus was then shown as carrying a necklace—not a mirror as we are used to think her symbol means; Jupiter carried a sceptre, but as a pole with a knob on it was not distinctive, he was given the capital Greek letter Z, the initial letter of Zeus, and we use that Z, but with a vertical line across the lower bar. His Latin equivalent, Jupiter, carried a thunderbolt instead of a sceptre. The symbol for Saturn was a sickle or scythe. I tried to take these symbols further back. The necklace of Venus found its origin ultimately, I think, in the lapis lazuli necklace of the Lady of the Gods, Ishtar, as described in the Epic of Gilgamesh, lines 163–165. But in the bas-relief figured on p. 18 of the 1931 edition of the Babylonian legends of the Creation, issued by the British Museum, Marduk has appropriated to himself both the symbols of Jupiter and Saturn, and bears the thunderbolt, the sceptre, and the sickle. Also there is no doubt that "The Star of Marduk" is the *Planet* Jupiter, for it is written, "When he stands in the midst of the heavens he is Nibiru" (Thompson's Reports, No. 84); and "it divides the heavens and stands still; it is the star of Marduk, Nibiru" (Cuneiform Texts, Plate 2, l. 37). And finally, in the 5th tablet of the "Creation" it is written (1) He [Marduk] "formed the stations of the great Gods. (2) He set in heaven the constellations which are their likenesses. (3) He fixed the year, he appointed limits. (4) He set up for the twelve months three stars apiece. (5) According to the day of the year, he . . . figures. (6) He founded the station of Nibir to settle their boundaries. (7) That none might exceed or fall short."

It is just this that the planet Jupiter actually does, more or less precisely, and the word *Nibir* means "he who transits." In his twelve-year revolution round the sun, he spaces out about the

12th of the Zodiac in one year—that is to say, he covers one “*sign*” (not one *constellation*) of the Zodiac in a year, and when he is in opposition to the sun, he souths (or transits) at midnight. In other words, he divides the heavens equally. By his “stationary points” he divides that 12th of the Zodiac into 3 (almost equal) parts or “dekans.” Now this tablet must have been composed *after* the 12, real, unequal and irregular constellations had been replaced by the 12 imaginary, equal and regular signs.

In 1934, I wrote in the *Observatory Magazine*: “Even though this 5th tablet must have been written well within a century from the division of the Zodiac into signs and dekans, I think the Lord Marduk was taking to himself credit for more than he actually did do. He may have, perhaps, divided the 12 signs into 36 dekans, but he did *not* ‘fix the boundaries of the stations of Nibir.’” That great advance in astronomy had already been made in India.

Dr. J. K. Fotheringham asked me why I had used the B.M. version and not Professor Langdon’s, and seemed to challenge my interpretation of the tablet. I took the opportunity to ask him whether there was any difference in *the astronomical sense* in the two versions, and he acknowledged that there was none (which for me was all that mattered); he agreed, too, that if the tablet showed that a real phenomenon was described, then we ought to allow that it should be so interpreted.

As regards the meaning to be ascribed to “the evening and the morning were the — day” in the first chapter of Genesis, I think, speaking as an astronomer, we must accept it either as a “day of God,” in which case we can by no means define its meaning, or as a “day of man,” and take it practically. In this case we must consider what point on earth we take as a standpoint for observation; if at the equator, the day has 12 hours’ light and 12 hours’ darkness; as we go north or south, we come to a point where it has 6 months’ light and 6 months’ darkness.

Mr. L. E. JOSE said: This is one of the most momentous gatherings in the history of the Victoria Institute, and I think we need to be quite clear as to the exact suggestion which Wing-Commander Wiseman has put before us. I gather that it amounts to this.

That the Creation lasted over long ages, but that it was described to the author of Genesis i in a week of successive days of twenty-four hours each.

This seems a very reasonable view, having regard to the actual words of Genesis, where after each section of the story the words occur, "And there was Evening and there was Morning Day one" and so on with the following days. Very likely, days in which God talked with Adam in the Garden of Eden.

There is a lot of trouble in the world just now. It springs not so much (comparatively speaking) from the attacks of evil from outside as from the lack of true light from the Christian Churches. And this lack springs from unbelief. In dealing with this matter of the truth of Genesis i, the foundation of the Bible story, we are right at the heart of the matter. (Hence my opening remark.)

Just recently, a body of earnest freethinkers, earnestly seeking heavenly truth by the road of earthly wisdom, has issued a report of their conclusions. They have set us an example of lovable co-operation in pursuing their aim, but their ignorance of relevant facts and factors is very striking. There is great need for the Members and Associates of the Victoria Institute to bear witness to the truth by every good means in their power. By voice, by careful distribution of relevant reliable literature, and so on, to set their light upon a hill and not under a bushel. We need especially to get at the seats of education; at those who teach, at those who study. All this, of course, involves the expenditure of a little money. I hope we have all studied closely Wing-Commander Wiseman's book, *New Discoveries in Babylonia about Genesis*, and are making ourselves familiar with the whole subject. A great responsibility lies on us in these matters, and we need to be up and doing.

Writing at a date subsequent to the meeting, I should like to ask Wing-Commander Wiseman his view of the words in Exodus xx, 11, beginning "For in six days the Lord made heaven and earth."

Mr. SIDNEY COLLETT proposed that a very hearty vote of thanks be accorded Brig.-Gen. W. Baker-Brown, C.B., for so kindly giving up his valuable time and presiding at this meeting. Mr. Collett then added the following remarks:—

I have also much appreciated Wing-Commander Wiseman's paper, as it presents very clearly the two views, viz., the "period" and the "24-hour day" theory of the first chapter of Genesis. Now I suggest that the key to the true interpretation of this subject is found in the two words "created" and "made"; and if the way in which those words are used were carefully noted, much confusion would be avoided. In Gen. i, 1, we read: "In the beginning God 'created' the Heaven and the earth." When that "beginning" was, no man knows. But there our geologists may have as many millions of years as they like. But that word "created" is never used again in the whole of that chapter, except in relation to animal life (v. 21) and man (v. 27), both of which were, of course, "created," but never in relation to the earth. For example, on the third day (v. 9) God did not "create" the waters. They were already "created"; hence He merely "gathered them together." Then the dry land (the earth) "appeared." So the earth was there already, having been "created" as in v. 1. Also on the fourth day God did not "create" the sun, He "made" it in a condition to give light and heat to the earth and "set it" in its true position (v. 16 and 17).

Now I contend that a natural reading of the Bible shows that there must have been some catastrophe after the "Creation" mentioned in v. 1 for the three following reasons:—

First, we cannot imagine that the Almighty, all of whose works are perfect, could or would create the earth in conditions described in v. 2.

But secondly, we are not left to conjecture, for in Isa. xlv, 18, God Himself declares that He did not "create" the earth in vain—the original word is exactly the same as that used in Gen. i, 2, "waste"!

Thirdly, in Gen. i, 2, where we read the earth "was" without form and void, it should read: the earth "became" or "had become"; it is exactly the same word as is translated in Gen. xix, 26, where we read: Lot's wife "became" a pillar of salt; she was not originally so, but became so at the destruction of Sodom. So the earth was not originally "created" waste and void, but evidently "became" so, owing to some great catastrophe. Hence after v. 2, the first chapter of Genesis does not describe the "creation" of the earth at all, but its reconstitution for the dwelling-place of man.

Then there is that remarkable expression in Gen. ii, 3: "the work which God created to make" (which is the true reading) and which I submit can only mean that the Almighty, in creating the earth as recorded in Gen. i, 1, foresaw that a great calamity would occur, and that it would be necessary for Him to reconstruct it and thus "make" it for His original purpose as the dwelling-place for man. And while this somewhat strange expression "created to make" seems to fit in exactly with the views I have here ventured to express, it is difficult to imagine what else they can mean.

WRITTEN COMMUNICATIONS.

Mr. THOMAS FITZGERALD wrote: Commander Wiseman's helpful paper is valuable for, among other reasons, the emphasis placed on the necessity of determining the true meaning of the "days" in the first chapter of Genesis. Much has been written in the past on this subject, yet the question remains, "What is the true meaning of the words used by Moses in his narrative?"

While it has been well said that "*revealed* truth and *discovered* truth either agree, or at least run parallel, in their never-opposing course,"* we affirm that the right understanding of Genesis was never dependent upon the discoveries of Science. Whatever man may discover by his own research is never a subject of revelation.

We are often reminded that "it is never safe to neglect any source of information." The wise Biblical student will welcome all the facts which scientists have established, by precise observation and verification in their studies of *phenomena*, and we would not, for one moment, make the Bible a *substitute* for such researches. The *origin* of all things is another matter, and we claim the right to expect that the true scientist will not neglect the narrative in Genesis, which claims to be a revelation of the origin of the universe.

There is a growing tendency among a certain class of scientists to utterly ignore the Mosaic record. Sir Arthur Keith is the protagonist of this school. A few years ago, writing on the subject of man's origin, he stated: "Why is it that medical men, particularly those who are responsible for laying their profession upon a solid

* *V.I. Trans.*, vol. viii, p. 82.

basis of fact, no longer temporise with Genesis, but have scrapped this book, even as an allegory ? ”*

I am in entire agreement with Commander Wiseman when he says that the Bible owes nothing whatever to the Mesopotamian creation tablets. One remarkable feature of the Mosaic account is that, of all the Cosmogonies of ancient times, the Genesis narrative is the only one which survives.

No *proved discovery* of Science, so far, has been found to disagree with the accuracy of Gen. i, 1, which I hold, with many others, is a finished, comprehensive statement of what took place “in the beginning” (whenever that was), when God commenced His creative acts. The whole completed universe (the heavens and the earth) was then brought into existence. By what process and whether by stages we are not told. All those vast ages of the past are hidden in that first verse, which can only be understood by faith (Heb. xi, 3, R.V. Marg.). What follows is presented as *evidence* and must be received as historically true.

How precise and accurate is the statement of verse 2, “And the earth was without form and void” ! Why do interpreters persist in neglecting the import of the fact that the *earth* only is mentioned in that verse, not its *origin* (that is mentioned in the first verse), but its *condition*. My own view is that the Hebrew idiom may be better expressed in English thus—“but the earth was (what it had become) void and waste.” This translation will stand all tests whether philological, grammatical, exegetical or geological. The Bible itself is its best commentary, and in the first chapter of Genesis this use and meaning of the Hebrew idiom is fully established. The Rev. I. A. McCaul (lecturer in Hebrew at King’s College, London), writing on this point, said : “In lo, ‘darkness *was* upon the face of the waters’ ; ‘God saw the light that it *was* good,’ the italics indicate the absence of the copula in Hebrew. But in the words ‘and the earth was without form,’ the absence of italics shows that there is a word in the Hebrew in this case for ‘was’ and so there is, and it ought to have been translated ‘had become’ (Greek, *egeneto*), ‘and the earth had become without form and void.’ In my own mind there is no doubt whatever that this is the meaning of the Hebrew words. But if so, surely it affects the preceding verse, and

* *The Evening Standard*, November 4th, 1927.

necessitates an interval of time being interposed between the action of the first and second verses."* Dr. E. B. Pusey, Regius Professor of Hebrew, Oxford, agrees with this translation and interpretation.†

The author of the paper seeks to explain the "days" by referring (p. 104) to the fact that the original Babylonian record was written on six tablets on six days, and suggests as a solution of the problem of the numbering of the days in Gen. i, that the finishing of the works of creation is not in view, but that, according to "Babylonian literary usage," what was "finished" was the recording of the narrative. "The numbering of the days," says the author, "would indicate that the original record was written on six tablets on six days."

Is there any necessity to call in the aid of the Babylonian tablets for a right understanding of the Mosaic narrative? I think not, and here again we may be assured that the Bible itself is its best commentary. Wherever the numeral is applied to the word "day" throughout the Scriptures, the natural day is meant. The use of the expression "evening and morning" connotes the natural day without exception, and nowhere in Scripture can we trace the term "evening and morning," when in association, as signifying a vast, indeterminate period of time. A notable example of the numeral, associated with the term in the plural, "evenings and mornings," is found in Daniel, "and he said unto me, unto two thousand and three hundred evenings and mornings" (Dan. viii, 14, R.V.). For confirmation of this rendering see *V.I. Trans.*, vol. lxi, pp. 56, 57, also *Dr. Lange's Commentary on Daniel*, translated by Dr. Jame Strong, p. 178.

It is as true to-day as when Sir Wm. Dawson wrote in 1888,‡ that one of the most difficult problems in this history (Gen. i) is "the meaning of the word *day*, and the length of the days of creation," and the issue will remain undecided until the simple, plain narrative of Genesis is accepted as a record of historical facts.

Dr. R. E. D. CLARK wrote: Wing-Commander Wiseman's view of the seven days of Genesis is of great interest. As, however, it is not consistent with the English version of the Old Testament,

* *V.I. Trans.*, vol. ix, p. 129.

† *Daniel the Prophet*. Third Ed., p. xix.

‡ *The Origin of the World*. Fifth Ed., p. 123.

it would be interesting to hear how he deals with the apparently explicit statement of Ex. xx, 11, "In six days the Lord made heaven and earth, the sea, and all that in them is."

Later, for some unknown reason, the rotation of the earth may have been speeded up.

Lt.-Col. L. M. DAVIES, M.A., F.G.S., F.R.S.E., F.R.A.I., wrote : I welcome the author's demonstration of the fact that the creation story in Genesis owes nothing to Babylonian legends. He has done good service in making this so clear.

As regards the interpretation of the "Six Days," however, I feel less in accord. What exactly does the author hold? His remarks on p. 104 seem to imply that the division into Six Days only means that the creation record was written on six tablets on six successive days; but does this really satisfy himself? What about the first light, which we are told *constituted the First Day*? Was this, or was this not, the first actual light in the creation process, as the story indicates? If it was, it had nothing to do with the light of some long subsequent day on which the first tablet was written; and the author's theory becomes untenable. But if, as the author seems to suggest, it was not the first actual light, but the light of the day when the first tablet was written, then the First Day is annihilated as an account of actual creation, since it only mentions that light. Thus, there would only be *five creation tablets* if the Six Days were narration ones and not creation ones.

What, too, is gained by the author's theory? He realises that the geological record cannot be really squared with the story of the Six Days—so what do his tablets record? I think he would do far better to stand by the original belief of the Church, that those Days were literal ones of actual creative processes.

I do not agree that "the first two verses are evidently a superscription" (p. 99). How could they be, when the earth of verse 2 is in a *tohu va bohu* condition obviously *antecedent* to the operations of the Six Days, and the "darkness" over it has not yet been designated "Night" in contradistinction with "Day"? That the creation of heavens and earth mentioned in the first verse is PRIOR to the Six Days has been recognised by Christians from the earliest days. This was pointed out by Dr. Molloy in his book entitled

Geology and Revelation. As Molloy showed, the existence of a GAP of wholly unknown duration between verses 1 and 3 of Genesis was emphasised, among early Christians, by St. Basil, St. Ambrose and St. Chrysostom. They were followed during the Middle Ages by the Venerable Bede, Peter Lombard, Hugo of Saint Victor, St. Thomas, Perrerus and Petavius. Thus, at least fourteen centuries before geology was even heard of as a science, it was clear to commentators that a wholly unlimited interval existed between the original creation "in the beginning," and the commencement of the First Day's work. "How long that interval may have lasted," says Petavius, "it is absolutely impossible to conjecture" (*De Opificio Sex Dierum*); and Perrerus declared that it could only be made known by a special revelation (*Comment. in Genes.*).

All that men like Chalmers did, when the broad facts of geology became known, was to point out that the geological ages might go into that gap. As a geologist I agree, and have tried to deal with objections to that view in my book *The Bible and Modern Science*. To my mind there are no valid objections.

I agree with the author's statements that the Days of Genesis were obviously meant to be taken literally, and I see no reason for doubting that they were days of actual work. We are told that "in Six Days God *made*"; not that "in Six Days God recorded the making." I cannot understand why the author seems to find it difficult to believe that God created fully-grown grass and trees (p. 100); and I would remind him how Satan tempted our Lord (Who obviously had the power) to turn stones instantly into bread—*i.e.*, into not only the fully *matured* but also the *cooked* products of wheat. For why, if God can literally create, should He not as easily create mature as immature organisms? Adam and Eve themselves were not created as infants, but as adults.

I repeat, however, that although I cannot abandon the literal Days of *creation* for literal Days of *narration*, I much appreciate the author's valuable demonstration of the unique character of the Genesis narrative, and the impossibility of regarding it as owing anything to Babylonian myths. For his timely exposition of this fact, which occupies the greater part of his paper, the author deserves the gratitude of all lovers of Scripture.

Major H. B. CLARKE (late R.E.) wrote : It has always appeared to me that as Scripture cannot contradict itself any solution of a difficulty which makes it do so must fail, whatever other conditions it fulfils.

Therefore Wing-Commander Wiseman's suggestion that "the evening and morning" were one, two, three, up to six days, is only a method of saying that here the record finished, or that they were anything but literal days, which God did create or make the creatures of that period appears to me to be impossible. Exodus xx, 11, expressly states that in six days God did do this, and the fact that a literal day, the Sabbath, is therefore to be observed makes it clear to me that literal days of 24 hours are meant. The fact of "evening and morning" being mentioned appears to me to make the "periods" idea equally impossible. It is for these reasons, therefore, that I, personally, hold the catastrophic theory, which as the first speaker said, also accounts for other statements otherwise unintelligible. I am neither a Hebrew scholar nor an archæologist, to my regret, but await further light on the subject.

AUTHOR'S REPLY.

It will be seen that not a small part of the discussion is based on the old assumption that the repeated phrase "and evening came and morning came day one" etc., refers to the period occupied by God in creation and is only mainly concerned with upholding one or other of the two opposing views now prevailing on this subject. On the one side there are those who insist that the word "day" implies a "great period of time," and those (by far the larger number) who maintain that Scripture requires that creation occupied only six ordinary days. As both these views have been discussed in my paper, I do not propose to repeat the reasons why I am unable to accept either of them. It must be quite apparent to both schools of thought that their interpretation of the "six days" contradict each other. I submit that the new explanation accords with all the facts of Scripture, and agrees with the main conclusions of both sides because the days are shown to be literal days of revealing and recording, not days occupied by God in acts and processes of creation. How long the latter occupied we are not told.

So far as I am aware, the only new suggestion is that contained in Dr. Clark's communication, but as this is not an archæological problem, I must leave it to the astronomers. However, it seems to me that his suggestion is open to the obvious objection already cited in my paper, that an enormously long period of light and darkness would make animal and vegetable life as we know it impossible.

Mr. Jose's short summary of my views is correct, except that I should prefer to state them in this way—The six times repeated phrase "and there was evening and there was morning day . . ." refer, not to any act or process of creation, but to six literal days of revelation of the story of creation. After the six days this revelation ceased, therefore the seventh day was "hallowed" by God. The statement in Genesis ii, 1, "And the heaven and the earth (*i.e.*, the subject-matter of the preceding record) were finished," is similar to that which may be found on the last of a series of Babylonian tablets, where it simply indicates that the last or sixth tablet completes the record concerning the subject stated. There are, therefore, no time limits whatever in the Genesis record of creation, consequently no necessity to resort to the "gap and re-creation theory," or to divide the record up into six geological ages.

In his supplementary question, Mr. Jose requests an interpretation of Exodus xx, 11, and as several questioners cite this verse, I am glad of this opportunity of referring to it because I severely limited my paper to the Genesis narrative, seeing that an adequate discussion of this verse should include some account of the differing or complementary reason given in Deut. v, 14 and 15 (where the commandment is repeated), for observing the Sabbath. The words in Exodus xx, 11, with which we are concerned are *בְּשֵׁשֶׁת יָמִים עָשָׂה יְהוָה*, which the A.V. translates "For *in* six days the Lord made." First we note that the word *in* forms no part of the Hebrew text. It is next necessary to ascertain the limits of the meaning of the word *עָשָׂה* "asah," translated "made." It is an exceedingly common word, and very different to the Hebrew word *בָּרָא* "to create." Asah is translated "do" or "did" over 1,560 times and "make" 670 times. The dominant meaning, therefore, is to indicate something done; the pret.: 3rd person, expresses a completed state, a finished action. The wideness of its meaning may be seen, for instance, in Genesis i, 11 and 12, where

it is twice translated "yielding." It is frequently translated "thou hast shewed" as may be seen in Genesis xix, 19; xxiv, 14; xxxii, 10 (in Heb. v, 11); Exodus xl, 14; Numb. xiv, 11; Judges i, 24; II Sam. ii, 5; I Kings xvi, 27, etc. Had it been translated in precisely the same way here (as it probably would have been had the A.V. translators possessed the key to the significance of the six days of Genesis i), it would have read "For six days the Lord shewed heaven and earth, the sea, and all that in them is, and rested (desisted or ceased) the seventh day, wherefore the Lord blessed the seventh day and hallowed it." I submit that to translate the word "asah" in a manner similar to that repeatedly given elsewhere is far more legitimate than to make "evening and morning" a long geological period or to make "was" (of Genesis i, 2) mean "had become" or "became," or to suggest that "asah" means *recreation*.

I hope the foregoing is the light which Major Clarke is awaiting. He will see that I agree with him about the days of Exodus xx, 11, being literal days. This seems evident from Genesis ii, 3, where the seventh day of cessation is in the preterite: expressing a completed action—not a rest which still continues. Although he holds the view that re-creation took six days of twenty-four hours each, I am glad to note that he candidly refers to it as the "*catastrophic theory*."

I regret that General Baker-Brown should have thought that I intended to discuss Genesis in a general way. When the Council asked me to read a paper, and later requested the title which I proposed for it, I had not determined the precise matter which I should bring before the Institute. I gave, therefore, a general title, "Genesis and Archæology." Some weeks before the paper was printed, I decided that my subject should be the meaning of the "six days." Of course, this paper was in the hands of the Institute before the paper on Genesis i and ii was read a fortnight previously. It will be observed that I am unable to accept the "six literal day" or "long geological period" theories referred to in that paper, but have submitted for your consideration an entirely new reason for taking another view of this problem.

General Baker-Brown cites three sciences with which any interpretation should conform. I agree, provided we conform only to the established facts, and not the conjectures of these sciences. For we cannot put his final statements under the heading on archæology, even among the conjectures. Babylon, as all archæologists

know, is for Iraq, not a very ancient city. Archæology has revealed a very high state of civilisation long before Babylon was built.

I agree with him generally in his remarks under the heading of geology; that the formation of land, its drying after the seas had receded, and the appearance of vegetation and of life upon it, probably required "great periods of time." But other speakers and written communications insist on six literal days for this process.

It should, I think, be stated that the paper was not written for the "man in the street," but for the Victoria Institute, and great care has, therefore, been taken to base its statements on the meaning of the Hebrew text, and not on any English translation.

I agree with the Rev. Arthur Payne that "and there was evening," etc., must refer to a normal day, but I cannot agree that it refers to periods in which God *recreated* the earth and all life on it. I have endeavoured to show that the phrase refers to the period occupied in revealing the story. It is surely significant that the Bible never speaks of a past *recreation* of the earth.

Mr. Edwards' use of the word "finis" is a good illustration. The statement in Genesis i has precisely this meaning on ancient tablets, for it indicates the completion of the *record*.

Mr. Bryning's explanation seems to be a slight variation of the "long period theory," for there were six such "evenings and mornings." Exodus xx, 11, implies that they were literal days, and the Hebrews commenced their day in the evening. Either the evenings and mornings were immense periods of time, or ordinary days, and his theory does not seem to help. It can scarcely be said that the six-fold repetition of the phrase merely means that while it was evening at one part of the earth it was morning at another.

Mrs. Maunder will observe that my references to the "creation" tablets were limited to citing those lines which most closely resemble Genesis i. Unfortunately, only about 22 lines of Tablet V have been discovered. I thank her for her valuable remarks on the probable date of the references to NABIRU on this tablet. The colophon of K3567 shows that this fragment was written in the days of Asurbanipal (668-626 B.C.). But archæologists are agreed that the general contents of the Assyrian tablets were copied from far older tablets. As I have stated in my paper, the Assyrian scribes explicitly say this. With regard to the length of the "day," the standpoint for observation is surely in the region of the Tigris and

Euphrates, as is stated in Genesis ii, and in that country there is quite a normal "evening and morning."

I understand that Mr. Collett holds the "six, twenty-four-hour day theory," but does this explain the evidence of animal and vegetable life in various strata more than one day before the creation of Adam? Those who hold this theory are willing to give millions of years if necessary for Genesis i, 1-2, but insist on six literal days for vv. 3-31, although in the latter we have the first reference to life of any kind.

Colonel Davies would not, I feel sure, wish to press the views held by Basil, Ambrose, etc. It must have been as difficult for them as for us to understand why God *did* (not that He could, I agree that He could) create the earth in six ordinary days. Hence the gap theory became necessary in their day in order to surmount the difficulty.

It is agreed that the commandment "Let there be light" has no reference to the first day of the *revelation* of the story of creation; but I am unable to follow his subsequent reasoning about five days. It should be noted that the record carefully avoids the use of the word "light" in connection with the six times repeated phrase. The more limited words "evening and morning" are used.

With regard to paragraph 3 of his communication, I hope that we gain truth by this investigation. Surely, Colonel Davies does not claim that the "gap" theory was the original belief of the Church!

I think we are in agreement that the first two verses are a summarised description preceding vv. 3-31; all that he has written seems to show this. If I am asked, *could* God create fully-matured trees with fruit, etc., in a day? I answer "Yes"; but this is not our problem, it is, *did* God? Colonel Davies' theory necessitates that God did, but I submit that this is entirely contrary to the express statements in Genesis ii, 5, where we read "And every plant of the field before it was in the earth, and every herb of the field before *it grew*." Moreover, it can scarcely be claimed to be God's general way of working as revealed in the Bible.

I fully agree with Mr. Fitzgerald that Genesis i was not the product of man's thinking, but of God's revelation. I have endeavoured to stress this, yet it is very necessary to call in ancient literary methods in order to explain Genesis i, for, as I have shown in my *New Discoveries in Babylonia about Genesis*, these records were written long

before the days of Moses. I endorse his final statement that Genesis i must be taken literally, but remind him that Sir William Dawson accepted the "long geological period theory," while he takes the "six ordinary day" view. Is not this because neither contending side has taken the account literally, but each has investigated it as if it were a modern when actually it is an ancient literary production.

May I say that if, after full investigation, this new interpretation of the "significance of the six days" is upheld, then, as Mr. Jose stated in the discussion, it will have been "one of the most momentous gatherings in the history of the Victoria Institute." For it shows that the record is a direct revelation from God in six days, and is so recorded. Moreover, it reconciles the contending interpreters, for it reveals that while the days were literal, they do not refer to the time occupied by the Creator in creating, but in revealing and recording, and that this recording on six tablets was done in earliest times.

817TH ORDINARY GENERAL MEETING,

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, MARCH 7TH, 1938,
AT 4.30 P.M.

LT.-COL. F. A. MOLONY, O.B.E., IN THE CHAIR.

The Minutes of the previous meeting were read, confirmed and signed.

The CHAIRMAN then called on Albert Hiorth, Esq., to read his paper entitled "From the River of Egypt unto the Great River, the River Euphrates."

*FROM THE RIVER OF EGYPT UNTO THE GREAT
RIVER, THE RIVER OF EUPHRATES.*

*A Suggested Solution of the Arab-Israel Problem in the Promised
Land.*

By A. HIORTH, Esq., C.E.

FROM the earliest days of the world's history, "the Ur Period" (Ur was Abraham's native place),* one man towers above all his contemporaries as the chosen ancestor of a race of people and a line of kings.

No man in history ever received greater promises and rights than he as reward for his obedience, of which we all enjoy the fruits now, and some time in future shall enjoy them even more richly than to-day :

"I will make of thee a great nation. I will bless thee and make thy name great, and thou shalt be a blessing . . . in thee shall all the families of the earth be blessed. . . . Yea, a nation and a company of nations (†) shall be of thee, and kings shall come out of thy loins." (Genesis xii, 3-4, xxxv, 11.) Such a *charter of nobility* has certainly never been granted to any man either before or since, the Royal ancestor to-day of

* *Cp.* Sir Ch. Marston's Works.

† "Commonwealth of Nations ?"

kings in the Near East, and of Kings like David and Solomon, yea of the King of Kings, Jesus Christ, in whom *we* "all the nations of the earth are blessed."

And a Title Deed such as that given to Abraham in Genesis xv, 18, is also certainly without parallel in history.

"Unto thy seed have I given this land, from the river of Egypt unto the great river, the river Euphrates," a country larger than the combined area of England and Germany, which could probably hold 100 million people, if reconstructed according to the standards of antiquity (the traditional Land of Eden itself); where *all* the descendants of Abraham can be placed.

Strangely enough, the region of Ishmael is mentioned *just* after—the handmaiden's son ("a wild man") shall dwell in the land "to the east of his brethren" (Genesis xvi-12. A. V. "in the presence of all his brethren"), and Abraham fulfils this commandment even in his lifetime. He gave to Isaac, the heir with the rights of a firstborn, all that he owned, and gave to the children of his concubine gifts and allowed them to move away from Isaac his son "Eastward to the east country." (Genesis xxv, 6.)

Not only the patent and the title deed, but also the partition of the country is given, and the boundaries traced out in the field, in Palestine ("Erez Israel"—the manor of the vast estate—in Ezekiel, chap. xlvi, 13-23, and xlviii). Not only the people of the two tribes, the Jews, but also the people of the ten tribes of Israel shall own the land and divide it amongst them. Moreover, even strangers in the land who have their families there shall be granted their lots—"Lot for an inheritance." (Ezekiel xlviii, 22.) Joseph is to have two lots and the priests and Levites the "holy gift" in the midst.

Israel shall return home representatively: "I will take you, one of a city, and two of a family, and I will bring you to Zion" (Jer. iii, 14, 18), saith the Lord; and all the tribes are expressly represented: for then shall "the House of Judah (the Jews) go to the House of Israel and they shall come together from the land in the North to the land I gave as inheritance to your forefathers." (Cp. Jer. xxxi, 8, 10, 27, 31.) "The land in the North" and the "Islands far distant"; the new Covenant is to be made with the house of Israel. (v. 31-34 *et seq.*)

In the coat of arms of the people of the Covenant, the oldest in the world, there are two heraldic emblems, the lion and the unicorn, given by God; the Lion in Genesis xlix, 9-10, to Judah

(the father of kings), and in Deut. xxxiii, 17, "The wild ox"* to Joseph's children: Israel, "the least amongst the people chosen by the Lord"—"because He would keep His promise to the fathers." This concerns each one of us, for hereby shall "*all the families of the earth*" receive their blessing. "The right of the firstborn" was despised and sold by Esau to Jacob (Genesis xxv, 33 and I Chron. v, 1-2), even though the princely house remained in Judah.

They, the smallest nation on earth, were also, according to the promises of God, "to own the enemies' gate," translated as the "straits," that a small nation controls to-day, from Gibraltar through the Suez, past Aden, Singapore, the Panama Canal, and back.

We see the identity of the people of the twelve tribes according to the words of the Bible retained even unto the New Jerusalem: above its gates are inscribed the names of the twelve tribes of Israel. (Rev. xxi, 12, *cp.* chap. 7.) The tribes must be found before fulfilment—and St. Paul speaks of Israel's "blindness in part." Blindness, but when at last the veil is lifted all Israel shall be saved. (Rom. xi, 25-26.) It is thus of interest for the Christian to-day to seek for the signs of the appearance of the tribes of Israel.†

For centuries, indeed perhaps for thousands of years, Christians have regarded the Jews as the (whole) people of the Covenant and Palestine as the "land of Promise," and all Israel's promises and blessings have unhesitatingly been transferred to the "Church"; but throughout the Bible it is Israel, the people of the twelve tribes, by whom (and to whom) the promises were given and shall be fulfilled, but it was not until the "last days" that this began to be recognised. Thus at last we now begin—after the Great War—to have glimpses of the beginning of a fulfilment of the prophecies concerning the people in the "valley of dead bones." (Ezek. xxxvii.) Judah's people and Israel's people shall both be gathered in the fatherland under one King, and in the key-chapter, Isaiah xix, 23-25, we read of Israel's gathering in the *great land of promise* which will afford room for all of them as well as for the strangers in that land.

* We find to-day in a well-known heraldic emblem both the Lion, the Unicorn, and, probably regarding a certain god-given priority, "Dieu et mon Droit."

† There are many indications to be seen of fulfilment also here, further on request from the author.

In this chapter (Isaiah xix) "The Prophecy of Egypt," a specification of time "in that time (day)" occurs several times, and in verse 23 there is mentioned the time (day) when a "high-way" (cleared way) shall run from Egypt to Assyria, and thus the nations will readily be able to pass to each other, yea and they shall even serve the Lord together. Then shall "Israel be the third with Egypt and with Assyria, a blessing in the midst of the land." It would here seem that Abraham's blessing in the land of Abraham by Abraham's people shall come to fulfilment, "on that day" (*i.e.*, when the railway there is completed, and to-day it is nearly so) will the time be ripe to seek in God's Word for light upon this, for we know that he who seeketh shall find. (*Cp.* Dan. ix, 2, 22, 23.)

The lands mentioned below awake in our day, one after another, from the sleep of thousands of years, as sovereign states (kingdoms) within the League of Nations at Geneva.

1. EGYPT.*—Became this year a sovereign kingdom under King Farauk I; adopted as honorary member of the League of Nations at Geneva.

Great upheavals now appear to be imminent in the Near East. It is interesting to consider the government in Egypt, which is now sovereign after the agreement with England, and makes plans for the next fifty years regarding the complete irrigation of the country, its cultivation and a raising of the greatly increasing standard of living of the people.

The population has doubled during the past 14 years (English government) and is now about 14 millions. It is estimated that in a relatively short period it will increase to 30 millions.

Three-quarters of the present population are estimated to live on the soil, but agriculture has not been able to keep pace with the increase in the population. Yet the possibilities are almost unlimited, for perhaps less than one-thirtieth of the whole area is under full cultivation. It is here that by fully utilising the waters of the sources of the Nile that great future prospects can be realised by complete irrigation.

A provisional programme has been drawn up of work to be completed by 1953 (strangely enough the great memorable year

* Regarding the future plans for that country *vide* *Teknisk Ukeblad*, No. 8, 1937, and No. 19, 1919.

of the Pyramids), but in its perspective extends much farther, to the cultivation and full utilisation of the country.

Egypt is said to have the world's largest "rainless belt," and the River Nile remains—as always—the true source of all fertility, with its tributaries from the huge lakes on the highlands of East Africa, Lake Victoria, and Lake Albert at the outlet of the White Nile, and Lake Tsana with the Blue Nile from Abyssinia (now an Italian possession).

These unite near Khartum and water the fields of Egypt until they enter the Mediterranean at the delta. In July the Nile and its sources overflow their banks, and the mud thus deposited fertilises the irrigated areas for a crop each year of wheat, sugar, cotton, vegetables and fruit.

Since the great dams were constructed and "permanent" (perennial) irrigation made possible, there have been several crops each year and steadily increasing prosperity. In Lower Egypt there are now estimated about 12 million acres of land with modern irrigation and in Upper Egypt more than $1\frac{1}{2}$ million acres irrigated.

Of about 5 million acres a very considerable area is to be irrigated and placed under the plough before 1953, and later on the whole country will be taken in turn. It is estimated that 13,000 million tons of water will be required, the greater part to be drawn from Gebel Awlia, Lakes Albert and Tsana, via the Asswan Dam.

The Asswan Dam, which was commenced more than 30 years ago at the first cataract, has 180 sluices, seven metres high, and can pass up to 20,000 m.³ of water per second in flood time. The dam, the height of which has twice been increased, is estimated to cost £9,000,000.

A number of other dams are also to be constructed and reinforced (and form bridges), and a new dam at Gebel Awlia. These works are estimated to cost about £6,000,000.

Lake Tsana as a reservoir, however, is an extremely delicate problem to-day. After the Abyssinian war it has become an Italian air-fleet base, and an irrigation dam in that lake, controlled by a power hostile to Egypt, would imply a life-and-death threat (hunger and pest) to many millions of people in Egypt.*

* In this connection the following passage is significant: "and the Egyptians will I give over into the hand of a cruel lord; and a fierce king shall rule over them, said the Lord, the Lord of Hosts. . . . and the river shall be wasted and dried up, and they shall turn the rivers far away; and the brooks of defence shall be emptied and dried up . . . and everything sown by the brooks shall wither." (Isaiah xix, 4-8.)

The plan for the basin of Lake Albert alone is estimated to cost £15,000,000. From that lake the river passes through several hundred kilometres of decayed marsh districts (Sudd-districts) where up to 60 per cent. of the water is lost for irrigation, whence it is planned to conduct the water in canals, partly outside the marsh lands, an extremely complicated and costly work that will take decades.

As will be seen, the new Egypt will make great efforts to advance its largest—the world's oldest—industry, Egyptian agriculture.

Fig. 1 gives a survey of the Nile and its sources and of the sites of the dams for the irrigation works. Fig. 2 shows, with all desirable clarity, the dangerous situation of Egypt, Palestine and Syria between the kings from the north and the extreme north (Italy, Turkey and Russia?) Palestine tempts with its immeasurable wealth, and perhaps above all the entrance gates to the two continents, to Asia at Haifa and to Africa in Egypt by the Suez.*

In the *Teknisk Ukeblad* there is a description of the proposed plan for an extension of the Asswan dam, with 300,000 h.p., light, heat and electric energy for the 14,000,000 poor fellaheens of Egypt. Fig. 3 shows the Asswan dam with its sluices, where in flood time nearly 20,000 m.³ of water per second can pass,† and fig. 4, the tower-shaped power stations in the water on the upper side of the dam. (Egyptian law does not permit disfigurement of the body of the dam by any stone-cutting tools, bores or the like.) (*Cp. Teknisk Ukeblad*, No. 8, 1937.)

2. PALESTINE, the main demesne in Abraham's inheritance, "Erez Israel," since the Great War, has been far on its way towards its reclamation from the sand. Modern towns are being erected and the hills, from valley to summit, clothed with fruitful farms. During the post-war years millions of pounds have been invested, mostly by Zionists, the imports are 15-18 million pounds per year, there are several million pounds' surplus on the national budget; all this in a country the size of Wales or the county of Hedemark in Norway.

There are now nearly 500,000 Jews in that country (as compared with 900,000 Arabs). For comparison we may mention

* See note on p. 130.

† Further described in Victoria Institute's *Transactions*, 1923, and in *Teknisk Ukeblad*, 19.



FIG. 1.—The Nile and Tana Lake.

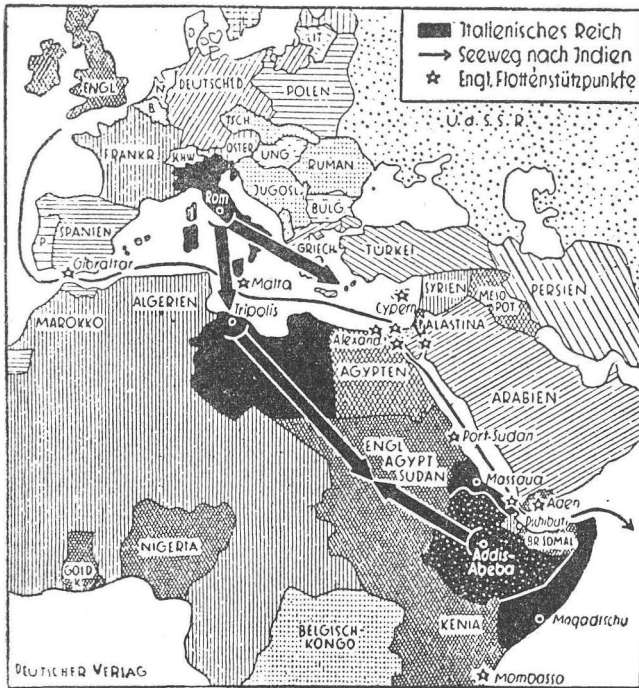


FIG. 2.

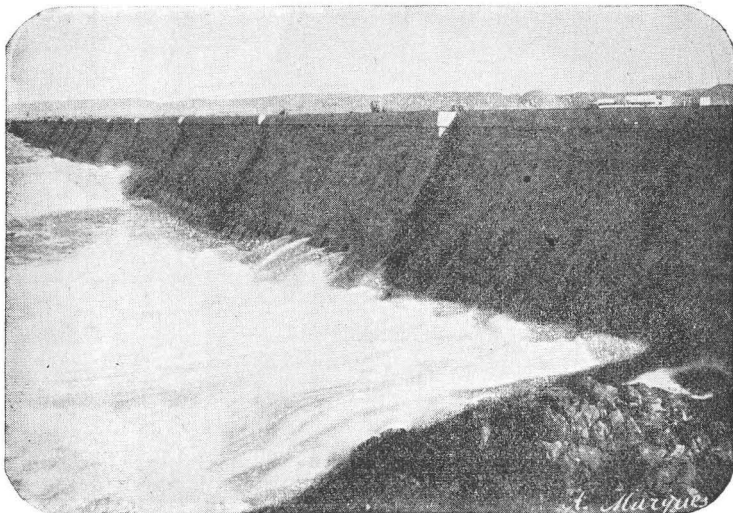


FIG. 3.—Asswan Dam.

that Ernst Blumenthal, in a lecture given at Oslo (December 4th, 1937), estimates that the Arab world occupies an area 260 times larger than Palestine.

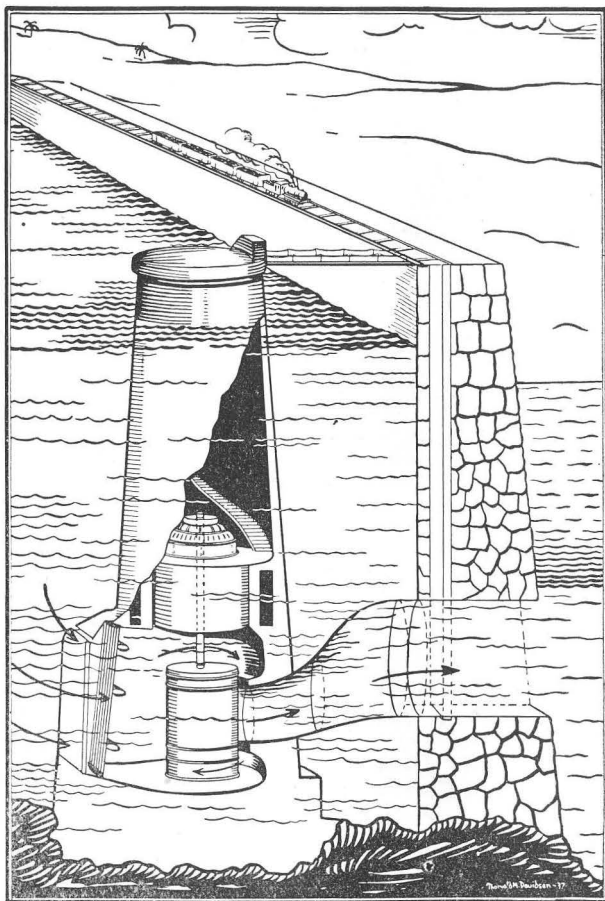


FIG. 4.

An illustration of the almost miraculous results already achieved by the Zionists by the intense restoration activities of the post-war years, is afforded by the fact that there are now said to be exported from the desert land nearest to its oppressing Turks 8-10,000,000 cases of oranges, grapefruit, etc., annually.

But at the present moment this rapid development is at a standstill. The problem of Arab *versus* Jew appears to be insoluble, and a segregation of these two closely related races would appear to be imperatively necessary if real peace is to be secured. The Bible also appears to point to a situation like that indicated above. (Genesis xvi, 12; xxv, 6; notice also Genesis xxvii, 39-41 to xxxii, 11-18, and xxxiii, 16-20.)

The Arabs possess a country of their own, with an area of 3,000,000 sq. kil., inhabited by perhaps 3,000,000 to 5,000,000

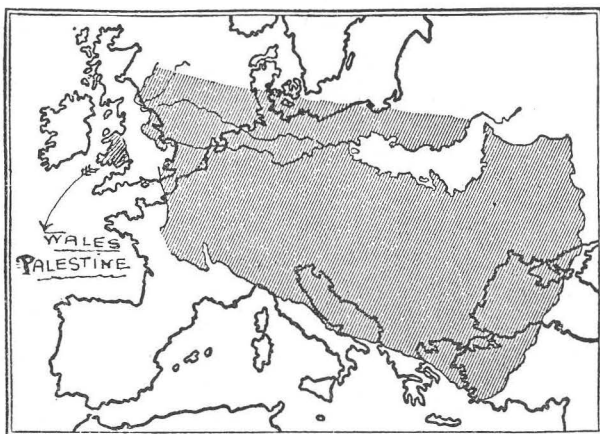


FIG. 5.—The comparative sizes of Europe and of Arabia.
The maps are shown to the same scale.

(estimated), and one of the most thinly populated countries on the globe (between 1 and 2 per sq. kil.).

Fig. 5 shows the actual size of Arabia as compared with Europe (from *Geography and World Power*). Notice that Wales is the same size as Palestine. In addition, the Arab population occupies large portions of North Africa, Mesopotamia and the Red Sea countries, also the coasts of the Persian Gulf. From the Nile to the Euphrates these sons of Ishmael have spread, and now they also demand the Land of the Israelites for themselves alone. (*Cp. Isa. xliii. 3.*)

For details of developments hitherto, reference is made to the *Transactions of the Victoria Institute* (1923), and we shall here merely attempt to illustrate graphically the great prophecies

of Ezekiel and Zechariah concerning the "living waters" that run under Jerusalem to the east, and which render the waters of the Dead Sea "wholesome," so that fish from the Mediterranean swarm there. The Mount of Olives is rent right across from east to west, and the living waters flow and there is "light towards eventide." (See fig. 6.)

As early as the middle of the last century, students of the

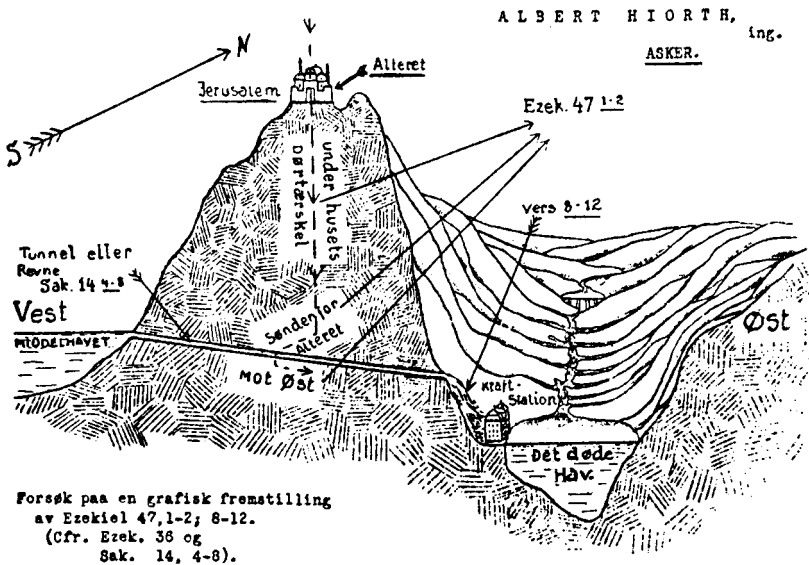


FIG. 6.—An attempt to sketch graphically the prophecy in Ezek. xlvii, 1-2, 8-11 and Zech xiv, 4-8.

prophets saw the truth regarding the return home of Israel and the partition of the country in the last days. One of the most interesting examples of interpretation of the prophets and of the segregation of Israel-Arabs (Arabs to the east) is probably that of Major J. Scott Phillipps in his remarkable paper read before the British Association at Aberdeen on September 16th, 1859. Fig. 7, being his map of Syria and Arabia, shows his exact biblical statement of the frontiers. Israel receives the heart of the Land of Promise, "the navel of the earth" (Ezekiel xxxviii), divided according to the twelve tribes, and Ishmael—the Arabs—eastward to the East Country,

which already Abraham saw, Genesis xxvi, 5. The east and south borders he indicates as the River Euphrates, the Persian Gulf, Lake Oman. (Ezekiel xlvi, 11, and Deut. ii, 24 (the Uttermost Sea), and the Sidon of our day, according to Genesis xlix, 13 (Phœnicia).) This, as will be seen later, will be a very important point in, it may be, a very near future.*

Even now, by the division of the country recommended by

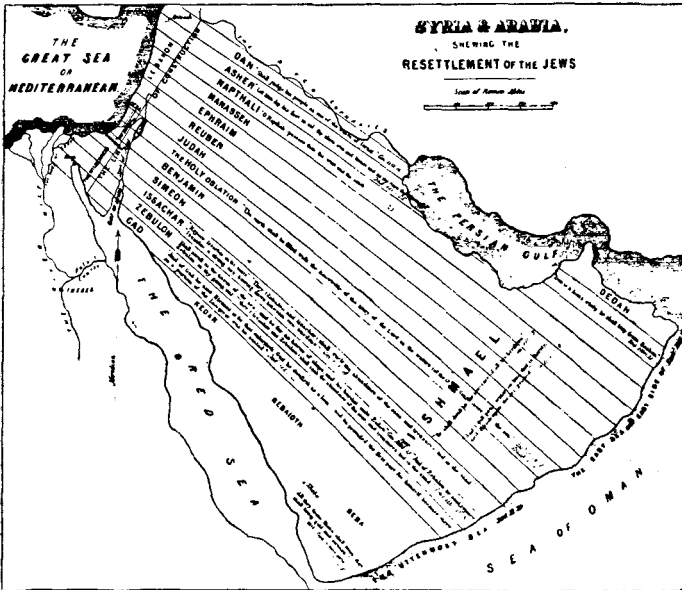


FIG. 7.—Division of the Promised Land according to Ezek. xlvii, by Major J. Scott Phillipps, Aberdeen, 1859.

the Palestine Commission, we see what may prove to be a commencement of the partition, the Arabs towards the east, an arrangement, however, which can scarcely be thought to be durable if it should ever come about.

The world will follow with great interest the partition of that country in the near future. Great, very great, things are imminent. At almost any moment the great, last cataclysm foretold in the Bible may have its beginning, and according

* Further information may be obtained on application.

to the Prophets that war will take the form of a race towards the "Central point of the earth," "Erez Israel," "Armageddon." In Baxter's *Forty Future Wonders*, and in Solovjev, *Antichrist*, an attempt is made to illustrate these events, the most important at the end of time, in the spirit of biblical prophecies.*

THE RIVER EUPHRATES plays a very important part in these prophecies regarding the land of Abraham's seed; it indicates, as it were, a people under certain conditions. (But it should be carefully noted that a new Babylon may also simultaneously arise in those regions under the sway of Antichrist himself.)

Mesopotamia and the Valley of the Euphrates were once the world's granary of ancient times, and much indicates that this country may again be a Garden of Eden when the words of the Bible concerning the land of Abraham's seed are fulfilled.

We must then foresee a reflowering of this country, now a region of mires and deserts, similar to that of Egypt and Palestine in former times.

In the course of my studies of these prophecies, the well-known Norwegian engineer, Joh. Støre, brought me his magnificent plan for the restoration of Mesopotamia. I will very briefly outline this plan, with the object of arousing the interest of the world in this gigantic idea, which, so far as I can see, would be a keystone in the fulfilment of the prophecies here dealt with. (I here discuss exclusively material fulfilment.) And precisely at a time when we might expect to be given a clear light in these matters there appears this mighty plan before the world.

All the plans have been submitted in confidence to the governments and ambassadors of England, Egypt, Turkey, Saudi-Arabia and Iraq.

Mr. Støre points out the unfortunate attempts that have been made in Mesopotamia to irrigate the country on the Egyptian model, with huge dams in the lowlands, in the swamp districts.

One of England's pioneers there told me that he had himself seen one of the dams collapsing and flooding the land instead of irrigating it. Støre here proposes, after the Norwegian pattern, a huge dam at the sources of the River Euphrates high up in the Turkish Alps at Ararat and Lake Van, near the Black Sea. (Fig. 9.)

* As to the future condition of the country see Isa. xi, 15, 16, xxx, 25, xxxv, 1, 6-8, xli, 1, 18-20, xliii, 1-6, 16, 19, 20, xliv, 3-5. Psa. cvii, 33-38.

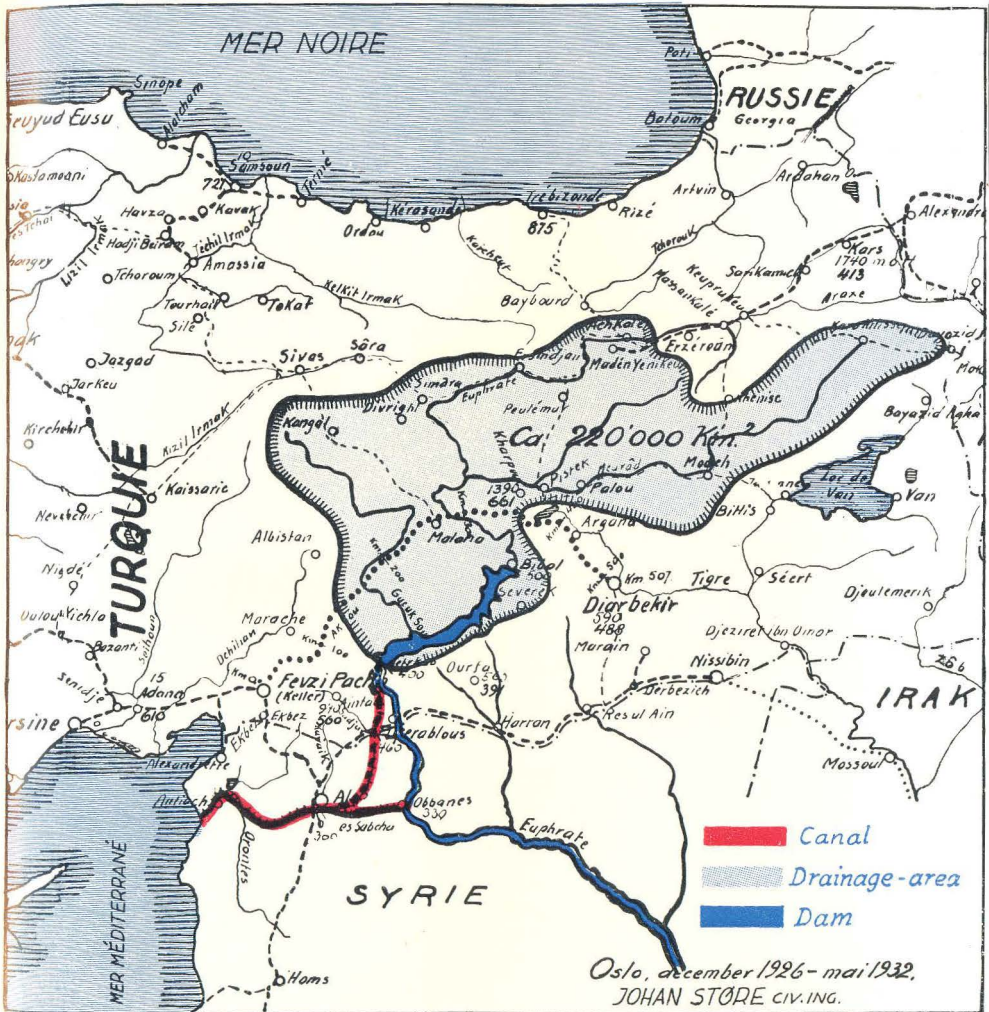


FIG. 9.

From Kefr-Kab to Bibol the whole valley is to be converted into a vast lake by means of a huge dam which will retain the enormous precipitation from a snow district the size of southern Norway, a dam several times the size of that at Assuan and with a capacity of several thousand million cubic metres of water.

From this huge dam the whole Valley of the Euphrates down to the Persian Gulf is to be canalised and irrigated (as described for Egypt in *Transactions of the Victoria Institute*, 1923).

The illustrations show the snow districts of Alpine Turkey in winter garb, very like the Norwegian highlands. They were taken by Norwegian and Danish engineers now building railways in the Near East.

It is estimated that at the large dam there will be water sufficient to provide as much as two million h.p., which Turkey will have for distribution in its own territory and in the new Mesopotamia, which will by degrees be irrigated, and where millions upon millions can settle in favourable conditions and on a fruitful soil for both horticulture and farming. There would eventually arise enormous traffic from the port of Basra eastward to India and westward round the coast of Arabia, via Aden and the Suez to the Mediterranean, a distance almost as great as that from Norway to New York.

We here have Störe's brilliant idea for shortening the latter by "the new America's" new Panama Canal, from Obbanes at the most westerly point of the Euphrates via Aleppo to the Mediterranean at the River Orontes, and Antioch.

As mentioned above, the plan can here only be indicated in outline, with the object of awakening the world's interest in its possible execution. Störe points out the extremely great difficulties (of which the political are perhaps not the least) which have to be overcome, technical, financial and juridical; three countries will be equally interested in a world undertaking of this kind.

The map is taken from the Turkish general staff maps—of about the same degree of accuracy as our Norse "county maps"—and the canal would have to be carried through relatively difficult country for a distance of about 140 miles, and to a height of more than 300 metres above sea level. An ample supply of water can be obtained for the sluices by a separate canal from the great dam to near Aleppo. But modern elevating plant has enormous advantages over sluicing, the largest in

existence being the Niederfinow Hebewerke (German) where lighters 40 metres long are lifted in a trough of water (which is 85 metres long and 12 broad and weighs 4,300 tons) 36 metres from the level of one of the rivers to that of the higher one.

These elevators operate with extremely little consumption of water and about six times as fast as a lock (sluice) with very little consumption of power. The Niederfinow plant can transport 5,000,000 tons per annum and at a cost (according to the nature of the goods) of from 5 øre (less than 1*d.*) per ton for sand or gravel-like material. About 300 h.p. is the capacity of the machinery.

Störe estimates a length of canal equal to thrice that of the Panama and a maximum elevation height of about 360 metres. According to the approximate estimates published, the Panama cost about £50,000,000 sterling, and between 30,000 and 40,000 men were employed for about nine years. Huge ocean liners can pass through this canal, whilst the Trans-Syrian Canal is intended to carry only large lighters and steamers of a corresponding size (about the same as in Niederfinow). The dimensions and equipment of the new canal will therefore be correspondingly cheaper. Modern methods of work and very cheap labour may here be taken into account, but the corresponding estimates still show a total that would amount to about that of the Panama Canal.

As indicated above, the present project has been prepared with the object of arousing the world's interest in the whole question of uniting the East and the West and the restoration of the cradle of our culture and the ancient granary of the world. In the meantime, efforts are being made to raise the capital for the preparatory or "spade work."

To-day we have here a magazine of explosives that may be ignited by a spark, and nobody knows how far the effects of such a violent explosion may reach.

And great, even enormous, upheavals are imminent in the material as well as the spiritual world; if only the latter could come first, the former could be modified to a very high degree. It may be that we here have the chief importance of the Prophets. It seems to me that Nineveh's story shows this. (Read Jeremiah xviii, 7-10.)

Moreover, before the exodus of God's chosen people from Egypt, it was necessary for the plagues to visit that land. To-day the cry is again heard over the "Egypt" of our world

to the hosts of the homeless nations, "Let my people go," whilst the foot and mouth disease—the cattle plague—spreads over Europe as never before, and we stand helpless in spite of the alleged progress of medicine.*

Would that the world to-day would listen to the thunder of hoofs from the horses of war and pestilence, of which we read in Revelation, chapter vi, and gaze at the gathering of "Kings from the East" (chapter xvi) when the "River Euphrates was dried up"† and "the dragon" (note Japan's "Black Dragon" which stands behind her warriors) sows his seed.

In an article in the daily paper *Cross and Crescent* we read: "The enemy to be vanquished is the same for all these people, it is the Evangelical Christian and the Chosen People of God, and the Jews—the former now concentrated in the north-west corner of Europe,‡ the people who build on the Bible, oppressed in the east by bolshevism and now in the south by the "cross and crescent" combined, overwhelming Asiatic hordes against the "congregation."

The coming barbarians will thus meet no Varus in the Teutoburg Forest; the Catalanian fields lie open to these Huns of Attila; these Saracens fear no Poitiers. The new Charles Martel may himself bear on his own shield—the cross and the crescent—how like the hammer and sickle.§

When the human flood of the East again bursts over its banks, when some day Britannia's guardians of the "sluices" of the Khyber Pass are no more, then a new Jhengis Khan may burst the dykes, for then "all that remains is swept away" (2 Thes. ii, 7) by the "flood" of the new Deluge (Dan. ix, 26) from the mighty hosts of the East.

At Noah's flood the Ark was saved; in the New Flood (Rev. xii, 15 and 17), only Jesus Christ and Evangelical Christianity will save us. Let us but follow Him and we are secure. (The same elements that destroyed the world and creation lifted the Ark up and above decay.)

Christians, look at these events in the East to-day. Do not these open possibilities for the coming Armageddon "all

* In Deuteronomy xxviii, both the evil and the remedy are to be found.

† The peoples of Turkey and the Near East?

‡ *Cp.* Jer. xxxi, 8-10. I shall be pleased to give further details on request.
A. H.

§ Mussolini is proclaimed in Lybia this year as "The Mohammedans' Protector." (Read Baxter, *Forty Future Wonders.*) He was given the "words of Islam" (*cp.* Rev. vi, 4 and see *Trans. Vic. Inst.* 1930).

fighting against all," which draws near? Those who have studied the prophecies in the Scriptures have long expected this—the incredible, the inconceivable, namely, the unity of Cross and Crescent. Christians, read the sign of the times! It may be this is the prologue to the last act of the drama of the world's history.

The collective plan set forth above, based on the spiritual science of the Bible (the Prophets), would bring several advantages to the people and regions concerned, cultural, social, economical and political.

1. *Egypt*, whose 14,000,000 poor fellaheens must now have resort to dried camel dung as fuel and who rarely have a proper light in their "homes," would obtain 300,000 h.p. for light, heat and energy.

An electric incandescent lamp and a little hot-plate in every "home" would signify an enormous advance in culture for these people, an advance that can scarcely be over-rated.

And power at a price that would amount to only a fraction of what we now have to pay in Oslo.*

2. *Turkey*, by the erection of the great dam, would obtain the control of anything up to 2,000,000 h.p.

A valuable addition to Turkey's state revenues, well worth including in the budget for the great plans for modernising that Mustafa Kemal Ataturk Pasha is now carrying out.

3. *Syria*, which is now expecting to follow Irak and Egypt at an early date as sovereign state (kingdom), will have the "new Panama" which would be a new water communication between the Indian Ocean, the Mediterranean and the Atlantic. A small due per ton and the income from labour on these giant works and the traffic which thereby will result are well worth taking into consideration for a newly-established state like this. For a number of years onwards the revenues from the actual work on the canal will give an annual income of millions, and tens of thousands of unemployed will obtain work, and later on opportunities of procuring land—good land—and homes in the new Mesopotamia.

4. *The World* would find a solution of one of the most burning problems of to-day, Arab versus Jew in Palestine.

* A description of the work may be obtained from A. H. Cp. *Tek. Ukeb.*, No. 8, separate print.

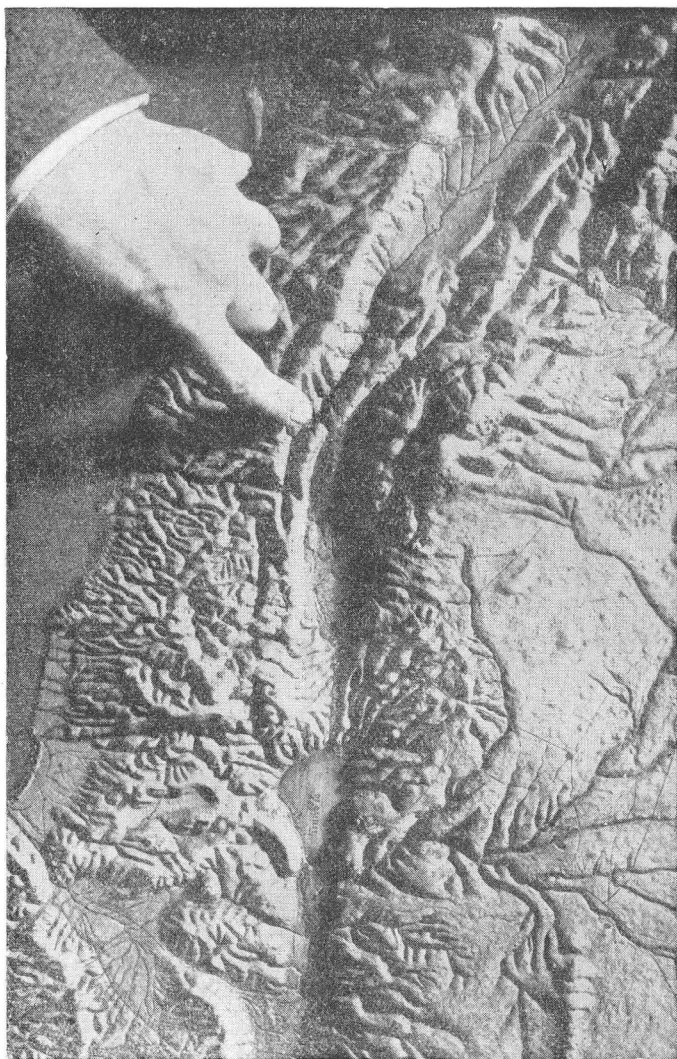


FIG. 8.—A. Hiorth's plan for turning the useless floods of the Litanie River through a small tunnel into the Jordan Valley. The dam (see finger-point) and the tunnel. The whole scheme, to be paid for by the power generated, easily 5 to 10,000 h.p.

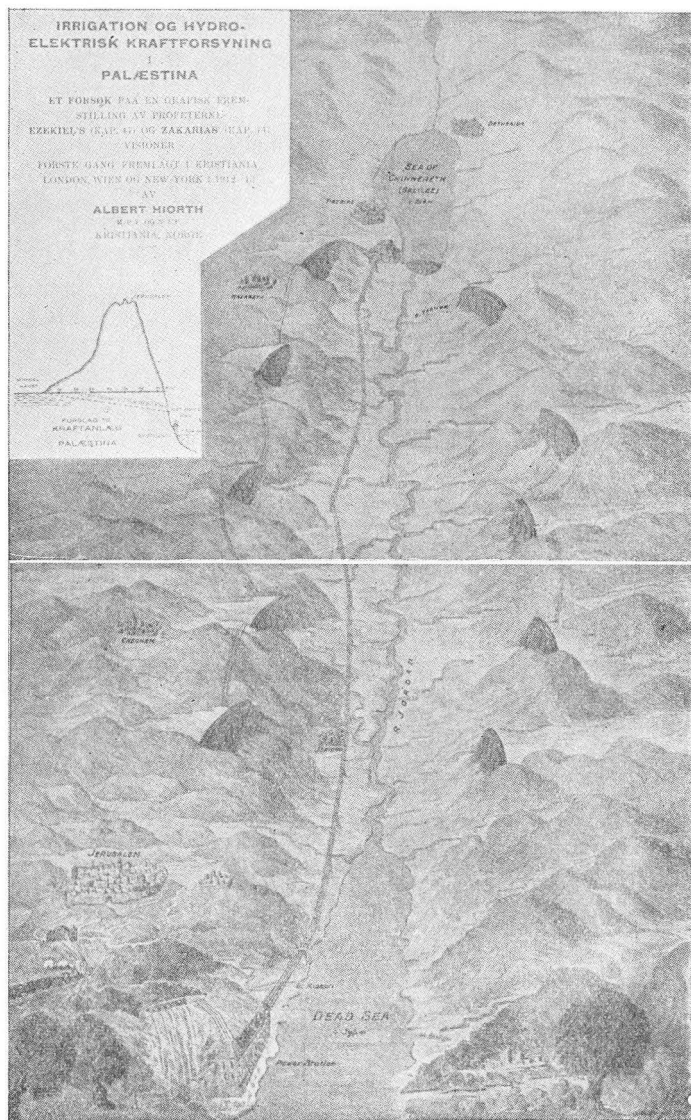


FIG. 10.—Proposed irrigation of Jordan Valley.

5. All those interested could there obtain more than enough land, and it would no longer be necessary to dispute over the crags of Palestine, a country the size of the county of Hedemark. Further, the world would obtain a new means of communication, a waterway parallel with the air routes from east to west, considerably shorter than the ships' route via Suez.

6. The World's Homeless will be given a chance, skilled unemployed will obtain work, the Jews of Poland and Germany, the outlaws and refugees of the Nansen Bureau, can be apprenticed to remunerative work, a worthy task even for the League of Nations.

"*But the expense*" will be the cry of all those interested, and with justification. "Imagine, perhaps £200 million." The fact is the entire plan would cost no more than that which is voted in one instalment for Japan's war against China.

Consider the advantages (and not only the purely material, immediate advantages) of such a plan. The whole world would benefit by its materialisation: first and foremost, all the millions of the Arabian world (estimated at 100,000,000); the seafaring nations by the shortened waterway, the interest of all in sheltering the world's most unfortunate (the scum of Europe), Arabs, Jews, Englishmen and all other most interested nations' social credit could be mobilised, a credit foundation being the immense wealth of the Dead Sea minerals, estimated by the Geological Committee at more than \$1,000,000,000,000.

By utilising quite a small fraction, a few per cent., of these minerals the whole of the plan sketched here might be realised. The store of potassium alone in the Dead Sea is estimated at a value of \$70,000,000,000.

The substitution of peace, well-being and happiness, first and foremost for some of the world's most unhappy people to-day, and for the tribe of Abraham in the Land of Promise of their forefathers and the "stranger in their midst," instead of brotherly strife, hunger and plague.

Truly a worthy task, even for a League of Nations to-day, and, if built on the foundation of the Bible, *ad majorem Dei gloriam*.

DISCUSSION.

The CHAIRMAN (Lt.-Col. F. MOLONY) said : Mankind is benefiting enormously by irrigation schemes, so we are bound to give most careful consideration to the great project which Mr. Hiorth has outlined in the latter part of his able paper.

A great deal of the paper is occupied with the fulfilment of prophecy. Now we shall all be agreed that there are certain predictions which we ought to try to fulfil. For instance, our Saviour's saying "This gospel of the Kingdom shall be preached in all the world." But Isaiah xli, 23, reads: "Declare the things that are to come hereafter, that we may know that ye are gods"; from this I gather that God has inspired some predictions in order that their fulfilment may testify to His divine wisdom. Now, if it come to be known that predictions have been fulfilled by men on purpose, their evidential value is largely gone. As we are a philosophic society we may well debate the question, what should Christians aim at? I submit that they should aim at the benefit of the human race, rather than at the fulfilment of prophecy.

Therefore we should consider a great project like this from a strictly practical point of view. It has three main items: the dam at Kefrkab in Turkish territory; the "New Panama" canal from the most westerly point on the Euphrates to the Mediterranean; and the canal connecting the two, and supplying water to the first canal. A map on the scale of 4 miles to the inch shows that the gorge at Kefrkab is very narrow and the site is apparently quite suitable for a big dam. This map gives aneroid levels at four places along the course of the Euphrates with which we are concerned. But if this reservoir is to stretch 120 miles to Bibol, the dam at Kefrkab must be 600 feet high. Now the highest dam constructed till the year 1921 was only 266 feet. The water at Kefrkab only needs to be 100 feet deep to supply the "New Panama" canal with water. A 200-foot dam would do this easily. Presumably the great extra height is planned so that the Kefrkab dam can irrigate the Euphrates valley and supply power for making electricity, and act as a great storage reservoir for use in dry seasons. A dam 600 feet high is an alarming proposition, but not unprecedented, because a dam has been made at Black Canyon on the Colorado river which raises the water 584 feet and forms a lake 115 miles long.

It cost £33,000,000. The site was peculiarly favourable at Black Canyon, because the breadth of the dam is scarcely more than twice its height, so the dam is curved on plan.

If we take the average depth of the great reservoir as 150 feet, the extent of the catchment area as 45 times that of the reservoir and the rainfall over it as 20 inches per annum, then the reservoir would take two years to fill, or three, if we allow for evaporation.

Imagine this whole scheme in working order. Hundreds of square miles in Iraq successfully irrigated. Long canals, irrigation cuts, drains, roads, farms, villages all in use, and the "New Panama" canal carrying a lot of produce to the Mediterranean. Then suppose that the Turks first empty the Kefrkab reservoir, and then shut the sluices and keep them shut! They could inflict a 3-year drought upon the irrigated land of Iraq. Oh, but you say, "then the Turks would lose their electric power." Yes, but it is possible to find substitutes for electricity used for lighting and power purposes, but there is no substitute for water. In view of these facts will not Iraq say, "We prefer to have the reservoir in our own territory on the Tigris."

So the scheme seems to me to have no prospect of success until the whole Euphrates is under one Government. Even if this came about, I still could not advise anybody to invest money in this, for does not experience show that very great companies often have to be reconstructed several times before they begin to pay?

As chairman, I am very sorry not to be able to endorse this most interesting project. I think that it is generous of Mr. Hiorth to press his friend's project, while allowing his own projects for Palestine (which he laid before us in 1923) to fall into the background. But I think he would be fully justified in reversing his policy by pushing his own projects and dropping those of his friend. We thank him most cordially for bringing this most interesting plan to our notice.

Rev. ARTHUR W. PAYNE warmly thanked Mr. A. Hiorth for his paper, and especially the lantern illustrations on the topic "From the River of Egypt unto the Great River, the River of Euphrates." Whatever might be the effect of the dam suggested by Mr. J. Stone, there was already some work of importance of that nature in Iraq.

When in 1938 the speaker took the 600 mile journey from Damascus to Bagdad in the Nairn Safety car he crossed the Euphrates and the Tigris and saw the remarkable barrage of the former river. That something more was necessary to be done was experienced on the home journey back from Mesopotamia to Palestine for the Euphrates was in flood and suddenly within a few hours a lake 60 miles round had been formed, and it was necessary to travel 60 miles farther to get home to Damascus.

The pictures of the snow regions shown by the lecturer reminded one of the fact that it is largely the melting of the snow of Ararat (on which Noah's ark rested) that chiefly causes the supply of water for the two great rivers of Mesopotamia, viz., the Euphrates and the Tigris.

With regard to the question of the irrigation and illumination of Palestine, there are three Jordan power houses arranged for, two below the Sea of Galilee, the third more north, near the Waters of Merom.

There are also substation power houses at Haifa and Tel-aviv established and in use. When the Rutenberg Scheme was being installed the Arabs said that the posts in Jaffa would serve usefully on which to hang the Jews, but when they saw the benefit they were enjoying in Tel-aviv they soon were glad to take advantage of this power and lighting system themselves.

One remembered also when Sir Herbert (now Lord Samuel) came to Jerusalem as first High Commissioner the Arabs said: "He won't be alive in 10 days," "Shoot him." "Shoot him." However, he stayed for his full five years, and at his departure from the Holy Land came at the season of *Hanuka* (Feast of Lights or Dedication, about our Christmas time) to Haifa and switched on the electricity, and it was indeed a delightful scene to see all the varied coloured twinkling lamps for the first time shining out over that now great city and harbour.

One was, however, specially glad to Mr. Hiorth for his reference to the spiritual needs of supply of power illumination, and one realises that real and lasting blessing can only come for Palestine, the Near East, and the world from that stream which flows clear as crystal from the Throne of God and of the Lamb, from God our Creator and God our Redeemer.

Mr. H. W. BRYNING said: The paper read by Mr. Hiorth is very interesting in its possibilities, but I cannot see that it provides a solution to the more pressing problem which confronts the British Government in the administration of Palestine.

I refer to the Arab-Jew problem, which is no new thing. For these claimants to the whole of Palestine know very well that this land is the heritage of the twelve tribes of Israel. However, the world has been tutored to believe that the Jews represent the "Israel of God" in Palestine to-day, and that the other tribes were cast away by God as rebels, whereas the reverse is the case as any Bible student knows.

These facts are basic to an understanding of the Arab-Israel problem which is clearly misunderstood by both the parties to the struggle, as neither realise that Great Britain stands to-day in the place of the dispossessed house of Judah, by Divine right, not by right of conquest, being the nation to whom Jesus Christ referred in Matt. xxi, 43, and by whom Jerusalem was rescued from Gentile dominion.

It has been argued that the British are Gentiles, but those who have said so do not realise that the Jews are now to be classed as Gentiles since their rejection of the Lord's anointed, whom their ancestors crucified. The expression "Jews and Gentiles" is therefore now changed to *Christians and Gentiles*.

The Arabs are well aware of the significance of the fall of Jerusalem during the Great War, and would most probably have accepted the position as British subjects but for the unfortunate and embarrassing Balfour Declaration, which, by the way, was only intended to provide a home for persecuted Jews. Regarding the Jews, who are of the Tribe of Judah, refer Jeremiah iii, 11, and xix, 1-11. Also Matt. xxi, 43 and Luke xxi, 24.

I may close with the remark that the lecturer's reference to Isaiah xix, 23, 24 may be taken to refer to the state in Palestine, Egypt and Assyria after the "time of the end" as the reference is to that Great Day of the Lord. This is very obvious from the phrase "*in that day*" which also occurs in Isaiah ii, 11, "and the Lord alone shall be exalted in that day."

AUTHOR'S REPLY.

I beg to thank the hon. members who have so kindly given their valued opinions in this—to me—most enlightening discussion.

Our hon. chairman, Lieut.-Col. Molony, kindly refers to Isaiah xli, 23, a passage that I cannot take to refer to Christians.

In my lecture, page 138, I referred to this chapter, verses 18-20, running thus :—

“ ‘ I will open rivers in high places, and fountains in the midst of valleys—I will make the wilderness a pool of water and dry land springs of water ’ . . . all this is done ‘ by the Hand of the Lord ’ . . . but He uses His human servants to perform the manual work : ‘ for I the Lord thy God will hold thy right hand . . . I will help thee . . . behold I will make thee a new sharp threshing instrument, having teeth, thou shalt thresh the mountains, and beat them small, and shalt make the hills as chaff—Thou shalt fan them and the wind shall carry them away, and the whirlwind shall scatter them ’ ” (vs. 15-16).

Could the modern stone-cutting tools and rock-blasting devices have been more accurately foretold, literally ?

* * * * *

Having thus understood these Biblical prophecies for our day, I could not help putting the schemes before the world (even if a debate in our Philosophical Society should decide that thereby the evidential value of the said prophecies be gone), and I do believe even hereby to “ aim at the benefit of the human race ” (*not rather than, but) building upon the fulfilment of prophecy* : “ Ad Majorem Dei Gloriam.”

* * * * *

I cannot enter upon a discussion on a 600-foot Bibol dam as I have no data to work upon. Mr. Store proposes a dam 120 metres high only.

* * * * *

I quite agree that a super-government (Turkey, Syria, Iraq) should be in force—fundamentally different from those now in force. I pointed to “ the day ” when “ Israel shall be the third with Egypt and with Assyria—even blessing in the midst of the

land—whom the Lord of Hosts shall bless, saying: blessed be Egypt My people, and Assyria the work of My Hands, and Israel, Mine inheritance ” (Isa. xix, 23–25).

* * * * *

As to finance, I may say that I never for a moment thought of—or wished—this plan to be floated on the lines of the “ big companies ” now in vogue ; on the contrary, I tried to point out a new way, viz., to mobilise the social credit of all the nations concerned, and mentioned the pooled interests of all the countries of Isa. xix, 23–25, with re-united Israel* as the centre of gravity and the pivot of the Scapa-Flow-Singapore axis ; from hence the accumulated blessings of the everlasting covenants of God will go forth, extending even to the genuine League of Nations, the Commonwealth of Theocratic Nations, finally embracing the whole world (Gen. xii, 3 ; Psalm xxv, 13 ; lxvi, 1–4 ; lxxxiii, 4–8 (now) and 18 ; Matt. v, 5, and Micah 4).

The wise promulgators of the Statute of Westminster seem to have been providing for this—the Scriptural—issue.

Of course, Mr. Bryning is right in distinguishing so clearly between the two separate peoples (“ Jews ” and so-called “ Ten-Tribe Israel ”), a fact that I tried to emphasise in the early part of the lecture, also that the re-united twelve tribes are finally to possess the whole promised land (Gen. xv, 18) and according to the partition-document in Ezech. xlvii, 3.

Major Scott-Phillipps’s diagram, from his Aberdeen lecture in 1859, was shown on the slide, and as to the Arabs, the Bible passages of Gen. xvi, 12 and 25, 6 were quoted, the area located “ eastward to the east ” (Kedem).

Personally I believe to see Ezech. xxxvii being fulfilled to-day (especially after 1897, Basle Conference of Zionists). The “ Jews ” get their national home in the smaller demesne of the great promised land (“ Erez Israel ”) together with prototypical “ Joseph,” wielding the mandatory rights ceded by 56 nations—flying the Union Jack (Union of Jacob’s sons) over Jerusalem (Ezech. xxxvii, 13, 16, 17 and 19–22).

In the near future the verses 10 and 24–28 should be closely watched in the light of current events by ALL CHRISTIANS wishing

* Representatively, Jer. 3, 14–18 a “ seventh Dominion.”

to serve the persecuted Jewish brethren, who gave us the fundamentals of our civilisation: our Bible and our Saviour Jesus The Christ (Gen. xii, 3, the blessing).

I wish to express my warm thanks to the Rev. A. Payne for the interesting personal observances in the lands of Iran and Iraq, but more especially for his sublime SPIRITUAL views of the passages I have treated materially-technically only.

818TH ORDINARY GENERAL MEETING,
HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, MARCH 21st, 1938,
AT 4.30 P.M.

LT.-COL. F. A. MOLONY, O.B.E., IN THE CHAIR.

The Minutes of the previous meeting were read, confirmed and signed and the HON. SECRETARY announced the election of Mrs. C. M. Craig as an Associate.

The CHAIRMAN then called on E. R. Bevan, Esq., O.B.E., D.Litt., LL.D., to read his paper entitled "The Teaching of Jesus about Non-resistance to Evil."

*THE TEACHING OF JESUS ABOUT NON-RESISTANCE
TO EVIL.*

By EDWYN R. BEVAN, ESQ., O.B.E., D.Litt., LL.D.

IF one states the bald fact that Christians profess to regard the words of Jesus as words of God, profess that they owe to the Lord absolute obedience, and at the same time never dream of carrying out those utterances of Jesus in the Sermon on the Mount, which are couched in the imperative mood and have, consequently, the form of commands, it must seem at first sight a strange anomaly. "If thy right eye offend thee, pluck it out and cast it from thee." I believe some intransigent sects in Russia in former days carried this out: some of their members did pluck out their right eyes, but one does not hear of Christians elsewhere doing it. "Resist not evil: but whosoever shall smite thee on thy right cheek, turn to him the other also." Certainly most Christians, if assaulted by a hooligan in the street, would call a policeman. "If any man will take away thy coat, let him have thy cloak also." A Christian master who discovers that his valet has been making depredations in his wardrobe is unlikely to press the man to take also his new overcoat. "Give to him that asketh thee, and from him that would borrow of thee turn thou not away." Rich Christian philanthropists usually

find a pile of begging letters on their breakfast table every morning, and the richest of them, unless he said No to a very large number of the appeals, would soon find himself reduced to beggary.

Yet there the commands of the Lord are, seemingly, plain in meaning. No wonder that opponents of Christianity have often made this apparent want of correspondence between what Christians profess and what Christians do a subject of bitter mockery. Usually the opponent does not himself think the commands of Jesus practicable or salutary ; he will not himself abjure all resistance to evil ; perhaps he is not prepared to say that his country should abolish its army and navy and police force ; but from this safe position of non-committal for himself he will maintain that Christians, if they were true to their professions, would be absolute non-resisters and sneer at them because they are not. The Church, we hear it said over and over again, discredited itself entirely because its ministers, during the Great War, did not proclaim that it was wrong for any Christian to bear arms in battle. Even people who were not themselves conscientious objectors thought it miserably inconsistent of Christians not to be.

But it is not only that opponents of Christianity have made capital out of the anomaly. Some Christians themselves have felt uncomfortable about it. The Society of Friends, as we know, has always maintained that Christians ought to carry out, just as they stand, some of the commands which other Christians do not carry out literally. I never heard of Quakers plucking out their right eye, nor do I think that the rich Quakers, who have certainly been liberal with their money for philanthropic purposes, have ever given to every one, literally every one, who asked of them. But Quakers have followed the command "Resist not evil" with a more literal closeness than the generality of Christians ; they have adhered in profession and practice to the view that a Christian man ought under no circumstances to fight against other men in war. An even closer adherence to the command, literally understood, was made by Tolstoy a principal part of his interpretation of Christianity. He disapproved, I think, not only of all participation in war but even the use of force by governments for the coercion of criminals. The Society of Friends has never denounced the police as an unchristian institution. To all criticisms by other Christians, Quakers and Tolstoyans have replied : " We are just

doing what Jesus said: there the command is in the New Testament: how do you justify your disobedience?"

Various ways have been taken by Christians of justifying the disagreement between their actions and the precepts of the Lord Jesus. I think one must admit that some of these ways are unsatisfactory. One way is to say that the precepts are not meant to be literally carried out, but to illustrate a general principle. This seems very unsatisfactory. How can they possibly illustrate a general principle if they are not meant to be literally carried out? You can illustrate a general principle of conduct, that is, a rule which, for the most part, holds good, if you describe how anyone should normally act in a given set of circumstances. Let us suppose the circumstances to be that a hooligan has assaulted you in the street: if then your turning the other cheek and not calling in the police force is the normal way in which you should act in order to conform to some more comprehensive general rule, you may rightly use the special circumstances of this particular case in order to give an example of what the general rule means in practice. But if your turning the other cheek would *not* be the normal way in which you should act in those particular circumstances, then the supposition of your doing so can no longer serve as a typical exemplification for a general principle of conduct. Let us take an analogy from the rules of the road. We may say: "Supposing your car comes up close behind another at a blind corner or bend you must never overtake." That may be regarded as the illustration of a general principle of conduct, securing safety on the road, because it is what ought literally to be done in certain particular circumstances. But if after having laid down the rule about not overtaking at a corner, you added: "That, you understand, is the illustration of a *principle*, but, in actual *practice*, everyone does overtake at a corner, and does so quite rightly," then to speak of the rule as illustrating a general principle of conduct would be simply absurd. You cannot give an instance of the application of a general principle of conduct in a particular supposed set of circumstances unless you state the line of action with ought literally, in those circumstances, to be followed.

Another way of explaining the inconsistency between the precepts of the Sermon on the Mount and the practice of Christians is to say: "The commands of the Sermon on the Mount hold up an ideal, the utmost that would be reached by perfect sanctity; the practice of ordinary men may approximate

more or less to them, but ordinary Christians cannot be expected to go such lengths in self-renunciation and submission to evil. The Lord Himself does not expect it of them." Surely this plea will never do. An ideal type of conduct is one which, even if we fall short of it, we ought always to be striving to realise, one which we should feel ourselves blameworthy for not realising. But an ordinary Christian, supposing he is assaulted by a hooligan in the street, does not make an effort to exercise self-restraint and not call the policeman, then yield through the frailty of human nature and call the policeman, then go away feeling guilty for having fallen short of the ideal. He thinks he did quite right to call the policeman. If the precepts of the Sermon on the Mount were an ideal for conduct, however great a demand that conduct might put upon human nature, Christian preachers should be continually holding it up as something we ought to be trying to realise. They ought to tell us: "Perhaps you have been assaulted by a hooligan and called the police. Certainly we know the flesh is weak; but if again such a thing happens to you, you must pray for grace to give you greater self-control and offer the attacker the other cheek. What human nature cannot do in its own strength, it can be enabled to do by the Spirit of God." That is how preachers ought to talk if the precept to turn the other cheek were just a very high ideal which it needs supernatural virtue to attain. But we know that Christian preachers do not talk like that.

Sometimes the line taken in this connection is to say: "The idea of a man turning the other cheek to a hooligan appears impracticable to you because you are thinking only of what ordinary men are, but if you think of the spirit of Jesus, and its power to quell evil by the way of love, you would see a better way of overcoming evil than the use of force." Mr. Gandhi says very much the same thing, but, being a Hindu, he more commonly uses the term "soul-force" than "the spirit of Jesus." Though there is no attempt to resist evil by force, evil must in the long run, we are told, give way to the great force of love (or "soul-force"), and if we ourselves had the spirit of Jesus we should see its being conquered everywhere. And that is the only real conquest of evil, because, while force can only check certain outward actions on the part of the man of evil will, the force of love can change him internally, so that he wills evil no more. We must allow that this line of argument does proceed upon certain great truths. It is true that there is a great power in

love to change the evil will of men. Many cases may be brought forward in which all application of force had left a man's bad heart hard and resolute, but some manifestation of love broke the man down. It is true that if there were more people who had the spirit of Jesus, and if those who have it in some degree had it more, we should see more such cases of the conquest of evil by love than we do. But when the argument implies that whenever evil is encountered by the spirit of Jesus it inevitably gives way, that all resistance is melted, it forgets two things. One is the free will of man, by which men may go on choosing evil persistently in spite of all the power of love bearing upon them. It is absurd to think that if we had more of the spirit of Jesus all evil would melt from our presence, when all evil did not melt from contact with Jesus Himself. When Jesus came into contact with the evil will in Caiaphas and Pilate, Caiaphas and Pilate were not converted by His actual bodily presence and living speech. Among his twelve Apostles one in the end betrayed Him. It is difficult to think of any one who was subjected more intensively to the spirit of Jesus, to the "soul-force" of Jesus, than Judas Iscariot. Some two or three years of close and intimate companionship, seeing Jesus continually, listening to Jesus continually, and at the end of it all the heart of Judas was the heart of a traitor! The other thing that the argument often forgets is that even when the spirit of Jesus, or "soul-force," does conquer, it sometimes takes very long to do so. The most signal instance in history, I suppose, of conquest by "soul-force" is the acceptance of Christianity by the Roman Empire. At the beginning you see the little scattered congregations of believers, poor people for the most part, unarmed and helpless, and on the other side the gigantic power of the Roman Empire with its armies and vast machinery of government. The Empire directs its power to annihilate the Christian Church, and the Christians literally carry out the precept to offer no resistance to this tremendous satanic will; they let themselves be dragged to prison, thrown to the beasts in the amphitheatres, tortured and killed. And in the end the Roman Empire surrenders. The Roman Power at the beginning of the period condemned Jesus to the death of a common criminal, and three hundred years later the Roman Cæsar was doing homage to the instrument of execution, to the Cross. A marvellous conquest by spiritual power without any resort at all to material force! Yes, a marvellous conquest, but it took three hundred years!

Whatever, then, the spirit of love or soul-force may accomplish, one sees that, if no forcible resistance is offered to the evil will, one must expect, for a long time at any rate, the evil will to get its way unchecked. If, in the spirit of Jesus, you offer the other cheek to the striker, you have no ground for confidence that your act of love will melt the heart of the striker and that he will not strike you on the other cheek. If it is a question of protecting someone else from outrage, you can have no ground of confidence, that, if you bring the spirit of Jesus to bear, the outrage will not be perpetrated, whereas in many cases it might be prevented if you used the force at your disposal. We must, then, not attempt to get out of the difficulty by pretending that there is always another way besides force by which the evil will can be overcome here and now. We must clearly envisage the truth that in a large number of cases the operation of the evil will can be prevented by the use of force, and that if, instead of using force, you offer no resistance, the evil will is likely to accomplish its purpose. Supposing, then, you act on the precept laid down by Jesus in the Sermon on the Mount, you must be prepared to see in all these cases evil prevail, which you might perhaps have prevented.

What can we make of these commands that stare at us from the pages of the Gospels? If we have no intention of carrying them out, if we do not even think it desirable that we should carry them out, how can we go on professing to regard the Lord Jesus as an authoritative guide for life? Let me try to state the way in which I myself should answer these questions. I begin by repeating what I said just now, that I do not see how any precepts can be regarded as showing the ideal kind of conduct, or as illustrating a general rule of conduct, unless they mean that the kind of action they enjoin is to be performed literally as they describe it. There are, of course, cases in which a command may be couched in definitely symbolical language, as some of the ancients supposed that the Pythagorean maxims were. The maxim, for instance, *Μαχαίρη πῦρ μὴ σκάλευε* "Poke not the fire with a sword," was explained to mean "Do not provoke by a sharp word a man who is of fiery and irascible temper" (Iamblichus: *Protrepticus*, Teubner, p. 112). It might be held that the language in which Jesus bids men in certain contingencies pluck out their right eyes is of this metaphorical kind. But where Jesus bids men not resist evil or give to everyone who asks of them or invite a thief to take even more than he

had intended, it would seem extravagant to say that this language was metaphorical. It may be possible to understand how a painful renunciation of natural desire is described figuratively by the phrase about plucking out the right eye ; but what possible kind of action other than that stated could be meant by not resisting evil or letting a thief take more than he had intended ? No, I think we must say that if Jesus speaks with authority, when he prescribes that conduct, it must be a kind of action which ought to be done literally, as He describes it. It is, I believe, the right kind of conduct between man and man if you take the two people immediately concerned in isolation. Let A and B be two men : A strikes B on the left cheek ; what, considering these two individuals by themselves, apart from any complications made by their social environment, ought B to do ? He ought to let A strike him on the right cheek also. Let us suppose that there are no social complications, that A and B are two men wrecked on an uninhabited island, without any hope of rescue in a foreseeable future, and let us suppose that B is a Christian, really filled with the spirit of Jesus, and that A is an unregenerate bully. How will B in such circumstances behave ? He will carry out in the most literal way the precepts of the Sermon on the Mount. If A strikes him he will not strike back : if A violently takes away one of the garments B had saved from the wreck, B will not resist, but even allow A to take more : if A compels B to walk a mile to cut wood, B will be ready to walk another mile to fetch water.

What makes the difficulty for us, when we try to apply the precepts of the Sermon on the Mount to our conduct is the social complications. It is not a case simply of A and B, but of C and D and E and all the multitude of other persons who constitute the social environment of A and B. Now the most strictly literal interpreter of the sayings of Jesus would have to admit in many cases circumstances in the social environment which qualified the command. " If any man compel thee to go with him one mile, go with him twain." But supposing you are a doctor hurrying to the bedside of someone gravely ill, and supposing a highwayman compels you to go with him a mile in the opposite direction, will you, in that case, think it right to go with the highwayman another mile, and leave your patient unvisited ? Would you not even think it right to wrench yourself, if you could, out of the highwayman's grasp, before the first mile was completed, and speed to the sick man's side A robber

takes away your cloak. But suppose you are a servant, and the cloak is part of your master's livery, would you in that case invite the robber to take the coat as well, which was also your master's? Even the most extreme Tolstoyan would say, I think, that in such cases the Lord's command was not to be literally carried out. He might indeed say that the social complications in the two cases supposed were exceptional, and that in the great majority of cases there were no social complications to prevent the literal fulfilment of the command. I do not think that would be true. So long as A and B are persons living, as we do, in a social environment, there must always be complicated circumstances of some kind to affect the mutual action and reaction of A and B. If a hooligan assaults you in the street and strikes you in the face, you must, so far as you alone are concerned, be ready to offer the hooligan the other cheek; but such a hooligan left at large is a menace to a much larger number of people than yourself, and, if a policeman is in sight, you call him and give the man in charge. Your valet steals an article of dress from your wardrobe. Would not a Christian really full of the spirit of Christ regard all his clothes as a livery for the Lord's work? We have a plurality of coats for the exercise of different social functions. A man who possessed nothing but one country tweed suit and no dress clothes might find it impossible to carry out the particular role in society which he believes to have been assigned him by God. If in carrying out that role he is doing God's work in the world, as God's servant, the different garbs necessary for the discharge of his social functions may be looked upon as livery. To that extent what applied in the supposed case of a servant whose livery cloak is taken away by a robber applies to the man whose evening coat has been stolen by his valet; he will not press the thief to take the tail-coat he wears at weddings as well. And so on. The actions which we perform in our ordinary lives are throughout actions more or less determined by the social environment, not simply by our mutual relations to one other person.

The precepts of the Sermon on the Mount may thus be compared to the mathematical computation of what the trajectory of a bullet would be, supposing it took place in a vacuum, according simply to the dynamic force of its original propulsion compounded with gravity, no disturbing circumstances such as wind being taken into account. In actuality, there always are some disturbing circumstances, but if you know what the trajectory

of the bullet would be without them, you can allow, more or less precisely, for these circumstances in practice. Similarly the precepts which determine the proper conduct between A and B taken in isolation, may help to indicate our proper conduct in actual life when social complications have to be taken account of.

It may be said : If there always are, as a matter of fact, social complications which prevent the literal fulfilment of the command, what value is left to the command ? The answer is, I think, in the first place that certain motives which play a great part in human action ought, in accordance with the command, to be completely eliminated. When A and B are considered in isolation and A strikes B the natural reaction of B will be to hit back vindictively. No one can do us a wrong without provoking in us the desire to make him suffer in return. None of us can suppose ourselves free from the liability to be actuated by a vindictive motive. When A and B are considered in isolation, you can see the working of the vindictive motive, should B hit back, or try to restrain A by force. Social considerations being ruled out, such action on B's part can proceed only from a self-regarding motive. If that motive were quite eliminated, B would act just in the way the precept of Jesus described. But if B acts as the member of a society, then, even if the vindictive motive, or the self-regarding motive, has been eliminated, B will perhaps use force, or invoke force, for the restraint of A. His action may thus look externally the same as the action which, if he had taken it in a desert island, could have proceeded only from the self-regarding motive. If the precepts of Jesus were obeyed, the vindictive motive would be entirely eliminated from the actions of His followers. But the quality of an action is determined more by the motive behind it than by its external appearance : thus the actions which Christians do as members of society, even if they look externally the same as actions which proceed from a vindictive or self-regarding motive, may be wholly different in moral quality.

But it is not only that actions externally the same as those which would proceed from a vindictive motive are now done from a social motive ; the complete elimination of the vindictive motive would mean that in many cases the action would be also externally different. For we did not have to wait for the Freudian psychology to know how easily we all deceive ourselves about our motives. Supposing the action which proceeds from the vindictive motive is externally the same as the action which would proceed

from the social motive, it will scarcely be but in many cases where a man professes that his action proceeds from a social motive, where he really believes himself that he is acting purely from a social motive, the vindictive motive, the self-regarding motive has crept in and is that which really determines his action. The man who calls a policeman and gives the hooligan who has struck him in charge may tell himself that he is acting simply in order that society may be protected from a dangerous villain, but it may also give him a keen vindictive joy to see the man who has struck him in the hands of the police, and the desire for that satisfaction would, if the truth were told, have led him to call the police, even if no social considerations had come in. The actions which purport to be determined by social considerations in our environment are no doubt largely determined in reality by self-regarding motives, so that if the self-regarding motives were eliminated many actions now taken would not be taken at all.

Similarly in the case where we do not allow the man who has taken our property to go off with it, and do not invite him to take more, our action may be prompted by the social consideration that the man who takes our property is also likely to prey upon others as a thief, but it may be prompted by the keen sense that we have a right to hold what is our own and resentment that anyone should take what is *mine, mine, mine*. If that is our real motive, we are disobeying in our heart the precept of Jesus, and the elimination of the self-regarding motive would mean that even in regard to a thief our action would often be different—different externally.

We spoke of the case of someone who found his valet stealing articles of his clothing. The vindictive or self-regarding motive would lead the master instantly to prosecute the thief and have him put in prison. Even if the vindictive or self-regarding motive were absent, a master, animated by the spirit of Jesus, might, for social reasons, prosecute the thief and have him put in prison. But if I were animated by the spirit of Jesus, I should never regard the offender simply as a thief to be restrained and punished. I should regard him also as a brother, for whom the heavenly Father cared; I should be concerned to understand how the man had come to yield to the temptation of stealing: I should do what I could to help him, even if he had to be temporarily imprisoned, to recover his standing as an honest man, and make good. I might not indeed invite him to take further articles out

of my wardrobe, but I should be ready to incur expense, if, by so doing, I could set him on his feet again. It really would make a great difference to the action of those who profess to be followers of Jesus, if the vindictive and selfish motive were entirely done away.

I contended just now that, even if Christians were actuated in the fullest sense by the spirit of Jesus, it was a delusion to suppose that the evil will of men would necessarily yield to their influence. There are undoubtedly many cases in which the evil will would not yield to the spirit of love, while it *can* be prevented by force from having its way. But it is unquestionably true that where the evil will *is* overcome by the spirit of love, such overcoming is enormously preferable to forcible restraint. Where there is any hope of the evil will being overcome by the spirit of love, it is a tragic pity that force should be applied, and frustrate the work of love. How often that tragedy occurs! How often the will that might have been won by love is hardened in its evil by the use of force! That is the great truth which is behind pacifism, and is misrepresented by pacifism. Pacifism is right in seeing how greatly preferable it is to overcome by love, but refuses wrongly to see that such overcoming is often impossible, and that the use of force has then to come in as a second-best, a vastly inferior second-best. Even when the use of force produces a better state of things than could have come about if force had not been used, the use of force is hardly separable from a great deal of evil. Perhaps there is a balance of good in the result, but there is pretty sure to be a sad amount of evil to set against the good.

That, of course, applies specially to war. The evils and horrors of war can hardly be exaggerated. Whether modern war is on the whole worse than war in former ages I do not know. In some ways it is undoubtedly worse; in other ways its horrors have been mitigated, by the ambulance work, for instance, in a modern war, as compared with the horrible treatment of the wounded in less scientific days. It is only when we consider, on the other side, the evils which would in any given case follow from non-resistance to an aggressor that war may appear the lesser evil. I do not myself think that Chiang Kai-shek, as the Christian head of a great state, ought to tell his people to lay down their arms and let the Japanese trample on them as they please. One pacifist argument is, I think, demonstrably unsound. We are commanded, it is said, to love our neighbours, and it

cannot be an act of love to our neighbour if we try to kill him. "No one can say that it is an act of love to stick a bayonet into a man." The fallacy is shown in what has already been said about the difference of considering A and B in isolation, and considering A and B together with the complications of their social environment. My action towards a particular neighbour cannot always be the action which would be right if I considered that particular neighbour by himself in isolation. I have always to consider a vast number of other neighbours, and sometimes what would be an uncharitable action if one particular neighbour, or a few particular neighbours, were considered in isolation, is the action dictated by charity towards a much larger number of neighbours. If I am the driver of a railway engine and see a neighbour of mine standing on the line too near for me to avoid killing him except by wrecking the train and killing a large number of neighbours behind me, charity would prompt me to go straight ahead and kill my neighbour on the line. Supposing I were placed as an armed guard to protect the water supply of a great city against some malignant set of people who wanted to infect it, and saw two or three of them, some way off, creeping to where they could achieve their purpose, charity would prompt me to take the best aim I could with my rifle, so as to kill them all. Thus it is fallacious to test the charity of any action by asking how far it is an act of love towards the particular people immediately affected by it, considered by themselves. In a sense, indeed, if my action was right when I drove the train over my neighbour on the line, or carefully shot two or three of my fellow-men creeping to infect the water-supply, my action was one of love even to them, when the social environment which is theirs as well as mine is brought into consideration. If the man on the line was a perfectly good man he would desire that I should run over him and kill him rather than wreck the train; thus I was doing what he himself, if he chose his highest good, would desire. Similarly, if the men who wanted to infect the water supply ever came to apprehend their own greatest good they would be glad that they had been shot rather than that the city should be ravaged by a plague. They might thank me for it in another world. But in neither case would the action I took be the action which would have been prompted by love to that particular neighbour, or those particular neighbours, considered by themselves. Thus even if a man's trying to kill his fellow-men in war is not an action which would be prompted by love to those

fellow-men considered in isolation, it may still be that his action is that prompted by consideration of the greatest good for mankind. It is not killing which, always and in all circumstances, is unchristian, but hating, and that war is certain to stir up hatred is a thing more terrible, spiritually, about it than the killing. "That," the pacifist says, "is dishonest casuistry, since it is quite plain that killing men in war cannot be separated from hatred of them, and it is just another case where fine moral reasons are found to justify our giving evil tendencies the rein." I do not think the pacifist is right in saying that you cannot kill men without hating them, but it is true that to kill men without hating them is very difficult; nor do I think the pacifist right in saying that you cannot really have a good motive for doing something which the bad elements in human nature might have urged you to do; but it is true that we are all very liable to deceive ourselves and allege fine moral reasons for actions which we really do for bad ones. Thus, although the preceding argument has been directed to show that the pacifist position is a mistake, it may well be a very good thing that the pacifists are always there to challenge our sincerity and compel us to examine ever again, as honestly as we can, the motives from which we act.

DISCUSSION.

The CHAIRMAN (Lt.-Col. MOLONY) said: In view of the present state of Europe, this paper is surely timely. But the questions with which it deals are always before us. Every Sunday School teacher has to face them.

I do not think that any of the generals I served under would have liked all they said to be construed as "orders." Many hold that Christ only gave one order, that we should love one another, and that the rest was meant as advice.

There is a passage in St. Luke's gospel which bears on the matter which Mr. Bevan has set before us. Luke xxii, 36, reads: "He that hath none, let him sell his garment and buy a sword." I was once told at a Pacifist meeting that the word "sword" there means "large knife." But I consulted a learned D.D. about it, and he turned up the passages and said: "In some of the passages the word might mean 'large knife,' but in most of them it plainly means weapons. Shortly before, Christ had been speaking of the time of anarchy which He foresaw would shortly come upon Judea,

when all forms of police protection would be withdrawn and when it would be necessary for every man to carry a sword to protect his women from bandits and robbers.

As regards the passages from the Sermon on the Mount, which Mr. Bevan has been talking about, I believe that it is the case that the Romans enforced a by-law which entitled a Roman soldier on his journeys to compel any countryman he met to carry his equipment one mile, but not more.

Certainly the right plan for the countryman would be cheerful compliance. Christ probably meant that His people would be wise to co-operate with the Romans. Is it not likely that our Saviour also had the Romans in mind when He spoke about turning the other cheek? We may be sure that these Roman soldiers were much harsher and freer with the use of their hands than even their officers liked, yet to show resentment would have been futile and dangerous.

Mr. Bevan's analysis of the motives by which we ought to be actuated in these cases is surely most instructive.

Of course our lecturer is right in saying that war is certain to stir up hatred. Towards the end of the South African war of 1899, while there was still great bitterness at Capetown, there was little at the front; because both sides had tried to observe the Geneva Convention, and had performed various kindly acts for the other side. It is possible to obey Christ even in war.

We heartily thank Mr. Bevan for a very instructive paper.

MR SIDNEY COLLETT said: The Sermon on the Mount is a very important subject, for in it we are dealing with words uttered by our Lord Jesus Christ. Hence, we must be careful to avoid anything like an attempt to evade their true and natural meaning.

For while it is true that our Lord did speak in *parables*, and, at times, used language that was evidently *metaphorical*; yet, as the late Dr. Pierson once said: "Whenever it is possible to take a passage of Scripture in its literal sense, it should be so taken." That is a safe rule.

But this subject is a vast one. So I only desire to touch briefly upon one point: "If thy right eye offend thee, pluck it out and cast it from thee" (Matt. v, 29), quoted on the first page of the lecture.

Now the question is : Did our Lord really intend these instructions to be taken literally ? I answer most emphatically " Yes " ; and if you will read the whole verse instead of only a part of it, I think you will say so too. Here is the verse :—

29 And if thy right eye offend thee, pluck it out, and cast it from thee : for it is profitable for thee that one of thy members should perish, and not *that* thy whole body should be cast into hell.

The importance of these words is marked by three striking facts :

1. Our Lord repeated them almost word for word about a year later in His Ministry (Matt. xviii, 9) and repetition was always an Eastern mode of laying stress upon any subject.

2. Because, in spite of all the objections that may be raised about " mutilating " the body, Christ said " it is better for thee to enter into Life with one eye, rather than, having two eyes, to be cast into Hell fire " (Matt. xviii, 9).

3. Because the Bible furnishes some solemn illustrations of that truth.

In Gen. iii, 6, we read it was " *when the woman saw that the tree was good for food and that it was pleasant to the eyes* " that she took of the fruit thereof and did eat, and gave also to her husband and he did eat. And because of that look the whole world has been cursed for 6,000 years !

Now I ask would it not have been " profitable," to use our Lord's own word, if Eve had plucked out her eye rather than have committed that first act of disobedience with all its age-long consequences ?

For it was thus that " sin entered into the world, and death by sin " (Rom. v, 12).

Or, take the case of David when he *looked* upon Bethsheba, which he should not have done, that look led, not only to his sin with her, but also to the murder of her husband (II Sam. xi, 2). I therefore ask again, would it not have been " profitable " for David to have suffered the loss of his eye rather than have stained his whole life with those terrible sins ?

And to-day the Evil One is working so subtly through the human eye that it is almost impossible to go into a Museum or Art Gallery without seeing much that one has to turn away from ; while the

fashion-plate advertisements from the great West End houses are so indecent that we have to tear them up and throw them away, to prevent our maid seeing them! Also I saw recently a flaming advertisement of a film outside a cinema in North London entitled "The Cult of the Nude"!

So that the real and practical teaching of this part of the Sermon on the Mount is that we should rather lose anything or suffer anything, than allow our eye to lead us into sin, which might prove our eternal ruin!

Mr. PERCY O. RUOFF said: Christians, as Dr. Bevan has said, who "regard the words of Christ as the words of God," owe to the Lord absolute obedience. But the vital question is the true interpretation of these words. It is unfortunate that Dr. Bevan bases much of his argument on the words "If any man will take away thy coat, let him have thy cloak also," and omits the qualifying words "will sue thee at the law," which occur after the words "If any man." By the omission of these words, Dr. Bevan entirely misconceives the teaching of the passage, and the graphic illustrations he uses of thieves and valets become irrelevant. Under the Mosaic law, it was illegal to dispossess a man of his cloak. The case which Christ cites is that of an oppressor seeking at law to obtain the under garment: if the claim is pressed, the Christian disciple is urged to forgo his rights, and give up even the essential outer garment which could not have been obtained by legal suit.

Or take the words "Whosoever shall smite thee on the right cheek, turn to him the other also." In this instance there is clear evidence that a literal interpretation is not intended, for, when Christ was smitten on the cheek in the presence of Caiaphas, He said: "If I have done evil, bear witness of the evil; but if well, why smitest thou Me?" It is evident that The Lord desired that justice and truth should prevail.

Consider the question of plucking out the offending eye and cutting off the right hand. Mutilation of the body by a Christian is clearly a wrong act, because his body is a temple of the Holy Spirit. I heard of a Chinaman who gouged out his eye, and recently I observed the case of a man who mutilated his wrist with an axe, with disastrous and bitter consequences. The eye and hand may be vehicles of sin.

A literal interpretation would not deal with the root trouble. It is the imagination and the heart which sin, and Christians are exhorted to mortify these.

With regard to the compulsion to go the second mile, no doubt the reference is to *corvée*, a form of enforced military service. The instance of Simon, the Cyrenian, who was compelled to carry Christ's cross, illustrates the saying.

The principle enunciated in the saying "An eye for an eye and a tooth for a tooth" is a principle which exists in all jurisprudence. Redress for wrong done can be adjusted in law. Is it not clear that Christ is teaching his disciples not to retaliate by private revenge, but so to act towards wrongdoers that it should be manifest "that ye may be sons of your Father which is in Heaven: for He maketh the sun to rise on the evil and the good, and sendeth rain on the just and on the unjust."

I caught a boy stealing apples in my garden. The police urged me to prosecute. I might (1) have given him in charge, (2) flogged him, or (3) instructed him. What I did was to warn him of his sin and its consequences, gave him some apples and a penny to buy some sweets. In some circumstances it might have been salutary to put the matter in the hands of the police. In the Epistle to the Romans, it is clearly stated that ordered government is ordained of God, and of a ruler it is said "he is the minister of God to thee for good" . . . "an avenger to execute wrath upon him that doeth evil" (Romans xiii, 4).

Mr. GEO. BREWER said: In Matt. v, 40 our Lord says: "If any man will sue thee at the law and take away thy coat, let him have thy cloak also." This would hardly include theft, with or without violence. The Sermon on the Mount, which contains the teaching of our Lord with regard to non-resistance of evil, must not be considered as a code of rules for the establishment of God's kingdom upon earth; but a statement of first principles for the guidance of subjects of His spiritual kingdom, which was soon to be more fully manifested. As Mr. Bevan has so well pointed out, the teaching applies to individuals in their personal capacity only, apart from any responsibility which they might have in relation to others. The failure to observe this distinction has led to extraordinary com-

plications; advocates of extreme pacifism, including responsible statesmen, being prepared to dispense with all force needed for the protection of the country against an aggressor.

When our Lord stood before Pilate, he declared plainly: "My kingdom is not of this world: if my kingdom were of this world, then would My servants fight, that I should not be delivered to the Jews: but now is My kingdom not from hence" (John xviii, 36).

It is, I fear, not sufficiently recognised that the teaching given by our Lord, as recorded in the Gospels, was but partial, and preliminary to further instruction contained in other part of the New Testament. In John xvi, 12, our Lord says to His disciples: "I have yet many things to say unto you, but ye cannot bear them now. Howbeit when He, the Spirit of truth, is come, He will guide you into all truth." In Romans xiii, 1-4, we read: "There is no power, but of God: the powers that be are ordained of God. Who-soever therefore resisteth the power, resisteth the ordinance of God. . . . for rulers are not a terror to good works, but to the evil. For He (the power) is the minister of God for good. But if thou do that which is evil, be afraid: for He beareth not the sword in vain." Again, I Pet. ii, 13-14, tells us that kings and governors are sent by God for the punishment of evildoers and for the praise of them that do well.

It is clear, therefore, from God's Word that rulers in the kingdom of men must be prepared to use whatever force is necessary. Any government failing to do this would be unworthy of the name.

Col. A. H. VAN STRAUBENZEE said: The Interpretation of the Sermon on the Mount from which the lecturer has quoted does not fall into the dispensation of grace in which we are now living.

The four Gospels give us four lives of Christ, and each Gospel falls into four heads:—

1. The presentation of the kingdom.
2. The presentation of the King.
3. The rejection of the King.
4. The rejection of the kingdom.

As Matthew's gospel presents Christ's life as a King it is fitting that in presenting the kingdom He should give us the laws of that kingdom in chapters v to vii.

Where, then, does the kingdom come into being in the Divine plan ?

The Scriptures reveal seven such ages or dispensations :—

1. The Edenic state. Man in innocence, ended in expulsion from the garden.
2. Period, man without law. Ended in confusion of tongues.
3. Period, man under law. Ended in rejection of Israel.
4. Dispensation of man under grace will end in rapture of the Church and introduction of Day of the Lord.
5. Dispensation of judgment will end in destruction of Anti-Christ, and in binding of Devil.
6. Dispensation Millennial, will end in destruction of Satan and judgment of white throne.
7. Dispensation of glory will have no end.

All kingdoms have in it three classes of people :—

1. The King and Royal family.
2. An aristocracy or nobility.
3. Subjects to be ruled over by those set to rule.

So will God's earthly Millennial Kingdom be :—

1. The Lord Jesus Christ and the Church of God as joint-sharers. The Royal family.
2. Israel the aristocracy and nobility.
3. Subject Gentiles. [China—India—Africa, etc.]

At the close of the Law period.—Christ's earthly Advent lasted about $3\frac{1}{2}$ years.

At the close of our dispensation.—Satan will probably come to earth for about $3\frac{1}{2}$ years—and here it is the laws laid down in the Sermon of the Mount will again apply to Israel. Resist not Evil—the word implies the “ Evil One ”—because the earth given over to him resistance would be useless.

By the figure of speech “ Implication ”—the right eye means our choicest possession.

The word for smiting—is only used here and of our Lord—and means to smite with the palm of the hand—what we call a cuff. He who would take the inner tunic of a man let him also have the outer flowing robe, which is useless without the inner one.

Well, what about ourselves ?

The whole Bible has lessons for us, but our special text-book is probably the "all truth" of God in Ephesians, Colossians and Philippians—in these we do not find the words evil, sin, or resist, except the words Be ye angry and sin not. Righteous indignation is referred to; the anger is to be transitory. Evil-speaking is to be put away. But in Galatians, we are told to have sympathy one with another, called bearing one another's burdens, because (using a different Greek word) every man must bear his *own* burden—if this was followed—each realising he is a fallen being and avoid evil-speaking, even where there is an element of truth—what a much happier community we should be. For whosoever shall keep the whole law, and yet offend in one *point*, he is guilty of all.

As regards pacifism—and war. We have to remember that God is represented as a "man of war" to *all* who are out of Christ. At the present time readiness for war is essential to preserve in some measure the "knowledge of God" and "His truth" upon earth, in view of the Satanic forces gathering round us.

Col. SKINNER invited attention to a helpful explanation and one that might well be read within the lines of Dr. Bevan's admirable paper. The Bible, someone had shown, contained many obvious contradictions, but not by chance; it was of Divine purpose to fit every circumstance in the believer's life and experience. The two proverbs of chap. xxvi, 4 and 5, came readily to mind by way of illustration:—

"Answer not a fool according to his folly, lest thou also be like unto him."

"Answer a fool according to his folly, lest he be wise in his own conceit."

It was as we walked by obedient faith and were led by the Holy Spirit that we were guided to the right action for the particular occasion. Thus what might have been an appropriate line of action to have taken yesterday in one set of circumstances, might be quite unsuited to the new situation in which one found oneself to-day, and only as one sought the guidance of the Holy Spirit could one be sure of doing the right thing at the right time. But the precepts were all there, written beforehand for our admonition, awaiting

the appropriate occasion for use as brought to remembrance at the time.

This he further illustrated by citing known cases in which non-resistance on the one hand, and vigorous resistance on the other, had alike been justified and owned of God.

WRITTEN COMMUNICATIONS.

DR. R. E. D. CLARK wrote : It is impossible within a few sentences to take up all the issues raised by Dr. Bevan's interesting paper. I should like, however, to make three brief comments.

Firstly, has not Dr. Bevan ignored the fact that Jesus Himself did not live on a desert island ? Did not just the same complications arise in His day as in ours ? Was not Israel under a cruel foreign yoke ? Why, then, did Jesus teach pacifism if it was as inappropriate to His time as it is to ours ?

Secondly, does not Dr. Bevan's view presuppose that *we* are the arbiters of justice ? According to the New Testament we are all sinners, but God, in Christ, does not now treat sinners according to their deserts. God makes His sun shine on the just and the unjust alike and we, in this respect, are told to be perfect as our Heavenly Father is perfect and to *despair of no man* (Luke vi, 35). Far, then, from seeking to make the world a better place by means of force when other methods fail, we must say to the evildoer : " I, too, am a sinner and have no right to judge you." Is not this the consistent teaching of the Gospels ?

Thirdly, Dr. Bevan rightly points out that it is *very* difficult to kill without hating. But this being so, how does he think it right for a man to promise to obey his officers when he knows that these men are not as a rule actuated by Christian principles ? If a man deliberately makes himself a cog in the wheels of a system that works by lying and hatred, is he much the better just because he manages to remove hatred from his own soul ? Have we, in short, no moral responsibility for the hatred of *others* if we deliberately assist them in what they do, even though we do not ourselves hate ? This is an important question and it would be interesting to know how it can be answered.

Brig.-General H. BIDDULPH wrote: The paper undoubtedly brings out a great truth, viz., that our duty toward our *neighbour* is embraced by a wider circle, our duty toward our *neighbours*, and that the lesser may have to yield to the greater. There is, however, another factor: governmental rule is ordained by God (Rom. xiii, 1), and this rule expressly includes the punishment of evildoers even unto death. The state is made up of individuals, and it is contrary to our duty toward the state (our neighbours in bulk) to become an accessory to crime or to assist in the shielding of criminals, where we ourselves are not the sole or principal sufferers. Reasoning to the contrary would justify standing passive while a crime of violence was being committed under our eyes, without attempting with all the force in our power to protect the victim. Such conduct would not only be callous indifference and selfishness, but would exhibit a lack of love in the highest degree toward our neighbour, the victim, and dereliction of duty toward the state (our neighbours in bulk), the peaceful government of which is a duty imposed by God Himself.

Rev. Principal H. S. CURR wrote:—In common with all who have heard or read Dr. Bevan's paper, I have thoroughly enjoyed it. Its simplicity and lucidity are only possible on the basis of great erudition and a profound grasp of the subject. This discussion has put the problem of non-resistance to evil in a new and illuminating context.

It is not my purpose to argue regarding any particular interpretation of the words, but rather to draw attention to an aspect which may clarify the problem indirectly. Our Lord knew what He was about. All possible difficulties were present to His mind when He spoke as He did regarding the duty of His disciples to behave in a way which represented the reverse of the vicious and vindictive spirit which pervaded all classes of Palestinian Jewry in that distant age, fully realising the intricacy of the questions involved, and yet He expressed Himself in the way which seems so cryptic. The general drift of His counsels is perfectly clear. He is proscribing revenge in any form, revenge which Bacon described as a kind of wild justice. But the point on which I wish to lay special stress is the extraordinary effect which these challenging sentences in the Sermon on the Mount have had on human history. They have

ameliorated conditions in a wonderful way, not so much by the letter as by the spirit. It is true that present achievement falls far short of the ideal, depicted in our Lord's words, and yet their effect in subduing and sanctifying the passions of men has been extraordinary. Modern warfare is harsh, but it is mild and humanitarian compared with the Roman methods during the Apostolic Age, as the siege and sack of Jerusalem in A.D. 70 abundantly prove. The same observations can be made regarding private life. It has been restrained and constrained by the teaching of our Lord in a way which is simply marvellous. I am fully aware of all the difficulties implied in these sentences, but it seems to me to be indubitable that these bewildering commands of Christ were not uttered in vain by any manner of means.

The best commentary on the words is the Cross, when their author became obedient unto death. The New Testament itself puts this truth in the familiar words: "For even hereunto were ye called: because Christ also suffered for us, leaving us an example that ye should follow His steps: Who did no sin, neither was guile found in His mouth: Who, when He was reviled, reviled not again; when He suffered, He threatened not; but committed Himself to Him that judgeth righteously: Who His own self bare our sins in His own body on the tree, that we, being dead to sin, should live unto righteousness: by Whose stripes ye were healed" (I Peter ii, 21-24).

Major R. B. WITHERS wrote: The latter part of this paper is a fine exposition of the proper Christian attitude to various modern problems; but Dr. Bevan burdens his argument by his references to literal obedience to the Sermon on the Mount. He overlooks the fact that the Lord Jesus did not intend it to apply to all Christians. For instance, Matt. v, 22 (the sanhedrin and Gehenna), v, 23 (offering an oblation on the altar) cannot literally be applied to us. The whole atmosphere is redolent of Judaism and the Kingdom of the Heavens promised in the Hebrew prophets. These promises, now in abeyance, must yet be fulfilled (Matt. v, 17, 18; Rom. xi, 25-29).

The Epistle to the Galatians is a complete answer to any who would fasten upon us the yoke of literal observance of these precepts.

It seems to be forgotten that the earthly portion of the ministry

of the Lord Jesus was but a fraction of the whole. There were many things beyond the horizon of His disciples (John xvi, 12, 13). For our guidance we have the epistles of the Apostle Paul, which are as much the words of the Lord Jesus as those He spoke on earth.

It is astonishing that so eminent a theologian should be able to discuss this subject without indicating that he is aware of the important researches of recent years into the relation between the various Divine Economies.

AUTHOR'S REPLY.

Dr. BEVAN writes :—" I do not think it would be desirable for me to attempt to enter into controversy on all the points, covering a wide field, raised by the comments. Readers of my paper and of the comments will be able to form their own judgment how far the comments are cogent."

819TH ORDINARY GENERAL MEETING,

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, APRIL 4TH, 1938,
AT 4.30 P.M.

R. E. D. CLARK, Esq., M.A., PL.D., IN THE CHAIR.

The Minutes of the previous meeting were read, confirmed and signed and the HON. SECRETARY announced the election of H. E. Fitzgibbon, Esq., B.A., B.A.L., Assoc.M.Inst.C.E., M.Inst. M. & C.Y.E., M.A.T.Inst., as an Associate.

The CHAIRMAN then called on Albert Eagle, Esq., B.Sc., A.R.C.Sc., to read his paper entitled "Difficulties underlying the Einstein-Eddington Conception of Curved Space."

DIFFICULTIES UNDERLYING THE EINSTEIN- EDDINGTON CONCEPTION OF CURVED SPACE.

By ALBERT EAGLE, Esq., B.Sc., A.R.C.Sc.
(Lecturer in Mathematics, University of Manchester.)

IN the last twenty years all the world has heard of a very remarkable theory—Einstein's Theory of Relativity—which is chiefly associated with the names of Einstein and Eddington. This theory is supposed not only to have corrected all scientists of former ages, like Newton, whose ideas on the Universe could not possibly be the last word, but also all ancient geometers, like Euclid, who dealt with matters of pure thought which had nothing to do with the external physical Universe.

No theory has ever, in so few years, been put before the general public in such a furore of books, lectures, articles in scientific journals, magazines, and even newspapers. Scores of books, learned, semi-popular and popular, have been produced. Both Einstein and Eddington have thought it necessary to produce books of the latter class while one publisher alone has produced over a dozen books, mostly of the semi-popular class for novices or elementary students, which occupied two pages in his general catalogue.

One aspect only of this theory I will deal with to-night ; and that is the "curved space" aspect. According to this view, space is only Euclidean in the absence of gravitating matter. Round any star, and to a less an extent round any particle of matter, space no longer obeys the laws of Euclid as exemplified in the famous result of Euclid I, 47, of which a particular case is that the length of the diagonals of a square is $\sqrt{2}$ times the length of the sides.

What curved space is, Sir James Jeans has explained to nearly half the homes in the country in a broadcast on astronomy on November 28th, 1934. He pointed out that an aviator who started out successively in different directions from the same point, with an aeroplane of a certain cruising radius, sees a certain circular area of the earth's surface ; and that if he does the same with another aeroplane of double the cruising radius he will see approximately four times the area of the earth's surface, and so on till the cruising radius gets comparable with the earth's radius ; while, when the cruising radius is equal to half the circumference of the earth, he finds the boundary circle which he has reached has become reduced to a point instead of being a circle of ten times the circumference of the boundary circle when his cruising radius was only one-tenth as large. According to Sir James Jeans, curved three-dimensional space differs from flat three-dimensional space exactly as the curved surface of a sphere differs from a plane. That is to say, that if we started successively in opposite directions and go far enough, we may reach the same point in absolute defiance of the capability of our intellects to understand how that can possibly be. This makes it clear that the gravitational field which curves or distorts space must have played a still greater havoc with our minds ; for we are prevented from thinking correctly as the facts have given the lie to our ideas of the truth, or the possible.

But the curved spacist may object that when we travel a steered straight line of about 12,500 miles over the surface of the earth we reach the same point irrespective of the direction in which we set out. Quite so. But that is easily comprehended : we know that it is because the earth's surface curves away from us beneath our feet, and if we want to keep the same distance above it we must curve our path downwards too.

So curved space means, of course, that if we consider a sphere void of matter, and then put a sun or planet inside it, the points in this now distorted sphere cannot be made to coincide with the

points of the same sphere before the mass was introduced except that the two systems of points could be made to coincide for some particular radius ; for a Euclidean sphere and a non-Euclidean sphere can intersect in a *spherical surface* just as the spherical surface of the earth and a plane can have a *circle* of intersection.

Now, unless we can form some mental conception of where these points in this non-Euclidean sphere *are*, when practically all of them are somewhere different from the positions of all the points in the Euclidean sphere occupying the same space before the gravitating particle came into its neighbourhood, our talking about curved space may be pure nonsense, as we may be deluding ourselves and misleading other people by pretending that certain things exist which do not exist.

Where have these distorted-away points gone to ? They do not seem to have gone to anywhere different. Perhaps a relativist might reply that Einstein's theory distorts time as well as space and these distorted points have gone into a different time. But this explanation only makes matters worse. It is as much as to say that these points are not there when we want to think about them but only when we do not want to think about them !

Let us leave Sir J. H. Jeans on curved space and go to a higher authority, his teacher, Sir Arthur Eddington. Sir Arthur says, in his well-known book, *Space, Time and Gravitation*, p. 104 :

“ Thus if we draw a circle, placing a massive particle near the centre so as to produce a gravitational field, and measure with a rigid scale the circumference and the diameter, the ratio of the measured circumference to the measured diameter will not be the famous number $3\cdot14159265\dots$ but a little smaller . . . Placing the particle near, instead of at, the centre, avoids measuring the diameter through the particle and so makes the experiment a practical one . . . It is of value to put the result in this way, because it shows the relativist is not talking metaphysics when he says that space in the gravitational field is non-Euclidean. His statement has a plain physical meaning . . . ”

Now, in the above, Sir A. Eddington seems to me to be talking like a pure geometer infatuated with the idea of curved space, and not at all like a physicist should talk about a physical experiment.

Let us consider this experiment as any physicist like myself would like to consider it. We will take Sir Arthur's figures of a ton inside a circle of five yards radius. A ton of lead would make two solid hemispheres each about 22 in. in diameter. Let us place these with, say, a $\frac{1}{4}$ -in. air gap between their plane faces. Between these hemispheres place a thin metal disk somewhat over 10 yards in diameter. On this disk let a circle of 5 yards radius, together with a diameter, be scratched with a diamond point. Let us also have a small piece of the same metal with some fine graduations on it to form our measuring rod. Now ordinary materials are elastic; and so, if we hold our measuring rod by the further end when it is pointing *to* the mass it will be in tension and therefore lengthened. To get over this difficulty let us suppose the metal of the measuring rod has an infinite modulus of elasticity; so that it is what we may call perfectly rigid. Now it is quite conceivable for the measuring rod and disk to change their dimensions in a gravitational field even if perfectly rigid. For elasticity depends on the fact that the atoms of a solid are not in actual contact, but are held in equilibrium positions *near* each other by the forces of cohesion, and so the distance apart of the atoms is altered by an applied tension or compression. But even if perfectly rigid, a solid would necessarily change dimensions if some influence altered the *size* of the atoms. To do this only requires that the radius of the atomic orbits of the electrons in the atom should be altered. And, since it is now accepted by physicists that the *time* of revolution of electrons in their atomic orbits is increased in a gravitational field, a change in the *radius* of the atomic orbits is almost inevitable, since the time of revolution and the radius of the orbit are so intimately connected with one another. Also we know pretty conclusively that all bodies, when in motion, undergo what is called the Lorentz-FitzGerald contraction in the direction of their motion. This contraction is very simple. If v is the velocity of the body, and V is the velocity of light, then all dimensions in the direction of motion are reduced in the ratio of 1 to $\sqrt{1 - v^2/V^2}$.

Theoretically, one would expect any change of dimensions in a gravitational field to be about the same as the Lorentz-FitzGerald contraction for a velocity equal to that acquired by the body falling from a great distance to its position *in* the field. This is about one part in 1,400 million parts for bodies in the earth's gravitational field.

Now return to our sheet of metal between the two lead hemispheres. What is going to happen to it if the atoms gradually increase in size nearer to the centre of the disk? Clearly the disk must become saucer-shaped. If, on the other hand, the atoms become smaller nearer the centre of the disk, the outside edge will be too large for the inside portion and consequently it will go into puckers. If now we measure the length of the scratched circle and its diameter we shall obviously get the same ratio as we should if the lead hemispheres were removed, since at every point we move the measuring rod to, the material of the disk will have expanded or contracted just as much as the measuring rod. So we have failed to detect "curved space." But we have not been measuring a plane circle and its straight line diameter. To do so we must prevent the disk from buckling; so let us make a large number of fine radial cuts in the disk, not quite going as far as the centre, which would divide the disk into many pieces. This will keep the disk in one plane. And now, if the atoms near the centre of the disk have become larger, the width of our cuts will become wider near the edge than near the centre; while the reverse will happen if the atoms near the centre become smaller. *Now* it is very obvious that if we measure the length of our scratched circle (including the gaps) we shall not get a ratio which is exactly equal to π . It will be greater than π if the gaps are wider near the circumference than near the centre; and less than π in the opposite case. How very simple this is to understand! There is obviously no question of the ratio not being exactly equal to π meaning that the *space* surrounding the ton of lead has become curved in some un-conceivable manner.

The above assumes that a small sphere of matter would change its dimensions equally all round in a gravitational field. There is no reason why this should be so. There might be a change of dimensions in one ratio in the direction of the field, and in quite another ratio in directions at right angles, just as the Lorentz-FitzGerald contraction only exists in the direction of motion and is nothing in the perpendicular directions. If this more complicated law is followed it will need a simple mathematical expression to state whether the cuts in our disk are wider or narrower near the edge than near the centre.

The above consideration show how very differently a physicist looks at a physical experiment than a pure geometer; and shows how diffident such geometers should be in expressing an opinion

on anything which is really a matter of physics and not of geometry. For the geometer, as such, neither knows, nor cares, anything about the trillions of complicated systems called chemical atoms of which the disk is composed, and the unknown influence to which these may be subjected in a gravitational field.

Let us now turn to the mathematics of curved space. Every student, who knows a little of both co-ordinate geometry and the differential calculus, knows that if P is the point whose co-ordinates are r and θ , and if Q is the point whose co-ordinates are $r + dr$ and $\theta + d\theta$, then the distance PQ^2 is given by

$$PQ^2 = (dr)^2 + (r d\theta)^2. \quad \dots \dots (1)$$

According to relativitists, this equation is no longer true in a gravitational field; but instead, if we have a mass m at the origin, the distance PQ is given by

$$PQ^2 = \frac{(dr)^2}{1 - \frac{2Gm}{V^2r}} + (r d\theta)^2; \quad \dots \dots (2)$$

where V is the velocity of light as before, and G is the Newtonian constant of gravitation. That is to say, that if $dr = 0$, so that P and Q are at the same distance from the origin, their distance apart is $r d\theta$ as it obviously is; but if $d\theta = 0$, so that P and Q are on the same radius, their distance apart is not dr but dr divided by the square root of $1 - \frac{2Gm}{V^2r}$. That is to say, that

when PQ is radial, the *measured* distance PQ , between the points P and Q , is not equal to the *physical* distance between them, which is dr , but is greater than dr ; while in the perpendicular directions the measured distance and the physical distance are equal.

Now how can the distance in one direction be the distance measured by the measuring rod and the distance in a direction at right angles not be the distance given by the measuring rod? Very easily if we admit that the measuring rod changes its true length when we turn it through 90° . What *other* conclusion, than this very obvious explanation, could any clear thinker possibly come to if he was compelled to accept the correctness of the equation (2) as the correct expression for the square of the measured distance PQ ? So we can readily admit that the

relativitists' formula for the distance between two points in a gravitational field is correct provided we believe that the measuring rod preserves its length unaltered when it is at right angles to the field but that it has become shorter in the ratio of 1 to $\sqrt{1 - \frac{2Gm}{V^2 r}}$ when it is pointing in the direction of the field; for then the measured distance corrected by the relativitists' formula gives exactly the same result as would have been given if we had been able to perform the measurements with a rod which was not affected by a gravitational field. Now this change of length is rather interesting. If the measuring rod was of unit mass and fell into the gravitational field from a large distance, thereby acquiring a velocity v , it would have acquired kinetic energy of $\frac{1}{2}v^2$; but it would have lost an equal amount of potential energy Gm/r . So substituting $\frac{1}{2}v^2$ for Gm/r we see that the supposed contraction in length is in the ratio of 1 to $\sqrt{1 - v^2/V^2}$ when the rod is pointing to the particle, but is nothing when pointing in a perpendicular direction. So this supposed contraction is exactly as if the Lorentz-FitzGerald contraction, acquired during the fall, was supposed to be preserved after the velocity had been arrested.

This might be so. No one knows enough about the manner in which physical matter may change its dimensions in a gravitational field to say it is not so. It does not seem to me to be the most likely manner in which matter may be expected to change its dimensions in a gravitational field; but it must be remembered that anything which does not involve a contradiction in thought must be admitted as an *a priori* possible thing to happen in a matter on which we are quite ignorant.

Now if a measuring rod in a gravitational field does behave in this manner, so that the relativity formula for the distance is correct, it completely takes all the curvature out of their curved space; for all the points round their gravitating particle are still in the ordinary three-dimensional flat space round the particle!

But if this extraneous factor multiplying the dr is not required to compensate for a recognised deformation of the measuring rod in a gravitational field, whatever excuse is there for its insertion in this high-handed manner without any reason being given us for its insertion? "Curved space demands it," relativitists would reply; "if it was not there space would have no curvature; and, since we know that space is curved in a gravitational field, this factor must be there."

If we ask *how* they know that space is curved they fall back on the fact that light is found to be slightly deflected when passing near the sun, and on one or two other minute astronomical phenomena so that the only justification for this factor is an *a posteriori* justification. As there is no *a priori* justification for it, the agreement obtained between relativity mathematics and physical phenomena stands exactly on the same basis as any other empirical formula, devoid of theoretical basis, which experimentalists often find extremely useful in representing their results when they do not understand the operating causes sufficiently well to produce a formula with some theoretical justification.

If mathematicians want to mix up distances in one direction with distances in another direction multiplied by a factor, they should coin a new name for their product, and not still call it "space" as if it *was* the space of external reality; and then pretend that the space of external reality is distorted. If a distinctive suitable name for the quantity in equation (2) was coined I should not have the slightest desire to dispute the fact that this thing *is* distorted in a gravitational field.

Is it possible that this variable change of length of bodies in different directions in a gravitational field is what relativitists mean by their curved or distorted space?

I could give many quotations from Einstein, Eddington and other relativitists to show most emphatically that they do *not* mean this. They mean that the distance is correctly given by the formula (2), above, when measured with a rigid rod which undergoes no internal change in a gravitational field which could affect its length; which possible change, apparently, they never even thought about. To assert that formula (2) could be correct in this case is surely pure nonsense; and is quite as erroneous as the assertion that $2 \times 2 = 5$. In my humble opinion it is a sheer delusion to pretend otherwise. Yet the Bishop of Birmingham, in a letter, has told me that I have not "understood" curved space, and tells me that "curved space, though finite, is the whole of space: it is not set in a three-dimensional void."

Where in earth or heaven these points in the neighbourhood of a gravitating particle *are*, which do not coincide with any of the points of the three-dimensional space which existed there before the particle was introduced, no one has ever enlightened me. Surely it is very plain that we cannot come to the conclusion that three-dimensional space can be curved without at the same

time coming to the conclusion that our brains are of no use at all for thinking ; or for coming to *any* truthful conclusions ; for we have made ourselves believe in something in flat defiance of the ability of our brains to comprehend how it is possible. We have, in fact, done intellectual violence to ourselves of a very damaging kind.

The truth is, of course, that Einstein and Eddington did not reach the conclusion that space was curved as the result of any reasoning ; it was the result of an infatuation for a mathematical idea. Now anyone is quite welcome to prefer his infatuation as a guide to truth to his reason ; if he likes to do so. But he must not lose his reason to such an extent as to think that other people ought to rate his infatuation above *their* own reason. We must tell relativitists emphatically that the reason why we disagree with their curved space is not because we possess defective brains, and so cannot understand it (and all curved spacists seem to look on disbelievers with a supercilious contemptuous pity for the possessors of brains of such limited powers) but because we emphatically dislike their curved space idea as being indistinguishable from a self-contradiction.

Relativitists have fallen into a mistake which no competent practical physicist would ever have fallen into. They think that when they use a symbol, say s , for distance, that that represents a *physical distance in external reality*. It does nothing of the sort ; the mathematician's s is merely a *pure number* representing the number of times the *physicist's* unit measuring rod goes into the distance being measured. One can know nothing about the *physical distance* in external reality until one *knows* all about the physics of the measuring rod when it is moved about in a gravitational field ; and neither physicists nor mathematicians have any such omniscient knowledge.

If relativitists want to improve upon Euclid ; instead of trying to find fault with Euclid's pure thought, by attacking Euclid's theory of parallels, they should have attacked Euclid's naive physics, on which subject the poor man was completely ignorant. Now a large part of Euclid—all his metrical theorems for instance—depends upon the assumption that one can *transfer* a measuring rod to different parts of a geometrical figure, or can transfer one geometrical figure and superpose in it on another, without their undergoing any change of magnitude during the transfer. Now this is emphatically not so. One cannot have a geometrical figure consisting of filaments of nothing existing in a

stark void. In this world a geometrical figure must consist of a diagram scratched on the surface of a piece of *physical matter*. Poor Euclid simply did not know that practically all substances, save invar, which had not been invented by his day, changed their dimensions appreciably with only a few degrees' rise in temperature; nor did he know that any measuring rod, held vertically by its upper end, was longer than when held vertically by its lower end. Still less could he have known anything about gravitational fields and realised that in all probability all bodies changed in dimensions on being moved about in one. Most of us will say: "Thank heavens, Euclid did not know anything about such things. What a difficulty he would have found with the foundations of his subject if he had known!"

But of course my saying that three-dimensional space may obey the mathematics of curved space, merely because measuring rods alter in dimensions when they are moved about in it, completely denies that Einstein has, in any manner *explained* gravitation. No one could be so illogical as to imagine that the fact that bodies change in dimensions in a gravitational field can be the *explanation* of the gravitational pull of attraction between the bodies. Obviously both the pull and the change of dimensions must both be due to some unknown underlying cause. So that all claim that Einstein has *explained* gravitation falls to the ground, until he has given an intellectually clear explanation of how a three-dimensional stark void, in which there is nothing present, can possess a curvature.

I will now give two or three further illustrations of the absurdities that accepting this idea of curved three-dimensional space, which, of course, requires that more than three spatial dimensions exist, can lead people into.

Everyone can imagine any three-dimensional body rotating about an axis. Let us listen to Sir Arthur Eddington explaining rotation in four dimensions. He says:*

"although the mathematician visualises four dimensions, his picture is *wrong* in essential particulars—at least mine is. I see our spherical universe like a bubble in four dimensions; length, breadth, and thickness, all lie in the skin of the bubble. Can I picture this bubble rotating? Why, of course I can. I fix on one direction in the four dimensions as axis, and I see the other three dimensions whirling round

* *The Expanding Universe*, p. 32.

it. Perhaps I actually never see more than two at a time ; but thought flits rapidly from one pair to another, so that all three seem to be hard at it. Can *you* picture it like that ? If you fail, it is just as well. For we know by analysis that a bubble in four dimensions does not rotate that way at all. Three dimensions cannot spin round a fourth. They must rotate two round two ; that is to say, the bubble does not rotate about a line axis but about a plane. I know that is true but I cannot visualise it."

Were such incomprehensible ideas ever soberly put forth as rational explanations in science before the days of Einstein and Eddington ? Yet in the face of the above contradictions Sir Arthur has not the common sense to see that he is trying to make his mind believe in the impossible *because it involves a contradiction*. Cannot he see that when his mind "flits rapidly" from one pair of dimensions to another that he is trying to imagine something, which, in its completeness as he wants to imagine it, cannot exist because it involves an inherent contradiction ? What possible better evidence could one have that one is trying to imagine the impossible than this that one's mind refuses to visualise it but only flits frantically about first over one part of the desired vision and then over another part ? How in the world can anyone so allow their infatuation for a geometrical idea to depose their rational thinking passes my comprehension.

I will now give another quotation which I should forgive anybody who said they considered it a bit of priceless nonsense. It seems so much like it that I think it will be a kindness if I do not divulge the author's name ; but it is by one of the leading writers on relativity. This writer says :—

"By Einstein's law of gravitation matter causes a curvature of the space that it occupies. If you try to put too much matter in one lump, space curves round so much that it closes up. That is what happens to the large globe of water ; when it reaches a diameter of 400,000,000 miles, space has closed up tightly all round. You cannot increase the globe, because there is nowhere to put any more water. All space is within the sphere ; what is outside is—nothing."

Now a globe of water of this diameter would contain about 70 million times as much matter as there is in our sun. Yet the Galactic System, of which our sun is a member, contains about 4,000 or 5,000 times as much matter as this. All this matter is

kept from falling together by the rotation of the Galaxy in about two or three hundred million years. Suppose something slowed down the rotation and the stars began to fall together in different groups. There would be enough matter to make 4,000 of the above described spheres each of which would "contain all space" while outside each of them there was just "nothing." And yet somehow, not only would there be the 3,999 of these spheres outside any one of them, but there are all the many millions of other galactic systems known as the spiral nebulae which would be quite unaffected by the catastrophe which had overtaken ours! Yet somehow these could not then still be in existence since "all space" is inside any *one* of the 4,000 spheres formed by the coalescing of about 70,000,000 suns!

Although there is nothing in the above quotation which can possibly be taken seriously we can seriously ask ourselves why anyone should express such views; and what ideas made them do it. As I showed a few minutes ago, the relativitists' formulæ for curved space are satisfied if we suppose that any piece of matter in a gravitational field has its radial dimension shortened, but not the other dimensions. Now the formulæ are such that it turns out that at the surface of this large sphere that our author is talking about, the radial dimension of any piece of matter would have been reduced exactly to zero. In this case obviously one could keep on putting fresh matter into the sphere without its getting any larger; for as soon as any piece of fresh matter has reached the surface it has been reduced to zero volume; so, of course, its entrance into the sphere cannot increase the latter's volume. What could possibly be more obvious! In fact, if this were true, such a sphere could not only contain the mass of 70,000,000 suns, it could contain the whole of the matter in the Galaxy, and even all the matter in all the other millions of spiral nebulae too!

But granted that matter may possibly contract in volume in a gravitational field, what an absurdity it is to think that the formula which holds for a very minute contraction can be trusted to hold till the volume has been reduced to zero!

For instance, sea water decreases in volume by about one part in 144 parts at a depth of one mile. But what should we think of a popular writer who, on the strength of this, declared that at a depth of 150 miles the volume of sea water would be absolutely zero; and that, consequently, if one bored a hole one inch in diameter to a depth of 150 miles and let the oceans drain into it,

all the water in all the oceans could flow into that hole without filling it up! Of course it could if the water at the bottom was compressed to an *absolutely zero* volume; for as more water flowed in, more water would be compressed to zero volume.

After the way in which I have ridiculed curved space many of my audience must want to ask me *why* anyone should *want* to believe in curved space. The reason is that by so doing we can get a blind and purposeless explanation of gravitation which does not depend in any manner on any of the properties of matter.

Now all sensible physicists, and all sane thought, realises that phenomena in the inorganic world are as they are because matter has been created with certain properties and the observed behaviour is simply the consequence of these properties. This common-sense view is substantiated ever more and more, in all directions, the more accurate and detailed our knowledge of the properties of matter becomes. Everyone realises that the properties of chemical compounds are due to the properties of the chemical atoms present and to the way in which they are combined with one another to form a molecule of the compound. Even the properties of the extremely minute atoms and atomic nuclei are now fast being found to be due to the properties of the electrons and protons constituting them and the manner in which they are arranged inside the respective atoms and nuclei. No sensible person can doubt, I think, that the explanation of gravitation must lie in some unknown properties of matter and of the medium in which it is immersed. But relativitists care nothing for such knowledge and ideas. They recall to us that when a particle is projected on a curved surface, to which it is confined, its path depends not at all upon any of its properties; but is what it is out of necessity from the nature of the surface. So, they claim, the apparent phenomena of gravitation do not depend upon any of the properties of matter, but arise simply as a necessity from the nature of the curved space-time in which a piece of matter moves. To be able to give the explanation of the behaviour of a thing without knowing anything about its nature seems to some mathematicians to be a glorious triumph, and a wonderful testimony to their powers of mathematical analysis. This way of thinking tries to abstract from reality everything that is tangible, and tries to reduce the physical universe to a purely geometrical universe—to a kind of distorted Euclid.

Even Einstein, who started this way of thinking, finds his soul so revolts against the ideas as they have been developed by

Sir Arthur Eddington that he has declared that if he thought for a moment that Eddington's ideas were true he would never spend another day over the study of physics. Is any further condemnation necessary than such an opinion from such a source ?

In my opinion, the curved space idea has been the most deplorable episode of absurdity in the history of science or of human thought. Great as are the objections, as I have just shown, to curved space on purely physical grounds, the psychological and philosophical grounds against the theory are even greater. It would be beyond the scope of the present paper to deal with these grounds here. I must content myself with remarking that the whole conception does such violence to the whole nature of our minds, and to all our rational thinking, that we instinctively feel the whole idea must be a lie, and therefore we cannot do other than revolt against it. It is noticeable that nearly all the writers on relativity have been (or seemed to me) quite ignorant of psychology.

One of the most famous of living psychologists, who has a very wide understanding of many sciences, tells me that I have only said in my attack on the theory in my book* what he would have liked to have said but had not the scientific standing to say ! And one of the greatest scientific thinkers in Germany, Prof. Hans Driesch, the famous vitalist biologist, tells me that he "endorses every word I have said" in my 60-page attack on the theory, and he added, "curved space, what nonsense it is."

Messrs. Einstein and Eddington have challenged the whole sanity of human thought and the worth-whileness of sensible thinking as they have never been challenged before ; and all serious thinkers who wish to preserve their God-given faculty of thinking rationally must reject absolutely their curved-space ideas until they have made them appear rational.

Sir Arthur Eddington demands that we shall surrender our own thinking and reasoning faculties to him, and believe as he believes, because he knows more about the mathematics of curved space than other people. He will tolerate no disbelief in his curved space from anyone. He has replied to any would-be disbelievers that "curvature is simply a technical property which we find space possesses." I must have the courage, I think, to declare that that statement is completely untrue. No competent physicist or astronomer has ever found a tiny bit of experimental

* *The Philosophy of Religion versus the Philosophy of Science.* From Simpkin Marshall, 5s.

evidence for requiring to believe in such an intellectual obscurity as that three-dimensional space can possess a curvature. It is, I must say, only mathematicians, dabbling in physics and astronomy, in which subjects they have had no adequate first-hand experimental experience, who are thrusting these ideas into the sciences of physics and astronomy.

It is, I am afraid, not easy for Sir Arthur Eddington to change his mind on this matter of curved space for he has declared most emphatically that "there can be no doubt in my mind" about the truth and reality of curved space. I can only feel regretful about Sir Arthur's mind and hope that this peculiarity will long be confined to only a small fraction of the human race.

To attack the theory of curved space is a most thankless and almost impossible task. It was so energetically and skilfully popularised at the moment when popular interest in it was aroused by the discovery of the deflection of light passing near the sun at a solar eclipse that it is now widely regarded as an established truth, although the public interest in it is now dead because the theory was uncomprehensible. So no public interest can now be aroused by any attacks on the theory. Moreover, the chief believers in the theory preserve a dumb-mutism attitude towards any attacks on it, comforting themselves apparently with the idea that whoever attacks the theory is beneath their dignity to notice. The public should judge for themselves the probable value of a theory whose chief defenders treat intelligent criticism of it in this manner.

Some people may think that I have more moral indignation, perhaps amounting even to animosity, against the theory of curved space than can be justified against any mere theory, no matter how erroneous or misleading it is. Perhaps some people, including editors, think the theory is scarcely worth attacking. But popular books on the theory, with titles like: "Relativity for Dick, Tom and Harry," are still appearing. And it is still widely accepted and believed in in academic circles. In some universities even, "The Elements of the Theory of Relativity" appears as a subject taught to students taking an Honours Degree in Mathematics. One cannot help feeling a little bit indignant that young brains should be injured over this brain-adding theory which, in my opinion, harms the brains of all who try to understand it. On these grounds I do not think protest against the theory is superfluous—however little other people may pay attention to it.

Another point is that abstract justice would seem to demand that the discrediting of the theory should be as extensive as its popularisation ; since it swept nearly the whole of our intellectual classes off their feet of common sense as if they were so many ninepins. Not only did nearly all our mathematical physicists fall before it ; but also many philosophers like Professor Samuel Alexander and religious thinkers like Dr. Barnes—they, too, all fell down before it. So much so that I have sometimes felt like sighing “ Only I, of mathematical physicists, am left who think rationally.” And then it dawns upon me that there may be, after all, perhaps 7,000 more or less obscure mathematical physicists who have not bowed the knee to curved space.

And all this intellectual catastrophe has been due merely to the fact that relativitists, in a rather high-handed manner, insist that in a gravitational field radial distances, as measured, must be multiplied by a factor, which factor is not necessary for distances measured in directions at right angles ; and that this extraneous factor is not required to compensate for the behaviour of the measuring rod in the gravitational field, but is there because the space is “ curved.” It is, of course, nothing but the insertion of this factor, and their high-handed dogmatic assertion that doing so *gives* the “ space ” an external reality, in a gravitational field, which makes that space appear curved and distorted. It would indeed be strange if it did not do so. In this assertion of theirs they were uncritically believed by nearly everybody, with the result that the intellectual life of the last quarter of a century has been befooled as never before. Surely after this revelation of the manner in which relativitists have produced their curved space any further exposure of the theory would be very much superfluously unnecessary.

This action of relativitists is one of those arresting strokes of genius which some people find hard to distinguish from those sudden irrational impulses which afflict most mortals at times in their unguarded moments. Fortunately, it is not often that the basis of a fundamental scientific theory, which receives world-wide popularisation under the driving force of an immense infatuated enthusiasm, is so insecure.

Sir Arthur Eddington closes his well-known book, *Space, Time and Gravitation*, with words which I must quote here as they are obviously words which he was inspired to write by some Higher Power. “ We have found,” he says, “ a strange footprint on the shore of the unknown. We have devised profound theories

one after another, to account for its origin. At last, we have succeeded in reconstructing the creature that made the footprint. And Lo! it is our own." How profoundly true it is that the footprint of curved space which Sir Arthur thinks he has discovered in external reality is not there at all but has simply been manufactured by his own brain by the proceeding which I have described above!

But need I say any more about curved space? for it has already fallen flat; and therefore, at present, at any rate, it apparently cannot be curved.

DISCUSSION.

Dr. R. E. D. CLARK (in the chair) said: I feel great responsibility in being in the chair this afternoon, especially as Mr. Albert Eagle has described as fantastic nonsense some of the very ideas which our President put before this Society in 1928! Clearly, it is my duty to make the peace.

I believe that the present misunderstanding arises solely from the use of words as, indeed, Mr. Eagle has pointed out this afternoon. He has told us that mathematicians have no right to mix up distances in one direction with distances in another which have been multiplied by a factor, and then use the ordinary word "space" for the last named. But relativitists think they are quite right in using the old word for the simple reason that the new "space" is just the same as the old except in very rare conditions. In this they follow the example of the ordinary man who never hesitates to estimate the distance between one place and another on the assumption that the earth is flat, though he knows very well it isn't! And to their credit, be it said, the relativitists willingly admit that the word "space" is used by them in other senses than the ordinary. Mr. Eagle ought to have reminded us that Professor Eddington, whom he criticises so strongly, has candidly stated that he used the word "space" in four different senses in one of his books!

The truth is that space of every-day experience is never curved, and Professor Dingle has recently told us that he doubts whether any relativitist has ever really conceived of its being so. Misunderstandings have chiefly arisen because newspapers have printed such headlines as "Space Caught Bending," while certain optimists go

on maintaining that relativity must bring "a new epoch in the intellectual and social life of mankind." (A. A. Merrill.)

However, I think we must agree with Mr. Eagle's main contention. He urges very rightly that some relativitists do not care for facts but only for mathematics. This is exactly the complaint that a large number of scientists and mathematicians are making at the present time. There has recently been a long discussion of the matter in *Nature*, but I cannot give an outline of it here, though I would particularly like to commend the contribution of Dr. H. Jeffreys to your notice. Suffice it to say that many scientists and mathematicians (such as Levy) believe that some people are to-day vesting mathematics with a kind of mystical "reality," instead of regarding it as a mere tool for calculation. In the case of relativity, the very careful consideration given to the matter by Dingle, Chari and others has shown that the "*t*" of physics differs widely from the time of experience, and this fact removes Minkowski's claim that space and time have been blended—for the "*t*" of physics is itself a measure of *space* and not of time.

By far the most illuminating account of relativity I have seen is that of J. Mackaye. He argues that relativitists and non-relativitists attack physical problems by the method of dimensions and by the physical understanding of what is happening, respectively. The physical basis of relativity, he shows, is simply the Doppler effect (involving motion through the ether), but by treating the problem dimensionally, this physical meaning is hidden and, of course, denied. He shows that any physical phenomenon can be treated in the "relative way" by the simple use of multiplying factors, and that in this way the physical meaning can be hidden. But the "space," "distance," "velocity," "time," "energy," "momentum," "now," "future," "past," etc., of relativity have different meanings from those in common usage. Thus, if light from a distant star reaches you now, the star's distance is very large in the ordinary sense of "distance," but in the relativity sense the "distance" is precisely nothing! Unfortunately, Professor Eddington would probably express this idea by saying that it was "true" the star was a great way off, but not "really true." But then, you see, Professor Eddington delights in paradoxes!

In recent years the theory of relativity has been attacked vigorously. Silberstein has contested the general theory. Bridgman,

like Mackaye and Mr. Eagle, claims that relativity is mere mathematics obscuring a physical meaning, while Drysdale, Lodge, D. C. Miller, and many others have questioned the whole notion of the impossibility of measuring an ether drift.

Let us hope that if the theory of relativity emerges from the crucible of criticism, it will do so in such a form that it will no longer seem at variance with common sense. I am sure you will agree with me that the paper we have heard this afternoon marks a step in this direction.*

Brigadier N. M. McLEOD said: The lecturer has told us a lot about Einstein's curved space, but I thought that curved space had rather gone out of the picture in recent years.

Did not Einstein and his colleague de Sitter, after their visit to Mount Wilson about six years ago, come to the conclusion that space need not necessarily be curved after all?

Let me quote from a letter in *The Times* of May 26th, 1932, signed G. Peace, F.R.A.S., etc.:

"As a result of collaboration at Mount Wilson, they (Einstein and de Sitter) state that they conclude that it is possible to represent the facts of observation without assuming a curvature of three-dimensional space, and to insert into the equations of Einstein relativity Euclidean three-dimensional space of the old-fashioned type."

Will the lecturer tell us if Einstein has gone back to his curved non-Euclidean space?

(LECTURER replied he thought both Einstein and even Eddington were already getting rather tired of their curved space.)

* Fleming, A. (Sir), *Trans. Vict. Inst.*, 1928, **60**, 248 ff. Eddington, A. S. (Sir), *New Pathways in Science*, 1935, p. 279. Dingle, H., *Roy. Institution Lect.*, Nov. 26, 1937. Merrill, A. A., *Jour. Franklin Inst.*, 1936, **222**, 212. Jeffries, H., *Nature*, 1937, **139**, 1004. Levy, H., *The Universe of Science*, 1932. Dingle, H., *Through Science to Philosophy*, Chap. xi. Chari, C. T. K., *Mind*, 1937, **46**, 159 ff. Minkowski, H., *The Principles of Relativity*, by Lorentz, Einstein, etc., 1923, p. 75. Mackaye, J., *Jour. Franklin Inst.*, 1934, **218**, 343. Eddington, A. S. (Sir), *Nature of the Physical World*, 1929, p. 33. Silberstein, L., *Univ. Toronto Studies. Phys. Ser.*, 1936. (See *Nature*, 1936, **138**, 1012). Bridgman, P. W., *The Logic of Modern Physics*, N.Y., 1928, pp. 167-172. Drysdale, C. V., *Nature*, 1934, **134**, 796, 833. Lodge, O. (Sir), Many works, *The Ether of Space*, 1909, *My Philosophy*, 1933, etc. Miller, D. C., *Rev. of Modern Physics*, 1933, **5**, 203.

I do not understand relativity and do not know anyone who does. But I wish to attack the very foundation of the theory.

Have not all the scientific publicists, including Sir James Jeans, who have told us about the Einstein theory, stated clearly and definitely that the basis of the relativity theory was the *null* result of the famous Michelson-Morley experiment, and have not the most eminent mathematicians, headed by the late Henri Poincaré, laid down that the theory must stand or fall by the result of the Michelson-Morley experiment ?

Professor Picard also said : " It vanishes as soon as the Michelson-Morley experiment comes within the scope of known physical effects."

Now I have studied the 1933 report on the Ether Drift (Michelson-Morley) experiments carried out at Ether Rock, Mount Wilson, over a period of more than 30 years, by Professor Dayton C. Miller, and I find that these physical effects have been observed and measured, and *from these results* have been calculated the direction and speed of the movement of the solar system through the ether of space, the speed being approximately 208 km. per second in the direction of a point about 6° from the S. ecliptic pole. Now, how can the theory stand when it was based on the fallacious assumption that the ether does not exist and that, therefore, movement through it cannot be detected, especially when this assumption depended upon the wrong reading of the result of such an all-important experiment ?

Mr. H. S. SHELTON thought it would interest the meeting if he read them an extract from an article he published as long ago as 1914, in which the arguments were not unlike those used by the lecturer.

" In Riemann's space a line returns on itself. In the space of Lobatschewsky, ' parallel ' lines bend apart. Does either of these or Euclidean space represent actual space ? To this question there is only one possible answer. The line returning on itself is not straight, and the bending parallel straight lines are neither straight nor parallel. No possible experiments can alter or modify this fundamental. It may be that non-Euclidean geometry is applicable to real existent conditions. It may

be that parallaxes of very distant stars are negative, and there may be means of proving that stars which, by astronomical measurement, are found to be nearer, should ultimately be discovered to be farther. On such a question it is possible to admit evidence. A non-Euclidean ether is as metaphysically possible as a centaur or a hippogriff. A non-Euclidean space is as contradictory as a round square. Our material lines may bend; our rays of light may bend; but our straight lines are not straight unless they are straight. It may be that we always see crooked, but that is no reason why we should not think straight. The writer would urge that not only we go back to or remain with Newton, but that we go back to or remain with Euclid. Non-Euclidean geometry, non-Newtonian mechanics, and the Principle of Relativity are admirable examples of the coherence of thought whatever may be the material supplied to it as foundation, but they must not be mistaken for reality.”*

The lecturer would therefore see that he was not alone in objecting to curved space, or peculiar in the reasons that he gave.

Mr. Shelton went on to say that the strength of the Theory of Relativity, which enabled it to carry with it a good deal that seemed to him to be nonsense, was to be found in the fact that it not only explained the previously unexplained irregularity in the orbit of mercury, but enabled Einstein to predict the existence and amounts of the bending of rays of light by gravitation, and the displacement of spectroscopic lines in a gravitational field. The latter prediction had been strikingly verified when astronomers were able to take the spectrum of the companion of Sirius—a white dwarf with an enormous gravitational field.

It seemed to him that there was a field open to the mathematicians to calculate from other and more admissible data the amounts of these three effects. The mere pointing out of the absurdities that arose from certain deductions from the Principle of Relativity was hardly sufficient. The problem was how to account for known facts in some other way. He hoped that experts in mathematical physics would give their attention to this problem.

* “The Philosophy of Science.” (*Science Progress*, January, 1914, pp. 415-6.)

W. E. LESLIE said : The first part of the paper is technical. What is the layman to make of these arguments ? If Mr. Eagle were denying the curvature of the earth's surface, the layman would reflect—"This man has the world against him. That does not prove him wrong, but it does suggest that I should receive his arguments with cautious reserve." That, if he is wise, will be his attitude toward the technical arguments of this paper.

Next, Mr. Eagle argues repeatedly that the curvature theory is beyond the capability of our intellects, that we cannot form a mental conception of it, and so forth. But there is a vital distinction between that which violates the laws of thought, and so destroys itself, and propositions of which it may be difficult or impossible to form a mental picture. Further, the Theory of Gravitation which Mr. Eagle accepts is as hard to understand as the General Theory of Relativity. The layman can believe that the theories of mathematical physicists are beyond his picture-forming powers, but he will not readily believe that they have all (with the exception of Mr. Eagle) violated the laws of thought.

For the rest, we have a series of sweeping statements that have little beyond their dogmatism to commend them. The curvature theory has won the universal acceptance which Mr. Eagle deplures, first because it is the logical outcome of the sweeping changes in the theory of the physical sciences during the last few years, and then because it has stood the test of observation. A ray of light passing the sun has behaved as Einstein said it would—and not as it should on Mr. Eagle's view. Our author will, one fears, continue to sigh that he only is left to think rationally—he is not likely to find 7,000 mathematical physicists to think with him !

LECTURER'S REPLY

The author agrees with Dr. Clark, and would especially commend Mr. Mackaye's amusingly ironical exposure of relativitists' ambiguities. I know that Professor Eddington says that he uses the word "space" in four different meanings. How then can he expect anyone to know what he means ? Unless by "curved space" he means "curved *Raum*" (German), he is misleading people.

I endorse Brigadier-McLeod's remarks. Professor Miller's results emphatically do not give "no fringe shift" which both relativity

and the Lorentz-FitzGerald contraction require. His results are most consistent with a contraction of 95% of the L.-F. amount; the 5% deficiency making it theoretically possible to determine (but with poor accuracy) the earth's motion through the ether. And this, roughly, agrees with that deduced from the rotation of the Galaxy.

Relativitists dare not look at these results, as belief in the slightest fringe shift is a complete experimental destruction of their whole theory, which incidentally is also founded on an erroneous definition of simultaneity in a moving system; this definition being made so that the velocity of light relative to the system will appear to be the same in both directions. The dishonesty of this question-begging definition has only gone unchallenged because a direct experimental test is impracticable—any practicable experiment requiring the light to be reflected back to its source.

The author cannot understand relativitists' ideas on the L.-F. contraction.' Thus Eddington describes it as "true (*i.e.*, apparently true), but not really true." This would be the dictum of someone ignorant of electromagnetism. The contraction is a theoretical *necessity** unless some quite unknown cause neutralises it; and if the contraction has only 95% of its theoretical value, then some unknown cause is neutralising 5%.

The author was very interested in the quotation from Mr. Shelton's 1914 article, and congratulates him on thinking so "straight" when many physicists were beginning to think crookedly.

In reply to Mr. Leslie, the deflection of light does not prove the curvature of space. It proves that light travels more slowly through the ether in a gravitational field—a very likely thing to happen. This produces the curved path just as it does in light rays through the atmosphere in which all horizontal rays have a camber of about 0.4 inch per mile due to the fact that the lower side, travelling through a denser atmosphere, travels more slowly than the upper side. A decrease in the velocity of light in a gravitational field would almost inevitably cause spectrum lines to be displaced towards

* See last sentence in H. M. Macdonald's *Electromagnetism* (Bell), in which he quietly remarks, "this contraction [proved above] accounts for the null result in the Michelson-Morley experiment."

the red. This makes an understandable *physical* explanation as against a purely mathematical one.

I do not see how relativitists can possibly escape the charge that their "curved space" is really a contention that "'nothing' can possess a curvature," to quote from Professor Dingle. With these words the theory should, in the interests of clear thinking, be finally dismissed by everyone.

820TH ORDINARY GENERAL MEETING,

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, APRIL 25TH, 1938,
AT 4.30 P.M.

THE REV. W. J. DOWNES, M.A., B.D., IN THE CHAIR.

The Minutes of the previous meeting were read, confirmed and signed and the HON. SECRETARY announced the election of W. H. Molesworth, Esq., as a Member.

The CHAIRMAN then called on Major R. B. Withers, D.S.O., to read his paper entitled "Some Fresh Light on the Greek Scriptures."

SOME FRESH LIGHT ON THE GREEK SCRIPTURES.

By MAJOR R. B. WITHERS, D.S.O., late R.A.

IT was with some diffidence that I suggested preparing this paper, for I fully realised that at nearly every point I was trespassing on the preserves of specialists. Nevertheless, no one can deny that the specialist is continually in danger of being "unable to see the wood for the trees"; and this is particularly the case with the subjects to be discussed. The type of mind possessed by a first-rate master of Greek is quite different from that of the research-worker in Physics or of one whose duty it is to weigh evidence in the Courts. Sir Robert Anderson devoted much labour to drawing attention to this point, as regards the weighing of evidence. By now his word has borne fruit, and convinced all who are not deafened by the ceaseless self-applause of some of the destructive critics. On the other hand, the vital need for the application of the method of Science to the study of the Scriptures is still generally unappreciated; and the results of such scientific study which has as yet been carried out are practically unknown. This is the aspect of the matter with which I propose to deal now.

To some, at this point of time, such stress on the need for scientific method must seem grotesque. It *ought* to be grotesque; yet the fact is easy to demonstrate that, outside a relatively

small circle of students, real scientific method hardly exists. For proof, I give three instances, one general and two particular :

The Scriptures, as they have come to us, are saturated with matters outside and beyond our every-day experience of cause and effect, matters variously described as supernatural or miraculous. In spite of this, the majority of those who claim to study them scientifically persist in assuming from the outset that supernatural or miraculous events do not happen. Such an initial assumption is fundamentally unscientific. It violates the first canon of scientific criticism as propounded in Mr. G. B. Michell's important paper read before this Institute (Vol. 58, page 12) ; a canon universally accepted without question by students of the physical sciences, namely : "Scientific criticism proceeds by taking the object to be judged *as it is* ; not according to theories of what it ought to be, or may be supposed to have been."

For a particular instance I quote the late Canon B. H. Streeter : "The first epistle of Peter presents us with Peter and Mark as together in Rome." To this he appends a footnote : "'She that is in Babylon elect together with you' (I Peter v, 13) can only mean the Church in Rome. Babylon as a symbolic name of Rome is found in contemporary Jewish writings (*cf. Sibylline Oracles*, v. 143 ; II Baruch xi, 1) and occurs six times in the Apocalypse" (*The Four Gospels*, p. 489). This extract and the first and third statements of the footnote are in direct defiance of the above-mentioned canon.

Lest it be thought that this unscientific attitude of mind is wholly modern, I quote one more, this time from a Roman Catholic work : *In Spirit and in Truth*, anonymous, dated 1869, pp. 173, 174 : "It was foretold by the prophet Jeremias, as the distinguishing mark of the Church of the latter days, that there should be one universal faith, easy of access to all. 'I will write my law in their hearts' (Jer. xxxi, 34). . . . It seems almost needless to prove here that this unanimity of faith is not and never has been the result of the Protestant use of the Bible." The unknown author's last statement need not be contested, for the problem does not arise. A glance at the passage in Jeremiah shows that the prophet was referring to Israel and Judah explicitly, and not to the Roman or any other present-day Church.

Now, each one of these three instances forms part of a system which its exponent, presumably, elaborates into a complete

entity and regards as a complete segment of the whole circle of truth. Wherein lies the fallacy? Is it not that in each instance the exponent of the system is dealing, not with the subject as it is, *objectively*, but with a concept of it which exists in his own mind, *subjectively*?

The Scriptures, denuded of all miraculous elements, form a purely theoretical concept. To make it objective would be an almost impossible task. The Apostles Peter and John wrote "Babylon." If they did not mean what they wrote then, is it worth while troubling ourselves about anything else they wrote? Life is too short to waste time thus. The same applies to Jeremiah and the author of Hebrews. They wrote that the New Covenant would be concluded with the houses of Israel and Judah. Any lesser man who happens to disagree with them should at least condescend to offer some evidence in support of his opinion. It is worth noting, by the way, that when the Apostle John wishes to convey something more than the idea of the locality, Jerusalem, itself; he says so plainly (Rev. xi, 8).

These three schemes which I have pilloried are all subjective; they are created in the minds of their exponents, they do not exist objectively in the Scriptures themselves.

The issue here is plain: Is our aim to discover what the Scriptures actually teach? Or is it to discover whether we can force the Scriptures into agreement with our own opinions?

In each of the three instances cited above, the Scriptures are approached with a set of initial assumptions firmly held in mind; and whatever is found out of harmony with it is ruthlessly discarded. Do not those who treat the Scriptures thus risk the charge that they are claiming to know more about them than the original writers themselves?

In past eras, people were more logical. The exponents of Scholasticism laid down certain initial assumptions, and proceeded to reason therefrom until they achieved what they regarded as a complete system of knowledge. They did not waste time and energy consulting other external sources of knowledge. It is said that when sunspots were first discovered, the leaders of contemporary thought refused to look through the telescope at them. Sunspots had been proved impossible by the Scholastic system, and there was no more to be said!

The Scientific method endeavours to discover the facts it seeks, by testimony, observation and experiment; to classify them and to make generalisations from them. It makes no

assumptions, beyond the basic assumption, necessary for all rational thought, that ultimate truth does exist.

The Scholastic method assumes this, and a great deal else as well. It assumes virtual possession of the truth, the whole truth, and nothing but the truth, in its premises; and power to work out all the consequences of the premises by reasoning, and to avoid all fallacies. This implies, in effect, Divine knowledge and wisdom.

The Scientific method recognises, in effect, that the Creator has worked out His own system in creation; and humbly seeks to discover all it can of that system.

Are we, fallible mortals, ever justified in reasoning from what we think the facts *ought* to be?

The prevailing tendency now is to try to "have it both ways," to use whichever method happens to suit the immediate purpose in view. The inevitable consequence of this illogicality is only too evident in the intellectual chaos of the modern world.

The late Canon Streeter, in the book already mentioned, speaks of the blinding effect of unconscious assumptions, and quotes some in connection with the Synoptic Problem; but he seems quite unaware that there are other and more fundamental ones.

The Synoptic Problem itself depends on two assumptions, that the authors of the Gospels were second-hand and unreliable witnesses, and that their records are not necessarily in chronological order. In consequence, similar accounts are assumed to be inaccurate versions of the same account, variations in undoubtedly parallel accounts are dismissed as errors instead of being scientifically examined, and assumed errors are used as evidences of composite authorship.

The Synoptic Problem depends on what may be called a standard synopsis, concerning the content of which most recognised experts are agreed. This synopsis is based on the foregoing assumptions, together with one other: that the Apostle John's Gospel may be left out of reckoning. If these assumptions be granted, the synopsis follows quite logically.

But why should we agree to these assumptions? They violate the principle of "Occam's razor," because a synopsis of all four Gospels can be prepared on the basis of one assumption only, that the accounts are reliable testimonies. This assumption is different in kind from the three referred to above; since it is the basic assumption without which scientific study of the Scriptures

is not really possible. If the accounts are not reliable, we are faced with a problem more fundamental than the Synoptic Problem itself; the problem whether they are worth studying at all! Without a higher standard of reference, whatever in them is true cannot be separated from the false, if there *be* any false. Where can this higher standard of reference be found? Apparently we are expected to discern it in the critics themselves; but if so, would it not save a deal of trouble if the critics were to work out for us a really authoritative "gospel" of their own, and scrap the others? Perhaps the standard synopsis may be so regarded, but the account it would give contains many miraculous elements which a true modern critic must regard as most objectionable.

A "conservative" synopsis based on the assumption that all four accounts are reliable is found in A. G. Secrett's *A Combined Analysis of The Four Gospels*. He gives a tribute to the value of the *Companion Bible*, edited by the late Dr. E. W. Bullinger, from whose own indicated synopsis as basis I have prepared one of my own, which turns out very similar to Mr. Secrett's. I have encountered some minor difficulties and disagreements, but there is no reason to doubt that they will be resolved with further study.

This synopsis effectively disposes of the main critical arguments against the accuracy of the Four Gospels. Some of the best known, the alleged discrepancies between the accounts of the denials of Peter, the inscriptions on the cross, the morning of the resurrection, are completely refuted by Dr. Bullinger in the *Companion Bible*, so I need not consider them. It seems too much to ask that those who quote them so glibly should have the Christian humility to ask themselves whether there is not a bare possibility that they may be wrong. If the only accounts we possess of the life of the Lord Jesus Christ are so full of error as the critics allege, we have no right to regard Him as Lord. It is irrational to believe anything so remote from ordinary experience on the strength of four brief and mutually contradictory documents.

In point of fact, while each of the accounts is complete in itself, the four will frequently be found to dovetail into one another. The accounts of the apprehension of the Lord in Gethsemane and of the trial before Pilate, are examples. The combined accounts, taking details from each individual account, are far fuller than any single one. Thrice does the Lord Jesus warn Peter that he will deny Him. The first in John and the

second in Luke refer to three denials before the cock crows. The third occasion appears to comprise two warnings by the Lord Jesus. The first is in Matt. xxvi, 34. The second, in Mark xiv, 30, is emphatic and extremely precise, and foretells two cock-crows.

The denials take place on six occasions. The first (John xviii, 17) is at the commencement of the proceedings, and is to the maid who kept the door. The second occasion (Mark xiv, 68, John xviii, 25) is in the courtyard, where Peter is standing warming himself; first to one of the maids and then to others. The third is immediately afterwards (John xviii, 27), to one of the Chief Priest's slaves. Peter then comes outside into the forecourt, and the first cock-crow occurs (Mark xiv, 68, John xviii, 27).

This, presumably, makes Peter turn back; for next we find they have kindled a fire in the middle of the court, and he is sitting in the midst of them. This evidently supplements, as night draws on, the original charcoal fire in John xviii, 18. A maid comes and makes the fourth accusation (Matt. xxvi, 70, Mark xiv, 70, Luke xxii, 57). So the harassed Peter comes out into the porch, and is accused by another maid (Matt. xxvi, 71) and a different man (Luke xxii, 58). These are probably on the same (fifth) occasion. Evidently Peter creeps back and tries to keep out of the way; but once more they approach him; first, several accusing him (Matt. xxvi, 74, Mark xiv, 71), and then some other one stoutly insisting. While Peter is still talking to this last accuser (Luke xxii, 60), the second cock-crow occurs. There would seem to be nine actual denials.

The history, thus related, gives an edge to Peter's misery beyond that of any single narrative! It is difficult to reconcile any two of the narratives, as they stand, apart from the others; but with all four in our hands, a self-consistent combined narrative can be drawn up. This phenomenon recurs at many other points, and affords strong evidence of the completeness and inspiration of the whole set. This fact is not altogether a new discovery, but it is to be feared that it is new to most students.

Apart from any question of inspiration, the simplest solution of the problems of the Gospels is to credit all four authors with at least ordinary common sense; and to assume that each viewed the whole history from his own particular personal standpoint, and recorded only a selection from the whole.

The "conservative" synopsis of the Four Gospels has a direct bearing on their authorship and dates. "Q" and "Proto-Luke" vanish. The necessary priority of Mark and lateness of John logically follow no longer; and the traditional view that the four exist in the canon in the order of their composition becomes possible once more. This raises the whole question of uncritical reliance on tradition. What do we really *know* of the dates of the Greek Scriptures? Apart from the Apostle Paul's epistles, practically nothing.

Were there no traditions and critical theories to worry us, we could reasonably date Acts where it ends, two years after the Apostle Paul's arrival in Rome, say about A.D. 62. Thus, Luke is located some time before this date, and Matt. still earlier; as might be expected from the preface to Luke. There is, therefore, really no reason why the Apostle Paul should not have completed the canon, as his words in Col. i, 25 appear to indicate. "To fulfil" seems meaningless in this context, whereas "to complete the Word of God" is thoroughly in accord with the transcendent revelation under discussion.

The traditional order of the Four Gospels is in agreement with what facts we know, so we need not reject it. On the other hand, the traditional dating of John's writings is quite unsupported by internal evidence. They might just as well have been written during the period of the latter half of Acts, when Israel's hope was fast waning to its extinction in Acts xxviii, 28. Together with Heb., James, Jude and I and II Peter, their historical setting corresponds exactly with the situation then. The immediate prospect of the return of the King and the setting-up of His Kingdom has gone. For those of the Circumcision called to go on to perfection (Heb. vi, 1) in uncircumcision (Rom. and Gal.), the Apostle Paul leads the way, as the Apostle Peter hints (II Pet. iii, 15, 16). But Peter adheres strictly to his commission as Apostle of the Circumcision; thus his direct exhortation is to patient endurance, even in suffering. So with the other Circumcision writings. "Be patient, then, brethren, till the presence of the Lord" (James v, 7), "We may be racing with endurance the contest lying before us" (Heb. xii, 1). "You are enduring for discipline" (Heb. xii, 7). Jude looks forward to the last time (Jude, 17-23). The action of Revelation is located in the Day of the Lord (Rev. i, 10), and its final message is: "Lo! I am coming swiftly, and My reward is with Me to pay each one according to his work. . . . Surely I am coming swiftly"

(Rev. xxii, 12, 20). So far as all these are concerned, the present interval of reigning grace, of conciliation, of the great Secret of Eph. iii, the unity of the one Body, is simply out of the picture.

New Testament criticism is generally based on an assumed scheme of theological development. It may be the Hegelian conception "thesis, antithesis, synthesis," or a theory of evolutionary development, or a theory of composition like the division of the Pentateuch into J, E and P sources. All such *a priori* systems are a travesty of true science.

There is no need to devise schemes ; for Scripture has a scheme of its own, and all we have to do is to perceive it and then believe it. Unfortunately, in practice the "all" is somewhat delusive ; as any who have attempted the severe mental discipline of regarding the Scriptures wholly objectively will agree. Our minds are ridden with a host of unconscious preconceptions and prejudices, and the primary difficulty is to discover them. The only course is to be continually asking oneself : " This passage *says* so and so. Do I accept it as it stands, or do I try to explain it ? "

Sometimes we unconsciously give ourselves away. I read a little while ago a sermon on Col. i, 20, in the course of which the preacher said : " Some people actually take this literally ! "

It is the failure to take the Scriptures literally, whenever this can possibly be done, which is the cause of all our misunderstanding of them. If we do take them literally, and appreciate that earthly promises and blessings belong to God's earthly people, and are temporarily in abeyance (Rom. xi, 25-32), while the celestial blessings (Eph. i, 3) belong to those who are called to the Evangel of the Uncircumcision (Gal. ii, 7) entrusted specially to the Apostle Paul (" my Evangel," Rom. ii, 16, xvi, 25, etc.), and depend on the earthly promises being in abeyance ; we shall hold the key to all their problems.

Let us go back for a moment to the three instances given at the beginning of this paper. The reason for the present absence of miracles like we find in Acts, can now be appreciated. The things of maturity, of perfection, have now come (I Cor. xiii, 10-12, Eph. iv, 11-14). We can understand the unlikelihood, to say the least, of Peter's preaching with Paul in Rome. Peter and the rest of the Twelve were and remained apostles of the Circumcision. Paul and Barnabas (Acts xiv, 14), Apollos (I Cor. iv, 4, 9), Epaphroditus (Phil. ii, 25), Sylvanus and Timothy (I Thes. i, 1, with ii, 6), Titus and others (II Cor. viii, 23)

were the apostles of the Uncircumcision. In this economy we are outside and beyond the privileges and responsibilities of covenant, and we can safely leave the New Covenant to those to whom it belongs in the future days when the Rescuer has returned for Israel (Rom. xi, 26). We have no need of covenant, because, unlike them, we have died to the law (Rom. vii, 4). We are not under law, but under grace (Rom. vi, 14).

We can believe the Scriptures as they stand! Yes, and we can find deliverance from bondage to the glosses of their interpreters, due to partial apprehension of them. One example has already been given in Gal. ii, 7. The evangels there contrasted are the evangels *of* the Circumcision and *of* the Uncircumcision respectively. The contrast is not in their hearers, but in their subject-matter. This, in turn, explains Paul's anathema in Gal. i, 6-9. The Twelve quite rightly preached to the Circumcision the Evangel of the Circumcision, but to *the Uncircumcision* the only true evangel was and is Paul's Evangel (Gal. i, 8); and the whole point of Galatians is the fundamental incompatibility of these two evangels.

The Scriptures are intensely objective! Where they do deal with abstractions, faith, grace, love, etc., they deal with them in a wholly objective manner. The source of all corruptions of the Scriptures is departure from objectivity, the injection of subjective elements. The majority of commentaries simply teem with subjective thoughts superadded to the text. Apparently, everything must mean something other than what it says.

Some time ago, glancing through a commentary the name of which I cannot now recall, I came across the following note:—

“Rom. v, 12. ‘Eph. ho.’ Literally ‘On which.’ A.V. ‘For that.’ Other renderings: ‘Because.’ ‘In whom.’”

That note was like a blow! The scales fell from my eyes, and I asked myself: “If this means literally ‘On which,’ why in the name of sanity and common sense can we not *be literal*?” Rendered literally the passage is transformed! The interrelation of sin and death becomes, at once, luminously clear. Sin brought death into the world; but it is *death* which brings sin to all mankind. We do not sin voluntarily in the same sense as Adam did. We are riddled through and through with mortality, and in consequence cannot help but come under the dominion of sin. It is the *life* of God's Son which brings salvation (Rom. v, 10), His life Who is designated Son of God with power by the resurrection of the dead (Rom. i, 4). The body is dead because of

sin, yet the spirit is life because of righteousness (Rom. viii, 10). In the resurrection life of the Son do we triumph over death and sin.

I will cite one more example. Practically every expositor I have ever come across regards justification as the same as forgiveness of sins. That appears to be an unquestioned tradition. Yet I question whether in ordinary affairs such confusion would be tolerated. Justification is a forensic term, equivalent to a verdict of "Not guilty." Pardon is outside the scope of the courts. It is a function of government, and can be applied only to those whom the courts have pronounced "guilty." The whole point of justification in Romans and Galatians is that it means acquittal. Through and in Christ Jesus we are pronounced "Not guilty"; and nobody, not even Satan himself, can now lay any charge against us (Rom. viii, 33). Pardon can be revoked. Justification is a final, irrevocable decision. For the justified, judgment is past and done with.

These matters are simple and obvious, yet I cannot discover that they have ever been systematically treated in this objective manner. Does there exist a single handbook of the essentials of the Christian Faith which examines its basic elements in the calm, thorough and objective way which would be found in a good text-book of Physics? How many of us have ever studied scientifically the various evangels mentioned in the Greek Scriptures, or the various "mysteries" or secrets, or the shades of meaning conveyed by the death, the blood, the sufferings, the offering, the cross of Christ, or of His different titles, and so on?

The question of the translation of "eph ho" cannot be left without further discussion. It occurs in at least eight* other passages, and is variously rendered "where," "wherefore," "wherein," "whereof," "for which," and, once again, in a rather archaic sentence, "for that" (II Cor. v, 4).

At the risk of being dismissed with the mild contempt the expert usually feels for the amateur's "dog-greek"; I must point out that the literal "on which" can be substituted for all these assorted renderings without obscuring the sense; though in two, English idiom demands "on what account" or "on which account." Even then, a close approximation to uniformity has been attained. The underlying idea is the same throughout, and is violated by the A.V. rendering "for that."

* Matt. xxvi, 50, Mark ii, 4 (MSS, A.C. and others), Luke v, 25, xi, 22, Acts, vii, 33, Rom. vi, 21, ii, Cor. v, 4, Phil. iii, 12, iv, 10.

This brings me to the most controversial part of my paper, the problem of translation.

I suppose we are all agreed in theory that real scientific study of the Scriptures should be our aim. It would, of course, be carried out with the extreme of accuracy demanded by scientific method in every other study; yet few people seem consciously to realise that such study cannot even be started unless we can know with certainty what the Scriptures actually say.

Is it really necessary to have not less than six English renderings of a Greek form which occurs in nine or ten passages only? "Eph ho" can be fitted into our extremely idiomatic tongue with the literal "on which" and a slight modification of it. On the other hand, "wherefore" is the A.V. rendering of no fewer than 19 different Greek forms, according to Young's Concordance; "wherein" of 6 and "whereof" of 8. I notice, by the way, that Young gives "upon which" or "upon what" as the equivalent of "eph ho," so I can to some extent claim his support.

This particular example has been dwelt upon because it came to hand in the course of the argument, but other words indicate an even stronger case. For instance, "zoe" means "life," and is so rendered in every occurrence but one (Luke xvi, 25, lifetime). "Psyche" means "soul" and nothing else; yet the A.V. renders it "soul" 57 times, "life" 40 times, "heart" once and "mind" thrice; and to make things worse renders "pneuma" (= "spirit") once by "life" (Rev. xiii, 15), also! Is it not hard enough to grasp the distinctions between these ideas without having to cope with all this wanton confusion? No wonder so much unsound teaching exists!

The confusion is increased by the misuse of another pair of words. We frequently read, particularly in "Modernist" literature, that the earliest Christians were hourly expecting the end of the world. Indeed, that is given as a certain proof of the alleged late date of the Four Gospels; the argument being that nobody would bother to write such accounts for posterity until the delusion began to fade—an entirely sound and convincing conclusion, if only the premiss were as sound! The Greek word for "world" is "kosmos," and it is so translated in 187 of its 188 occurrences in the A.V. Nowhere is "the end of the kosmos" mentioned. Heaven and earth (ge) are spoken of as "passing away" (Matt. v, 18, xxiv, 35, etc.), and the Apostles Peter and John speak of "new heavens and a new earth" (II Pet. iii, 13, Rev. xxi, 1); but "the end of the earth" or of the "inhabited

earth" (oikoumene) are nowhere mentioned, nor is there the smallest hint they were ever regarded as an immediate prospect. What we *do* find is the end of the "aiōn" (Matt. xiii, 40, etc.), a word which deals with *time*, not space. Incidentally, the A.V. has "world without end" in one passage, an expression frequently heard but devoid of any meaning I can discover.

Can it be denied that our greatest need now is an accurate, modern, and really scientific translation of the whole of the Scriptures? None yet exists. We hear a great deal of modern scholarship, the complacency of which, in the face of its failure in this matter, is extremely odd; yet nobody seems to have the courage to state the plain fact that for scientific study the A.V. is simply not good enough, the R.V. little better, and most so-called "modern" versions mere paraphrases.

In consequence of this lack, real research entails elaborate investigation with a concordance of the original tongues. This amounts to an attempt to carry out, in fragments and with unnecessary handicaps, a work which should already have been accomplished by the translators.

It is absurd to contend that an adequate approximation to a self-consistent, scientific translation cannot be made. It has already been attempted; and the proper attitude to such attempts is not destructive criticism, but a constructive effort to do the work better!

I definitely challenge our Hebrew and Greek scholars to make such an effort! I do not see how any sensible person can contend that the chaotic renderings of "psuche," and many other words, are unavoidable; or that such arbitrary treatment of them can be anything but an evil. I have in my own studies corrected every example of the Greek words I have quoted, and many others; and have satisfied myself that such uniformity makes just as good English and far better sense! I am well aware of the argument that complete uniformity of rendering is unattainable. Nobody but an ignoramus would deny it! But I cannot see that it is any argument against seeking as complete uniformity as possible; and, where it is impossible, complete consistency, at any rate.* It has, I repeat, been attempted, but with what degree of success I leave to those more expert to estimate. I gather that the main objection to the attempt is that it has not been sponsored by any recognised leading scholars.

* And then, lapses from uniformity could always be noted or marked!

Well, it is for these scholars to do better ; or to give some really convincing reason why it should not be done ; to explain to a wondering world why some Greek words must needs have at least as many English equivalents as a caterpillar has legs, and by what magic touchstone they are able to ascertain which is which.

I suppose my scientific training is to blame ; but I need something more than a "scholarly" *ipse dixit* to convince me that, for instance, "legō" is the equivalent of 13 widely different English words and "say" the equivalent of 10 Greek words ; that "logos" represents 23 English words, of which "work" is one, and that "work" correctly renders 8 Greek words.

Some contend, I gather, that the translators have sought to convey the meaning rather than the actual words. How the words can be divorced from their meaning is quite beyond my understanding ! Such talk seems to me the grossest obscurantism. I beg leave to have the words accurately, and search out the meaning for myself.

I have expressed myself strongly over this matter because the issue is vital. If a scientifically accurate translation of the Scriptures is impossible, then scientifically accurate study of them is impossible. It is idle to retort that the student should take the trouble to master Greek and Hebrew ; how can he, if he is unable to ascertain whether "psyche" means "soul" or "life," and, if it means both, where it differs from "zoe" ? If a scholar can master Greek sufficiently to understand these words, how comes it that he cannot express his understanding in his own mother-tongue without hopeless confusion ?

Two bogies are encountered under present conditions by the would-be scientific student—figures of speech and idioms. These ought not to be bogies, but, rather, helps ; and if they are bogies, it is because we have made them so. Figures of speech chiefly worry those who seek to interpret the Scriptures literally. Unfortunately, many teachers who ought to know better, when faced by what seems to them an awkward passage, dismiss it as "figurative." To such, the plain question suffices : "What figure is it ?" Figures of speech have been classified, and there is no need to be afraid of them.

When it comes to discouraging those who seek to translate the Scriptures literally, the Idiom bogy appears. It seems that we cannot be literal on account of idioms. Idioms cannot—so it is said—be brought over from one tongue to another.

One of the most important Hebrew idioms has been brought over into English, and completely naturalised, too, in such expressions as "holy of holies" and "King of kings."

If this idiom could not be brought over literally, how did the translators manage to do it? It may be replied that this idiom has to be explained before the ordinary Englishman can understand it. Quite so; and it might be added that it is very often wrongly explained also, so we must be thankful that it *is* translated, and not paraphrased! With a paraphrase, we are at the mercy of authority without knowing it. A translation discloses the facts, and does at least show some explanation is needed.

The forms of this idiom with the word "aiōn" are a great stumbling-block. I have seen two curious renderings. One: "to periods made up of periods of a thousand years," obviously comes from a crank. Another: "ages succeeding one another in endless succession" is mere folly. The "holies of holies" in the Tabernacle were not an endless succession of holy places! Actually, the meaning of this latter form indicates the true interpretation of the others.

So far as I can discover, the problem of rendering Scripture idioms into accurate English equivalents is by no means insuperable. At the worst, all they require is a simple explanation. I speak with diffidence here; but even if I am wrong, it is surely not beyond the resource of scholars to classify them and work out uniform English equivalents.

A word about context. The sum of its contexts fixes the colour and usage of a word. In different languages this sum necessarily differs, so usage differs also, and no two words are exactly equivalent. Obviously the only way to seize upon the colour and usage of a given foreign word is to bring over as precisely as possible, by scientific translation, as many of its contexts as possible. For example, in the Greek Scriptures the repose of sleep is sometimes a figure of death. In an accurate translation, this is evident from the context. For a translator to render "katheudo" and "koimaomai" by "to die" in these contexts would be to ruin the delicate beauty of the figure. His business is to translate, not to interpret!

Surely the problem to be solved is how to think ourselves out of our English idioms into the idioms of the originals? This is really an essential, and is frustrated if we aim at idiomatic English. The idioms of a language reflect the manner of thought of those who use them, and a mature familiarity with those

idioms is a necessary prelude to the understanding of the thoughts they convey. To attempt to bring them into line with our own way of thinking is certainly to confuse them. On the other hand, a word-for-word "crib" rendering is almost unintelligible. The only solution appears to be to have two, or even three, translations.

The first would be a word-for-word "crib," the second a rendering consistent and literal up to the very limit of intelligibility; both being for the use of students. The third should be based on the second, but in plain, simple modern language; consistent and literal in its renderings, and carefully avoiding all unnecessary modern idioms. If the original has literary beauty, it will surely come out in such a translation. If it is plain and homely, the translation will probably be plain and homely too; yet this need be no loss, since to decorate what is by nature simple is bad taste. Here we reach the real issue. What are we seeking; literature, pleasing to the ear; or the most faithful possible rendering of the original, pleasing to God?

As in the physical sciences, so in the Scriptures, fresh light follows upon more careful study, more precise apparatus, keener and more exact scrutiny of the facts—in other words, more completely objective approach. My aim has been to bring this home by giving a glimpse of the fresh light shed by recent study, and by indicating the conditions necessary for the winning of further light. We cannot stand still. If we persist in opposing modern weapons with obsolete ones, we are foredoomed to failure. Picking and choosing interpretations, instead of studying and believing God's Word as it stands, is the essence of heresy.

Perhaps I am unduly optimistic, but I like to hope that this paper will be criticised as little more than what "Mr. Punch" might call "another glimpse of the obvious." Would that this were so! My thesis, that the Scriptures must be regarded wholly objectively, scientifically, *is* obvious—in theory. The trouble is, few of us carry the theory into practice. If we did, we would, at one stroke, end our unhappy divisions and be able to bring a real, clear, convincing evangel to a world which so desperately needs it.

POSTSCRIPT.

The view that Matthew and Luke depend primarily on Mark and "Q" is now so firmly established that some may regard it as folly on my part to attempt to reopen the question.

I am, however, encouraged by the discovery, at the last moment, of a newly published book, *Matthew, Mark and Luke*, by the late Dom John Chapman, O.S.B. This work offers new and very strong evidence in support of the traditional order of the Gospels. The fact that his arguments do not depend on my view of the proper method of working out the synopsis, gives it special interest.

DISCUSSION.

Mr. DUNCAN said : There was an incidental feature of this paper which, to him, was very unacceptable, and which, he ventured to think, was also out of accord with the witness generally of the Victoria Institute.

Certain paragraphs towards the middle of the paper, dealing with the proclamation of the Gospel in the Apostolic Age, led up to the extraordinary conclusion that the twelve Apostles and Paul preached respectively different and fundamentally incompatible evangels.

To him (Mr. Duncan) this was a perverse conception, altogether irreconcilable with any just summing up of the New Testament evidence. One might indeed have recourse to words used by Paul himself, and say that he and his brother apostles were being "slandereously reported" when any affirmation was being made as to an innate incompatibility in their respective gospels.

The essential unity of the New Testament writings, emanating though they do from different minds, at different times and in different circumstances, was more and more apparent the longer they were reverently studied ; and it was to be regretted that any attempt should be made to interpret them as deriving from two mutually antagonistic currents of spiritual influence.

When, moreover, it appeared to be claimed that such a line of interpretation afforded "fresh light on the Greek Scriptures," there was forcibly brought to mind the warning word of the Lord Jesus Christ, "If the light that is in thee be darkness, how great is that darkness !"

The Rev. Chas. W. COOPER said : All Fundamentalists will value the paper which has been read to us to-day and will gladly give their support to the writer's plea for the need of a more scientific examination, criticism and determination, as to the actual statements made in Scripture.

The Report of the Archbishop's Commission upon the Doctrine of the Church of England—just published—acknowledges that the Bible is a revelation from God but then proceeds to give “the opinions” of members of the Commission as to the meaning of its statements.

The truths of Scripture are not dependent either upon men's acceptance or understanding of its actual statements: what the world needs is to be given or told the actual statements given in the Bible. The Bible will then be its own interpreter.

The root of most of the present-day controversies over Scripture is the lack of Christian scholars being able to come to an agreement as to whether statements concerning the “House of Israel” and the “House of Judah” refer to one or two separate nations.

Also, much of the confusion which exists in men's minds would vanish if the present practice of scholars substituting (on their own authority) the word *church*, where Scripture definitely speaks of the nation Israel.

I give two glaring examples of the inconsistency of the above practice:—

(1) The following note is from the speaker's Commentary on Ezek. xxxiv:

“The complete fulfilment of the spiritual blessings, which the prophets were (here) guided to proclaim, was manifestly never realised in any temporal prosperity of the Jews, and never could, and never can be realised in any earthly kingdom.”

Then, because the writer fails to recognise that the said promises were not made to the Jews or the House of Judah, but to the House of Israel, proceeds to wrongly assume that the promises are therefore prophetic of “The Church.”

(2) A second example of the confusion which exists through altering actual statements concerning the Kingdom of God is the comment of Dean Alford in his commentary on Matt. xxi, 43, which says “The Nation” herein mentioned by Christ, means “The Church.”

The comment of Bishop Thorold, S.P.C.K. Bible, on the phrase Kingdom of Heaven in Matt. xiii, Luke viii, is that “the Kingdom” is the Church.

By putting these two quotations together we are given the following curious rendering of Matt. xxi, 43 :—

“The Church shall be taken from you Jews (who never had the Church) and shall be given to a Church bringing forth the fruits thereof,” which is absurd.

Dr. A. DRUITT appreciated the endeavour to arrive at the correct text of Scripture, especially when it involved a search for the original words.

He asked the lecturer if he was acquainted with the Numeric proof of the inspiration of the Bible—by Ivan Panin—and later briefly explained the principles of Bible Numerics, and showed how, by the features of an acrostic numeric pattern the text was settled—irrespective of theological opinions and diversities of version ; also that, in so settling a text there was nothing found in Bible Numerics which was out of harmony with the Voice of Scripture. He commended the study of Bible Numerics to all.

Mr. W. E. LESLIE said : The first part of the paper is rather miscellaneous in character. Reference is made to “The Synoptic Problem,” but its nature does not seem to have been clearly grasped. The main object of this section is rather to put forward a number of views associated with the late Dr. Bullinger and his followers. The New Testament undoubtedly presents us with a most interesting historical progression of doctrine. This has been exploited by Modernists. It has also been taken up by Bullingerites, but their extravagance and dogmatism have brought the subject into disrepute among evangelicals. This is exceedingly unfortunate, as a sane examination of the material from an historical standpoint is urgently needed.

The second part of the paper considers the principles of translation, a topic on which it is easy for zeal to outrun discretion. Major Withers does not seem to know that while the translators of the A.V. set themselves to introduce variety in translation, the translators of the R.V. as deliberately set themselves to seek uniformity. They say in their Preface that many alterations which may appear unnecessary have been made for this reason. Still, the R.V. is only

a revision. We need a fresh translation incorporating recent advances in our knowledge of the Greek language, and of the Sacred Text. It should be the work of a body of scholars, in order to avoid the freakishness and theological bias of the unnamed version from which Major Withers so frequently quotes.

It is a pity that no interlinear translation based on the Greek texts of Westcott and Hort, Nestle (the new edition), or Weymouth's Resultant, is published. The "Russellites" and "Bullingerites" have tried to fill the breach, but their publications are best left alone.

In conclusion, while the paper raises a number of points of interest to Bible Students, it sheds very little, if any, fresh light on the *Greek* Scriptures.

WRITTEN COMMUNICATIONS.

Mr. E. J. G. TITTERINGTON wrote: Major Withers has brought before us a very important subject, for which I think we owe him a real debt of gratitude. His thesis falls into two parts: the need for a scientific and objective study of the Scriptures, and the need for a scientific translation as a foundation for such study. It is a matter for astonishment that there should be so much loose handling of the Word of God. Unfortunately, this is often found in conjunction with a reference to the original tongue, so that in itself a new translation would not obviate the evil; though this is, of course, no argument against the thesis before us.

The difficulty lies not so much in recognising what needs to be done as in the application. Major Withers acknowledges this. He seems, however, to have fallen into his own trap rather badly—to quote his own phrase, both in general and in particular. As a general instance, there is his plea for a literalness of interpretation, to the exclusion, perhaps, of one less literal. I do not say that he is wrong in this: only that in laying down this principle there is a definite subjective, as well as an objective element.

To come to particular instances: the speaker refers on page 208 to "the reason for the present absence of miracles like we find in Acts." This embodies two assumptions: (1) that there is a "present absence of miracles," and (2) a presumed explanation of this assumption. Many (myself included) would strongly dissent from assumption No. 1, and would be prepared to cite evidence in

support of our views ; if then, the assumed fact is no fact, what becomes of the rest of the argument ?

An even more important example of a subjective attitude of mind is to be found in the passage to which Mr. Duncan has referred. And a third, in the selection of one out of several possible renderings of the Greek phrase " eph' ho " in Rom. v, 12.

We do not get rid of this difficulty, which seems inherent in the human mind, when we come to the question of translation. We have to exercise our own judgment, first in the adoption of our original text, and then in finding the best equivalent in another language, and we cannot divest ourselves at any moment entirely of a subjective standpoint. This is not to say that the task should not be attempted (I believe the late Sir Edward Clarke made an effort in this direction), but in attempting it we should be clear in our minds as to what we are doing. Much as we all admire the Authorised Version, one cannot but regret that the structure of Matt. vi is obscured by the use of the same word " alms " in verses 1 and 2 to express two entirely different Greek words, or that the word " Parakletos " should be translated " Comforter " when it refers to the Holy Ghost, and " Advocate " when it refers to our Lord, and it would be easy to multiply examples.

But the translators of the Authorized Version were proceeding on a definite principle ; they carried it too far, no doubt, here and there, but the principle itself is set out in the Preface (not printed in most editions of the Bible) addressed to the Reader : see the section headed " Reasons inducing us not to stand curiously upon an identity of phrasing." As it stands in this Preface, " Is the Kingdom of God become words or syllables ? Why should we be in bondage to them if we may be free ? "

The truth is that the Word of God is something living, and though our existing translations are not perfect, we must at all costs avoid a translation which is merely mechanical, and therefore lifeless ; it is a spiritual task, which calls for spiritual equipment. Precision is needed both in translation and in interpretation ; but it is rather the precision of the lawyer, who deals with living language and abstract conceptions, than that of the scientist, who can only be precise so long as he is dealing with entities that can be weighed or measured or counted. " The letter killeth ; the Spirit giveth life."

Rev. H. TEMPLE WILLS, M.A., wrote : I have read the paper with very great interest and feel that the author has sounded a note very much needed in saying we need a new translation of the Bible, one nearer the present meaning of the words, and also a consistent translation. Why should the old English word "hell," for example, be used as the translation of iii or iv Hebrew and Greek words and so give a false idea of its meaning—the grave. Conditionalists have for long been pleading for consistency but tradition still holds the field for Rome and paganism. I trust Major Withers may be able to get his ideas attended to in the proper quarters.

Col. A. H. VAN STRAUBENZEE wrote : The lecturer has stressed the importance of the very words of Scripture—but I think he has omitted to emphasise the importance of belief in the plenary and verbal inspiration of those words.

Thus, in the Gospels we have four accounts of the Life of Christ given to us by God the Spirit—but *through* four sinful men, Matthew, Mark, Luke and John—Thus, as in days past the Holy Spirit touched an imperfect woman and brought about the birth of the Lord Jesus Christ, one in whom there is no error or sin. This same Spirit touched men set apart by God to produce the perfect written word—one and the same member of the Godhead has given us both Christ and the Bible, and both equally perfect, Ps. xii, 6. The words of Jehovah are pure words, as silver tried in a furnace (word) pertaining to the earth, purified seven times.

God has safeguarded the copies of the original writings that it is acknowledged, we have to-day at least 95 per cent. of the very words in the originals.

Our Lord believed in the infallibility of the Old Testament and we may say it reverently ; it was Our Lord's belief in verbal inspiration that sent Satan from him in utter defeat.

Job says in chap. xxiii, 12, "I have esteemed the words of his mouth more than my necessary food," and Christ, quoting Deuteronomy, that man liveth by every word that proceedeth out of the mouth of the Lord doth man live. In Hebrews, iv, 12, we have a record not of the *Higher* criticism but of the *Highest* criticism.

"For the Word of God is living and powerful, and sharper than any two-edged sword, piercing even to the dividing asunder of soul

and spirit, and of the joints and marrow and is a critic of the thoughts and intents of the heart.”

The Word of God criticises man and exposes man to himself in all his helplessness, sinfulness and hopelessness, and also exposes to man “God’s love for man,” *vide* John, iii, 16. Thank God then for the Highest Criticism in which God shows what we are and what He is.

I agree with the lecturer that a translation, giving us in every passage where it occurs, the same meaning of any given word, and also indicating “figures of speech,” would be valuable.

And that our theology for life now should follow the Gospel of the Grace of God as set forth in the Epistles, revealed after the Gospel of the Kingdom as in the Gospels.

Mr. THOMAS FITZGERALD wrote : Major Withers has done well to call attention, in his suggestive paper, to the need of applying the method of Science to the study of the Scriptures, and I desire to make some comments on the subject of his paper, first of a general character, and then with reference to some particular points connected with it.

No other book has ever been subjected to such haphazard and unscientific treatment as the Bible. A considerable proportion of those who profess to study it, do so without any attempt to discover why the Book was written and to understand the true relation of the parts to the whole.

While assuming the rôle of Christian teachers, a certain school speak of the Bible in glowing terms as to its superlative merit in the realm of literature, but refuse to acknowledge that its origin is Divine. We are told by such that, “The conclusion is forced upon us that the Bible is a human work, as much as the “Principia” of Newton or Descartes. Some things are beautiful and true, but others no man in his senses can accept. Here are the works of various writers, thrown capriciously together, and united by no common tie but the lids of the bookbinder—two forms of religion which differ widely, one the religion of fear, and the other of love.”* We are asked to believe that this is *scientific criticism*. It is, to speak plainly, a flagrant travesty of the facts, and violates the canon

* *The Bible and Modern Thought*, by Rev. T. R. Birks, p. 6.

that, "Scientific criticism proceeds by taking the object to be judged *as it is*," just as the geologist who picks up a pebble by the brook-side discovers that all nature is related to it.

The fresh light on the Greek Scriptures, which has resulted in recent years from the diligent researches of scientific students of the Bible is, as the author states, practically unknown.

Turning to some particular points, it is reasonable to ask, "How many students of the Scriptures really know anything of the vast accession of material, now available for the textual interpretation of the Greek New Testament?"

Prof. Alex. Souter states in the preface to his Pocket Lexicon, "The last quarter of a century or so has, as is well known, seen a vast accession to the material of value for the textual interpretation of the Greek New Testament, particularly in Greek papyri discovered in Egypt. These documents are for the most part written in the non-literary Greek, the *κοινή* (*διαλεκτός*), 'the common dialect' or *lingua franca*, spoken and written throughout almost the whole Græco-Roman world. . . . Unless I am mistaken, the newer knowledge sheds a flood of light on passages hitherto misunderstood or regarded as unprofitable (*e.g.*, 1 Cor. x, 11, James i, 3, 1 Pet. ii, 2), and sweeps into the dustbin a deal of the well-meant but hair-splitting theology of the past (*cf.* *Eis*), quite unsuited as it was to the comprehension of plain first-century Christians."

Take another point, which Dr. James Hope Moulton refers to in his *Introduction to the New Testament Greek*. "We are now at last able to read the everyday speech of the people, and we find to our astonishment that one 'Hebraism' after another can be exactly paralleled from the letters, wills, petitions or accounts of Greek-speaking Egyptians from the fourth century B.C. downwards. It is becoming clear that in general we must only expect Semitic idioms in places where there is direct and over-literal translation from the Hebrew of the Old Testament, or the Aramaic which presumably underlies the Greek of men living in Judæa. In Palestine, as in Lycaonia (Acts xiv, 11 ff.) and elsewhere, the bulk of the people must have been like the Welsh to-day, greatly devoted to their native language (*cf.* Acts xxii, 2), but able to understand and use the language then current throughout the civilised world. . . . 'Judaic' or 'Biblical' Greek being no longer recognisable as a distinct variety, we can use without restriction the general term Hellenistic

(Greek), employing it after the manner of the old 'Atticist' grammarians for the one general Hellenic vernacular as distinguished from the archaic language now firmly established for use in 'correct' literature."

I fear that the lecturer's appeal to scholars to make an effort to produce an accurate, modern, and really scientific translation of the whole of the Scriptures comes too late in the day. The apostasy has so pervaded Christendom that it would be impossible to bring together a company of men representative of all the Churches, who would bring to bear upon their work not only their profound learning but a deep spiritual understanding of the Divinely revealed truths of the Sacred Writings.

The right use of the critical apparatus now available to students is better than another agreed translation, yet scholarship alone without the enlightenment of the indwelling Spirit of God, would be no safeguard from error.

Dr. J. H. MOULTON writes of the advantage even a little knowledge of the Greek Testament will bring, and of how accessible that knowledge is in our time. He says, "How accessible that knowledge is I learnt with profound satisfaction when I found this book a few years ago in the hands of a poor and almost helpless cripple in a Black Country cottage. He had taught himself Greek enough to work through several chapters of St. John, and he used the added knowledge of Holy Writ to instruct and inspire the young men who gathered around him in the little room which proved a very gate of heaven for many."*

AUTHOR'S REPLY.

I thank Colonel Van Straubenzee for his kind remarks. Actually, emphasis on inspiration is, I consider, implied in what I wrote. If the Scriptures are not verily the Word of God, absolute accuracy in study and translation is of minor importance.

In the section Mr. Duncan dislikes, I referred to Gal. i, 6-9 and ii, 7, and I took the Apostle Paul to mean precisely what he said. If Paul found it necessary to anathematize so strongly the substitution of one evangel for the other, he must have regarded his own

* *Introduction to the Study of New Testament Greek.* Pref. xi.

evangel as fundamentally incompatible with Peter's. With the passages quoted above, the reader should study Gal. ii, 11-21, iii, 2, 10, and, indeed, the whole epistle. For the Galatians (and for us) to turn back to Peter and the rest of the Twelve, to the Evangel of the Circumcision, to law and to covenant, is to turn away from Paul's Evangel and the great Secrets of Rom. xvi, 25, and of Eph. iii, 3, 5, 6, which were given to him to proclaim (Eph. iii, 7-13). That Paul's Evangel will, in due time, be displaced in turn by the Evangel of the Circumcision and by the Law is evident from such passages as Rom. xi, 25-29, and Heb. viii, 8-12, with x, 15-39 (the latter written to *Hebrews*, i, 1, 2) in the Greek Scriptures, and Deut. vi, 24, Isa. xlii, 21, lvi, 6-8, Ezek. xlv, 21, 25, Zech. xiv, 16, 21, Mal. i, 11, and many other passages in the Hebrew Scriptures. Can any candid student deny that these prophecies are fundamentally incompatible with Galatians? Each is true in its proper setting in time and circumstance. This present Economy of reigning grace (Rom. v, 10-21) is not permanent! It will be followed by a short period of judgment, which will in turn be succeeded by the New Covenant and the Millennial earth-rule of Messiah. The work wrought by the sufferings, the cross, the blood and the death of the Lord Jesus Christ must not be limited. It was in the first place for His Covenant People (Rom. xv, 8, 9); His Apostle of the Gentiles was called to reveal that it also brought blessings, above and beyond covenant, to the Church which is His Body. But the Body will not always remain on earth; its blessings are celestial (Eph. i, 3); and in due time the promises of earthly blessings to Israel and Judah, and to the Gentiles through them, must be fulfilled.

Should this still be not clear to Mr. Duncan, I suggest he try the experiment of mentally excising every scrap of Paul's written teachings from his theology. He will then find he has nothing left of the doctrines *distinctively* for us! Justification by faith alone, all our celestial spiritual blessings, the one Body in which Jew and Gentile are absolutely equal, and many other things, will have vanished. He will have to worship in the Synagogue, keep the Law and the Jewish feasts, be a proselyte of the Jews like Cornelius and the Ethiopian eunuch, and wait for the restoration of the Kingdom to Israel. Much remains to be learnt about this matter; and I,

amongst others, am engaged in elucidating and clarifying it. It is impossible to say more here, so I must refer inquirers to my own published writings.*

Mr. Leslie does not seem to realise it is impossible to cover every aspect of so vast a subject in a short paper.

I have long admired the late Dr. Bullinger's insistence on the importance of accuracy in the study of the Scriptures and the need to believe them all (Luke xxiv, 25-27); but this is the first I have heard of the Bullingerite sect. Nor am I acquainted with the translations made by them or the "Russellites"; but at least they deserve credit for recognising the need of fresh translation; and I deplore Mr. Leslie's attitude. Such attempts should be judged as *translations*, on their merits, and not left alone because of dislike of their sponsors. Similarly, the charge of freakishness and theological bias made against the Concordant Version, which I quoted a few times, is one which, if made at all, should be supported by evidence. This was the version to which I referred on page 212, para. 3, but I avoided naming it there because I wished to focus attention on the true principles of translation, rather than on the effort to realise them. The Concordant Version is not perfect, but it is the only attempt yet made to approach the problem on sound lines; and it is significant that the only constructive criticism of it, so far as I can discover, has come from those who have themselves worked on it.

I would be glad to have Mr. Leslie's criticisms of the *principles* of this version.

It is impossible to answer Mr. Titterington briefly. I would greatly like to see his evidence for the present existence of miracles such as those in Acts v, 1-9, xiv, 19, 20, xvi, 25, 26, and xxviii, 3-6.

My "selection of one out of several possible renderings" of "eph ho" was strictly objective. I chose the literal rendering!

To select according to personal preferences is subjective. To select according to some standard external to oneself, in this case literalness, is objective. Although, admittedly, the *choice* of that standard may be dictated by subjective considerations; the standard

* *The Conciliation. The Secret of the Evangel and The Evangels. A Systematic Study.* A third, *The New Covenant* is now being serialised in *The Lantern*, and will, I hope, be published in book form later. Publisher: J. & F. Smithers, Ballynahinch, Belfast.

itself, once fixed, being independent of its user, is necessarily objective ; so selection according to it is wholly objective also. I admit my *preference* for literalness of translation and interpretation is subjective ; but literalness does not itself fail to be objective on that account, nor is there any reason why it must needs be mechanical or lifeless. I suggest my critic has himself failed to disentangle the objective and subjective in his last two paragraphs. The fine confused thinking in the quotation from the preface to the A.V. is a superb example of what to avoid. As God has chosen to give His revelation in words, it is neither curiosity nor bondage to treat His words with reverent precision.

I much appreciate the courteous criticisms of the Chairman, but I must add that my association of the Synoptic Problem with a standard synopsis is not due to misapprehension. On opening Hawkins' *Horæ Synopticæ* at random, I find, on pp. 80, 81, references to four synopses, including Rushbrooke's Synopticon, so I am not alone ! With Dr. Druitt, Mr. Fitzgerald, Rev. Temple Wills and the Rev. C. H. Cooper I am in general agreement.

821ST ORDINARY GENERAL MEETING,

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER. S.W.1, ON MONDAY, MAY 9TH, 1938,

AT 4.30 P.M.

B. A. KEEN, ESQ., D.Sc., F.R.S., F.INST.P., F.R.MET.S., IN THE
CHAIR.

The Minutes of the previous meeting were read, confirmed and signed.

The CHAIRMAN then called on Lt.-Col. E. Gold, D.S.O., F.R.S., F.R.Met.S., to read his paper entitled "Synoptic Meteorology; the Basis of Weather Forecasts."

*SYNOPTIC METEOROLOGY; THE BASIS OF
WEATHER FORECASTS.*

By LIEUT.-COLONEL E. GOLD, D.S.O., F.R.S., F.R.Met.S.

WHEN you hear a weather forecast broadcast from one of the stations of the British Broadcasting Corporation or see a weather map and its interpretation in your morning newspaper, you may not realise the organisation on which the information which you receive depends. It is my purpose to describe to you that organisation and its development.

It will be convenient for my purpose, and I hope assist you in following this lecture, if I divide it into five sections:

I. The information to be transmitted. This is primarily the results of observations—both surface observations and observations of upper atmosphere. But it includes also forecasts (*see V*).

II. The form in which the information is transmitted. This is primarily a matter of codes and specifications or scales. A meteorological code differs from an ordinary code in the fact that the significance of each figure in a message depends upon the position of the figure in the message.

III. The arrangements for the transmission of the information. This is effected primarily by wireless telegraphy.

IV. The presentation of the information on charts or in tables. This is primarily a matter for internal arrangement in each service. It has international aspects.

V. The forecasts derived from the information. These also are primarily an internal matter in each service. There are certain aspects in which international arrangements are necessary.

I shall before going to Section I give an historical note, mainly about the International Meetings, which have been primarily concerned with Synoptic Meteorology since it began to be organised about 70 years ago.

HISTORY.

Until about a century ago forecasts depended on observations at a single place, and so far as the weather a short (but variable) time ahead at a single place is concerned, observation there is the best guide. I say "variable" time because it may vary from five minutes to five hours or more. On some occasions it is impossible to tell from observations at the place what the weather will be in five minutes' time; on other occasions the weather at a place can be forecasted with confidence for several hours ahead by observation at that place. I say "the weather at a single place" and "at that place" because no method has yet been devised which will convey to a person at a place B all the information which actual observation on the spot gives to an observer at place A. For example, a report of the weather at Paris does not enable a person at London on that information alone to forecast the coming weather at Paris so well as a person of equal intelligence at Paris itself can do it. Very great advances have been made in the past twenty years in this matter of reporting exactly and fully the meteorological conditions at a place; the most difficult part is the fact of the sky, the varieties of cloud, their distribution and amount. But the problem is by no means completely solved.

Even before the invention of the electric telegraph, it was realised that a knowledge of the weather over a wide area would be a better basis for a weather forecast than the conditions at a single place, and charts of isobars over Europe for each day of the year 1783, drawn naturally long after the event, were published by Brandes. The chart for March 6th was reproduced in Hildebrandson and Teisserenc de Bort's book on *Les Bases de Meteorologie Dynamique* and subsequently copied in other books

on weather forecasting. It is worthy of mention, because it was not until many years after the collection of weather reports by telegraphy had commenced in the middle of the following century that the regular use of isobaric charts became established—they had, as it were, to be rediscovered.

The international arrangements for synoptic meteorology are made by the International Meteorological Organisation, which has a Commission—the Commission for Synoptic Weather Information—appointed to deal specially with this side of international work. It is indicative of the manner in which the pace of meteorology, as of other things, has changed, that in the first thirty-five years of the International Meteorological Organisation, no substantial changes were made in the arrangements for synoptic meteorology agreed upon immediately after the Congress of Vienna in 1873.

As I shall have occasion frequently to refer to the Commission for Synoptic Weather Information and the custom of indicating the Commission by the initials C.S.W.I. has become general, I propose to follow that custom in this paper.

The predecessor of the Commission for Synoptic Weather Information was the Commission for Weather Telegraphy. This was appointed in 1907,* and held meetings in 1909 and 1912. It was reappointed after the War, and since then it has held meetings in 1920, 1921, 1923, 1926, 1928, 1934, 1935 and 1937. My connection with the Commission began in 1919. The following notes indicate briefly the work which the Commission has had to do.

C.S.W.I. First Meeting.

At the meeting in 1909 the Commission considered the International Code for Weather Telegraphy which had been in operation without appreciable change since its introduction in 1874. The Commission made recommendations notably in regard to the introduction of the barometric tendency or the change of barometric pressure in the period preceding the time

* At the Congress at Vienna in September, 1873, a small sub-committee was appointed to report to the Congress on the question of Weather Telegrams. In discussing the report of this sub-committee, the British delegate, Mr. R. H. Scott, remarked that it would be very desirable to have a uniform system of cyphers for Weather Telegrams. The duty of arranging this was entrusted by the Congress to the International Meteorological Committee.

of observation. They recommended that this period should be three hours, and it has continued to be three hours until the present time. The Commission also recommended that appropriate arrangements should be made in any regulations for the control of wireless telegraphy for full facilities for the transmission of meteorological messages. These recommendations were approved and the change in the international code was introduced two years later.

C.S.W.I. Second Meeting.

At the meeting of 1912 the principal question was that of hours of observation—a question which has not yet been solved. General Rykatcheff, the Chief of the Russian Meteorological Service, pointed out that although other countries could usually choose two hours of observation approximately equidistant, which did not necessitate observations in the middle of the night, that was not practicable for his country where the difference of longitude meant differences of 9 or 10 hours in the time. The Commission recommended one set of hours—7, 13, and 18h. G.M.T.—for Central, Northern and Western Europe, and another set of hours—6, 12 and 18h. G.M.T.—for stations east of Longitude 30° E. The Commission also made recommendations in regard to the characteristic of barometric tendency, an endeavour to describe with one figure the appearance of the curve of a barograph during the period of three hours used for estimating barometric tendency.

C.S.W.I. Third Meeting.

At the meeting in 1920 the Commission began the work of post-war development which has extended until the present day. There had been a meeting of Directors of Meteorological Services in London in July, 1919, at which ideas for the utilisation of wireless telegraphy and for the revision of codes and specifications embodied in the Meteorological Annex to the International Air Convention were discussed; and this was followed by a Conference of Directors at Paris in September, 1919, at which new ideas were further diffused, though slowly. Consequently, when the Commission met in November, 1920, members were prepared for radical changes; and they made them. The code for reports from land stations was entirely revised; the inadequacy of a single figure to describe the weather was recognised and a code of 100 specifications adopted; visi-

bility, form and amount of low and high cloud were introduced into the code and a figure added to represent approximately the height of the cloud base (or "ceiling"). Reports of rainfall and of the time of beginning of rainfall were included twice daily and the maximum and minimum temperatures were made to refer to the day and night respectively, thus terminating the ludicrous arrangement under which a minimum temperature below freezing point was often reported on, say, Thursday morning, when the preceding day and night had both been mild with temperatures of 40° F. to 50° F. (This always happened after a cold morning followed by a mild day and night.)

C.S.W.I. Fourth Meeting.

At the meeting in 1921, in London, the Commission made some minor changes in the recommendations of the meeting of 1920, but the only substantial modification was a change in the code for reports for aviation. The code recommended for abridged reports by the meeting of 1921 was :*

$I_n I_n$ wwVhL NDDFW ($C_a ddF_1 S$).

This code marked the definite intrusion of aviation into synoptic meteorology, and the first group of this code has now become a world-wide group in synoptic and aviation codes. One of the resolutions of this meeting which has an historical interest is a resolution which reads :

"That, as Austria had now been admitted to the League of Nations, Professor F. M. Exner, of Vienna, should be co-opted a Member of the Commission."

C.S.W.I. Fifth Meeting.

At the meeting of the Commission in 1923, at Utrecht, the Commission decided to change its title from Commission for Weather Telegraphy to Commission for Synoptic Weather Information.

Among other points of interest in the resolutions taken by the Commission at this meeting were : (1) a decision to ask the different Meteorological Services to publish a description of the meteorological stations used in their collective synoptic messages ;

* For the significance of the letters see p. 243.

(2) a resolution expressing the hope that Russia and Italy would arrange for regular and punctual issues of synoptic reports according to the International Scheme; and (3) a resolution recommending the issue of reports giving observations made at the intermediate times of 10 a.m. and 4.0 p.m. at selected stations on the Atlantic seaboard. This marks a further stage in the progress from the once-a-day messages of thirty years ago to the synoptic messages every three hours of the present day.

This meeting also marked the beginning of a period of six years during which the general code and, particularly, the codes for weather and cloud were continually under discussion. The French Service had never been contented with the codes for weather and cloud, and had proposed alternatives which had led other services also to make proposals for modifications in the codes. All these proposals were referred in the first instance to a special Sub-Commission, called the Code Sub-Commission, which was appointed by this meeting at Utrecht.

C.S.W.I. Sixth Meeting.

The meeting at Zurich in 1926 was the first meeting after the war at which German members were present. On this occasion the veteran Dr. Hergesell represented the German service. The principal matters discussed were (1) the question of hours of observation. On this the meeting made general recommendations to the effect that any hours selected for synoptic observations should be included in the periods 0-2h., 6-8h., 12-14h., and 18-20h. G.M.T., the times 1, 7, 13 and 19 being recommended as the standard hours. (2) The specification of the force of the wind in synoptic messages. It was agreed that the force of the wind should be reported in the Beaufort Scale and a precise specification of the scale in terms of the velocities recorded by an anemometer at a standard height in an open situation was adopted, together with rules regarding the variation of the equivalent velocities for anemometers whose heights were different from the standard. (3) It was at this meeting, too, that the principle of using three index figures for a station was adopted and a decision confirmed to send a delegation to the Radio Telegraphic Conference to be held at Washington in 1927. This meeting at Zurich, like its predecessors and successors—until the meeting at Salzburg in 1937—was characterised by fine weather.

C.S.W.I. Seventh Meeting.

The meeting of 1928 was held in London. The Commission received the report of the delegation which had attended the Radio-Telegraphic Conference at Washington in 1927.* The delegation had been successful in its main purpose of obtaining the allocation, in the European region, of two wave-lengths between 3,000 and 8,000 metres for the exchange of meteorological synoptic messages and in its second purpose of securing that radio telegrams containing observations intended for a meteorological service should be granted priority. As a result of the allocation of wave-lengths specially for meteorological messages the Commission recommended at this meeting that there should be four general collective issues for the European and neighbouring area, viz. :—

1. For Western Europe (issued by France).
2. For Central and Northern Europe (issued by Germany).
3. For Eastern Europe and Siberia (issued by the U.S.S.R.).
4. For the countries of S.E. Europe and Asia Minor.

At this meeting also great progress was made in the revision of Codes and Specifications, but this work was not completed until the meeting at Copenhagen in the following year.

Perhaps the most important resolution of the meeting was that in synoptic messages issued by wireless telegraphy for international exchange *the pressure should be expressed in millibars*, a resolution which was subsequently confirmed by the International Conference at Copenhagen in 1929. This decision put an end to the difficulties arising from the use of inches and millimetres of mercury, difficulties which led to the proposal of the British Meteorological Office fifteen years previously to adopt millibars as the unit of pressure.

* It was at the Washington Conference that it was decided to adopt "frequencies" (kilocycles per second) instead of "wave-lengths" (metres) to denote the "note" of a radio-transmission. The proposal was considered by a Commission of the Conference which decided, after some discussion, to recommend the adoption of wave-lengths. The decision was practically unanimous. At the next meeting of the Commission, a day or two later, the question was reopened and, after a brilliant exposition of the case for frequencies by a young American scientist, Dr. Dellinger, the Commission reversed its former decision, and agreed, also practically unanimously, to recommend the adoption of "frequencies." It was one of the most interesting cases of *volte face* that I have ever seen.

C.S.W.I. Eighth Meeting.

At the meeting at Copenhagen in 1929, in addition to the completion of the revision of codes and specifications referred to, a new code was adopted for use in collective messages issued for the use of ships at sea, which brought these messages into line with the general international code. Arrangements for the main collective transmissions which had been recommended by the meeting in London were submitted to the Conference and approved with some slight modifications and extensions. The meeting at Copenhagen was mainly memorable for the struggle between what might be called the purely scientific side and the practical aviation side in regard to the form of code. In the end the aviation side carried the day, and in consequence the form of synoptic code in use at present begins by the information which is considered of greatest importance for aviation. It was not, however, possible to secure agreement on a single form of code for use all over the world, and a second form of code was adopted for use in tropical regions. In this second form of code less prominence was given to forms of cloud and no provision was made for reporting the height of the cloud base.

C.S.W.I. Ninth Meeting.

In 1934 the meeting was held at De Bilt, Holland. It was largely occupied with discussions about the symbols for representing meteorological information in synoptic charts and about observations of visibility. On both these subjects there were two schools of thought, markedly divergent.

The recommendation which the Commission made at this meeting in regard to symbols was reconsidered at the meeting at Warsaw in the following year after trial had been made of the symbols in which the greatest difference of opinion existed, namely, the symbols for amount of cloud. In the end it was impossible to secure agreement on this point, and the Conference at Warsaw therefore contented itself with noting that there were two systems in use. The recommendations of the Commission in regard to other symbols were, however, approved and are now in general use.

Another important recommendation made at this meeting was in regard to the issue by wireless telegraphy of monthly mean values of temperature and rainfall. The importance of such issues from the scientific and from the practical point of

view had been emphasised at the meeting in London in 1921. But it was not until this meeting and the meeting in the following year (1935) at Warsaw that international agreement was secured on a practical working scheme.

C.S.W.I. Tenth Meeting.

Warsaw, 1935. One of the most important results of this meeting was a modification of the second of the two forms of code approved at Copenhagen, in such a way that the first four groups in this form were identical with the first four groups of the first form. Thus general agreement was secured on a single international form of code so far as the most important elements were concerned. At this meeting, too, the Commission decided to appoint Regional Vice-Presidents for different parts of the world to undertake the duty, by Regional Conferences or by other means, of promoting in the regions concerned the application of the resolutions of the International Meteorological Organisation in regard to synoptic meteorology. Another important step which the Commission took at this meeting, as a result of a proposal by Dr. Dobson, was to express their desire to see a network of stations in Europe, in North America, and in the U.S.S.R. making daily observations of ozone. The establishment of one such station is a rather expensive matter, but substantial progress has now been made towards carrying out the recommendation of the Commission which was subsequently endorsed by the Conference of Directors.

C.S.W.I. Eleventh Meeting.

At the meeting at Salzburg in 1937, the most important question was that of the exploration of the upper atmosphere by means of radio-sondes. The Commission recommended the establishment of a network of fifty stations in Europe and corresponding densities in North America and other parts of the temperate zone. Radio-sondes is the name applied to free balloons carrying specially-designed instruments which transmit messages by radio-telegraphy. These messages give the values of pressure and temperature in the atmosphere in the position which the balloon occupies at the time the message is transmitted. The outstanding importance of this method is that it enables the values of temperature and pressure at different heights in the atmosphere to be obtained in all conditions of weather and

at altitudes far greater than can be normally reached by other methods. The normal height at which it is possible to obtain information by radio-sondes is about 50,000 feet, and in favourable conditions values can be obtained up to 80,000 feet. In some countries this method of investigation has already commenced and other countries are now making arrangements to carry out the recommendations made at the meeting at Salzburg.

At Salzburg, too, the code for upper wind observations was materially altered ; previously the height had been represented by one figure according to a conventional specification, and the speed given in miles per hour or kilometres per hour by two figures. In the new code the height is given by two figures (in hectometres—100's of metres), and the speed is given by one figure v_5 , according to a conventional specification.

A further decision at Salzburg was to specify the symbolic forms of message by a letter F and a number. This prevents confusion between the "Forms of message" and the "Specifications," which are both usually called Codes.

There are about fifty specifications, and each of these has a number allotted to it. For example, the specification of the face of the wind is Code 30, while that of present weather, ww, is Code 92. The numbers are arranged according to a simple system, so that if further specifications are required in future, they will receive a number in the same decade as existing specifications of related elements, *e.g.*, if an additional specification of weather were introduced it would receive a number between 90 and 99.

There are also about fifty distinct forms of message. This appears a flat contradiction of my remarks about the adoption of a single international form of code at Warsaw. The contradiction is only apparent. The first four groups of the code for fixed stations are universal, but additional groups are required, and the form of these additional groups depends on whether the station is in an ordinary situation inland, or on the coast, or on a light-ship, or on a mountain. They are also different in the morning and evening. Again, there are codes for more precise reports of phenomena of special importance for aviation, and codes for reports of cloud motion, of upper winds, temperatures and forecasts, and these differ in reports from ships. The difference may only be by the addition of an extra group or groups ; there is an underlying unity of form, but it is essential for the recipient of messages to know precisely what groups are

being used. The method of specification adopted at Salzburg enables this information to be given concisely. For example, the code consisting of the first four groups of the Land code is F 1, and that of the first four groups of the Ships' code is F 2, while the following $\text{IIIC}_L\text{C}_M \text{ wwVhN}_h \text{ DDFWN PPTT UC}_h\text{app RRT}_x\text{T}_x\text{E C}'_L\text{H}'\text{N}'_L$, which is the code for evening reports from a mountain station, is expressed simply as F 116, *i.e.*, it is derived from F 1 and belongs to the first general form of reports from land stations and is the sixth variant of that form.

I. THE INFORMATION TO BE TRANSMITTED.

The first stage in synoptic meteorology, as in climatology, is observation at an individual station. The word "observation" has a wide meaning. It includes the readings of meteorological instruments, and the results deduced from the readings, sometimes by a comparatively abstruse mathematical calculation, *e.g.*, when the values of the wind at different heights in the free atmosphere are derived from theodolite observations of a free balloon or when the temperatures at different heights are derived from the records of a baro-thermograph. It includes also the eye observations of form of cloud, amount of cloud, distance of visibility, and the character and intensity of precipitation and the present weather, of which 100 types are specified. In an ordinary report, excluding upper air observations, an observer must note sixteen facts, *viz.*, atmospheric pressure, temperature, humidity, character of curve of barograph, tendency or rate of change of pressure, direction of wind, force of wind, present weather, weather since last report, visibility, form of low cloud, amount of low cloud, form of middle cloud, form of high cloud, total amount of cloud, height of base of cloud; and twice a day he must note three more facts, *viz.*, the amount of rainfall, the maximum or the minimum temperature and the state of the ground.

This is a formidable list, and it is not enough for synoptic meteorology to take readings of instruments and estimates of conditions: they must be comparable readings and estimates at all the stations of all the countries of the world, since all the countries of the world are now contributing to the synoptic organisation. For example, thermometers must be protected from rain and from radiation, and yet they must be well ventilated: the radiation from which protection is necessary is not

only direct radiation from the sun, but radiation from or to the earth's surface and to the sky. In fact, the surroundings visible from the bulb of a meteorological thermometer must be as nearly as possible at the temperature of the air which it is desired to measure. Further, thermometers must be placed at a standard height because the temperature of the air changes, frequently very rapidly, upward not only at night but also in the middle of the day. Also thermometers must be placed in a situation which is not abnormal, *e.g.*, they should not be in a hollow: if they are, an unrepresentative low temperature will be recorded. Similar considerations apply to wind. It is important that the force and direction of the wind in reports for synoptic purposes should give a good representation of the general current of air over the surface of the earth in the region where the reporting station is situated.

Again, it is necessary that the meanings of terms like mist, drizzle, sleet, showers, heavy rain, should be uniform—as you may know our English word sleet is used in America for frozen rain—hard ice-pellets instead of a mixture of snow and rain—while the word mist, intended in International codes to apply to poor visibility not quite so bad as a fog, has in some parts the significance of thick fine rain.

With a view to securing uniformity in such matters, the C.S.W.I. has drawn up a set of instructions and explanations for the International Codes for Synoptic Weather Reports. These instructions are published in the *Manuel des Codes Internationaux* Part 1 of Publication No. 9 entitled *Les Messages Synoptiques du Temps*, of the International Meteorological Organisation.

The instructions are by no means complete, and as time goes on they will be further elaborated; but there are inherent difficulties which are not readily surmounted in getting international agreement on matters which concern the ordinary every-day language of the people.

II. THE FORM IN WHICH THE INFORMATION IS TRANSMITTED.

It would obviously be impracticable to collect and distribute the observations of weather from hundreds of places if they were described in plain language, and it would be impossible to represent them on a chart without the assistance of symbols. A meteorological shorthand is necessary and a meteorological

code and meteorological symbols. Neither shorthand nor codes and symbols appear to be particularly interesting or exciting, but the development of shorthand and codes and symbols during the past twenty years has been one of the most interesting examples of international co-operation.

I have spoken of shorthand, but the technical term used is "specification." I can indicate best by a practical example what is meant by the term specification. An accurate description of the weather at a place involves a great variety of terms: there may be rain or snow or sleet or drizzle, thunderstorm or fog; the rain may be heavy or moderate or slight. It may be continuous or it may be intermittent; or it may be short showers with clear intervals between. In the international specification of weather these varieties are arranged according to an agreed plan and are restricted to 100 varieties to which the numbers 00-99 are allocated. Thus if an observer has to report continuous moderate drizzle he uses the figures 54; if he reports continuous moderate rain he uses the figures 64; while if he reports continuous moderate snow he uses the figures 74.

This specification, the first plan of which was prepared by me in France in 1918, was discussed at a meeting in London in December, 1918. It was included practically unaltered in the Meteorological Annex of the International Air Convention of 1919. It was modified at the meeting of the C.S.W.I. in November, 1920, the principal change being to arrange the different elements rain, drizzle, snow, etc., in separate decades, *i.e.*, numbers

- 90-99 referred to thunderstorms
- 80-89 to hail or rain and hail
- 70-79 to sleet
- 60-69 to snow
- 50-59 to rain
- 40-49 to drizzle
- 30-39 to showers
- 20-29 to fog
- 10-19 to cloudy or overcast weather
- 00-09 to fine or fair weather.

This specification was used from 1921 to the end of 1929, when the present form, which was adopted at the Conference of Copenhagen, was introduced. The principal change was the introduction of a decade for sandstorms and storms of drifting

snow, and the allocation of the first number in each decade 90, 80, 70, 60, etc., for the use of observers who were for any reason unable to use the detailed specification. (This allocation of the numbers 90, 80, etc., was called irreverently by certain younger meteorologists : " The Blind Man's Code.")

In the revised form the decades are arranged as follows :

- 90-99 thunderstorm
- 80-89 showers
- 70-79 snow
- 60-69 rain
- 50-59 drizzle
- 40-49 fog
- 30-39 sandstorms and storms of drifting snow
- 20-29 precipitation in the last hour, but not at time of observation
- 00-19 phenomena without precipitation.

I have referred to this specification at some length because it is one of the most important and one about which there has been most discussion.

In addition to the specification of weather there are

- Specifications of the state of the sky, lower, middle and upper—10 types for each level.
- Specification of past weather—10 types.
- Specification of wind force—12 degrees.
- Specification of state of ground—10 types.
- Specification of character of barograph curve—10 types,

and special conventions or specifications for the other elements enumerated in the list of symbolic letters.

Among the most important of these are the Index Figures. When reports were sent by telegraph, the place of origin of the telegram indicated the station of observation. But when a large number of reports were collected in a single message, containing a long series of groups of figures, broadcast from a wireless station, it became necessary to indicate clearly to which station groups of figures belonged. It is a well-recognised principle in telegraphy and radio-telegraphy that when figures are being transmitted it is undesirable to mix letters among them. It increases the difficulty and, what is more important, the time of transmission of a message. Further, if letters are mixed among figures, the cost of the message is greatly increased.

A group of five figures counts as one word ; but a group in which one of the figures other than the first or last is replaced by a letter counts as three words. Thus it would have been uneconomic to put in the collective message the name of the station, or to have it indicated by letters. Accordingly, stations were given numbers, and these numbers were given in the collective messages and served to indicate the station to which the groups of figures following referred. At first two figures were used, and the figures were selected by the service of the country from which the message was sent. This did not prove satisfactory, and in 1926 it was decided to use three index figures for each station, and the allocation of the figures to the different stations was made by the President of the C.S.W.I. in consultation with the Directors of the Meteorological Services responsible for the stations. These index figures provided for 1,000 stations. It was clear that the number was insufficient to cover the whole world. Accordingly a group of 1,000 has been allotted to each continent or large region. Six such groups have now been allocated and the synoptic meteorological stations all over the world have now each its own International Index Figure. The groups are as follows :—

First Group—Europe.

Second Group—U.S.S.R. in Asia, India, Japan, China, East Indies.

Third Group—New Guinea, Australia, New Zealand and the Pacific Islands.

Fourth Group—North America.

Fifth Group—South America.

Sixth Group—Africa.

A complete list of the stations and their index numbers is given in Part II of Publication No. 9 of the International Meteorological Organisation.

If a message is issued which contains stations from more than one group, the stations from each group must be collected together to prevent risk of confusion.

In telegraphy a group of five figures counts as one word. (This has not hitherto applied in the United States and Canada, and in those countries the meteorological code for internal purposes has been a word code—though a figure code is used for the

messages transmitted for the use of services in other continents, and it is hoped that these two countries will before long also use the standard figure code.)

Consequently meteorological codes consist of groups of five figures. It is convenient to indicate the significance of a group by symbolic letters ; in an actual message each letter is replaced by the appropriate figure. Thus a group PPPDD means that the first three figures give the value of atmospheric pressure (in millibars and tenths) and the last two figures give the direction of the wind in points reckoned from North, *i.e.*, 08 = E, 16 = S, 24 = W, 32 = N, 00 = calm.

A full and complete description of the symbolic letters used is given in the *Manual of Codes* of the International Meteorological Organisation (Publication No. 9, part I, and in Annex G of the International Air Convention).

The following is an abridged and abbreviated list :

- a = characteristic of curve of barograph.
- C_L, C_M, C_H = low, medium and high cloud.
- D, DD, dd = direction on scales 1-8 and 1-32, 1-36.
- E = state of ground.
- F = force of wind in Beaufort Scale.
- GG = Hour—Greenwich Time.
- H, HH, h = height (above M.S.L. or above ground).
- III = index number of station.
- K = Swell (at sea).
- LLL and *lll* = latitude and longitude.
- N and N_h = amount of cloud and of cloud at height h.
- PPP = barometrical pressure.
- pp = change of barometric pressure in 3 hours.
- Q = octant of globe.
- RR = rainfall.
- S = state of sea.
- TT, T₁T₁, T_xT_x, T_nT_n = temperature of air and sea and maximum and minimum temperatures, respectively.
- T_d = difference between air and sea temperatures.
- t_w = characteristic and duration of past weather.
- U = relative humidity.
- V = visibility.
- v₁v₁ = speed of wind.
- ww, W = present and past weather, respectively.
- Y = day of week.

In the first form of code adopted in 1874 by the Committee appointed at the Vienna Congress of 1873 the groups were as follows :—

PPPDD FF_wTT PPPDD FF_wTT T'T'RRR
T_xT_xT_nT_nS.

The first two groups referred to observations at 6 p.m. the preceding evening; messages were exchanged internationally only once daily, and the evening observations were therefore incorporated in the message sent in the morning. Two figures FF were used for the force of the wind and the wet-bulb temperature T'T' was included. Three figures were used for rainfall. In British messages inches and degrees F. were used: in continental messages millimetres and degrees C. The use of the code was practically confined to Europe.

It is interesting to mention that the code was approved at a meeting at Utrecht in 1874 presided over by Buys Ballot, whose name is associated with the law "Stand with your back to the wind and the low pressure is on your left," a law which the Hydrographer of the British Admiralty, remarking that British sailors always faced the wind, preferred to have in the form "Face the wind and low pressure is on your right." At the same meeting at Utrecht it was decided to thank de Lesseps for "the numerous meteorological communications received from the Suez Canal Stations."

The system inaugurated in 1874, largely due to the initiative of the Director of the Meteorological Office, London (R. H. Scott), lasted till 1910, when a slightly revised form was introduced. Its symbolic form was nearly the same, viz.,

PPPDD F^wTTW PPPDD F^wTTD₁ appRR T_xT_xT_nT_nS.

One figure only is used for wind force and two figures for rainfall. The wet-bulb temperature is omitted and new elements are introduced, viz., W = weather during the previous day: D₁ = direction of motion of upper cloud and the barometric characteristic and tendency. This code lasted until 1921, when it was replaced by the first post-war code, viz.:

PPPDD F_wwTT abWVU C₁N₁C₂Nh (RRT_xT_xr or
RRT_nT_nr).

In this code two figures ww are allotted to present weather, one figure is allotted to visibility, a new element, while barometric tendency is allotted only one figure. One figure is allotted for

relative humidity. A whole group is allotted for cloud observations, viz. :

- C_1 = form of lower cloud.
 N_1 = amount of lower cloud.
 C_2 = second main form of cloud.
 N = total amount of cloud.
 h = height of cloud base.

There is no provision for including 6 p.m. reports with the morning message ; the maximum temperature of the day is reported in the evening and the minimum temperature of the night is reported in the morning.

Finally, a figure r is allotted to indicate the time of commencement of precipitation.

A corresponding but different code was required for reports from ships. Its symbolic form was

$QLLLx_1$ $lllx_2$ $PPDDx_3$ $FVKdx_4$ $wwGGx_5$ $TTtx_6$
 $CNWrx_7$ $y_1y_2y_3y_4z_1$

In this code the letters x y z refer to check figures which enabled the recipient of the message to ascertain if any mistake had been made in transmitting the message and to find what the correct figure should be. Such check figures are not necessary in reports from land stations because reports from neighbouring stations usually show if any mistake has been made. But they were certainly very useful when reports were received from ships far away in the ocean with no other reports of weather anywhere in the neighbourhood. When the codes were revised in 1929 these check figures were omitted to save expense.

In addition to these codes for surface observations there were codes for reports of upper wind and temperature, viz. :

Pilot II $hddvv$ for wind,
 and Temp II $YYGG$ $PPTTU$ for temperature.

As many groups of the form $hddvv$ and $PPTTU$ were given as were necessary to represent fairly the results of the observations at different heights.

These codes continued to be used until 1930, when the station code was replaced by the code now in use. The symbolic form of this code is

$IIIC_m$ $wwVhN_h$ $DDFWN$ $PPPTT$ UC_n app.

Twice daily a further group is added, viz. :

RRT_nT_nE in the morning.
 RRT_xT_xE in the evening.

The principle underlying the construction of this code is that the information of greatest importance for aviation comes at the beginning of the message, *i.e.*, information about the cloud, the weather, the visibility, the height of the cloud and the wind. That principle would not in itself be a sufficient justification for arranging the code for synoptic reports in this way, but there is a definite practical advantage which results from the arrangement, and this advantage, in conjunction with the principle, was held to justify the arrangement. The practical advantage is that the first three groups of this standard form are identical with the three groups of the abridged code which can be used for intermediate and supplementary reports for aviation. Such, for example, are the hourly reports from stations in and along air routes which are exchanged under the regional system which now extends over Europe.

There is a second form of code designed especially for use in low latitudes where the variations of the barometer are usually relatively small and regular, and where more precise information about the humidity is considered of greater importance. In this second form of code the first four groups are identical with those above, but the fifth group takes the form UURRt_w.

The new ships' code in use since 1930 has the symbolic form

$$\begin{array}{ccccccc} \text{YQLLL} & \text{III} & \text{GG} & \text{DDF}_{\text{ww}} & \text{PPVTT} & \text{3C}_L\text{C}_M\text{C}_H\text{N} \\ & & & \text{T}_d\text{KD}_k\text{WN}_h & & \text{d}_{sv_s}\text{app.} \end{array}$$

where D_k = direction of swell.

d_{sv_s} = direction of motion and approximate speed of ship.

The principle underlying this code is that the first four groups have a universal character and are the same all over the world, while the following groups can take different forms, according to the desires of the Meteorological Services arranging for the reports, or to the equipment of the ship which makes them. The nature of these groups is indicated by the figure which comes at the beginning of the first of them. In the example quoted, it is the figure 3. There are two other forms of these latter groups which have received international approval. They are indicated by the figures 6 and 9, *viz.* :

$$6\text{KD}_k\text{CN} \quad \text{T}_d\text{d}_s\text{AWC}_H \quad 9\text{SKD}_k\text{W} \quad \text{CNN}_h\text{AT}_d.$$

The adoption of this principle of having universal groups and variable groups in ships' codes originated, to the best of my recollection, with Sir George Simpson.

III. THE ARRANGEMENTS FOR THE TRANSMISSION OF THE INFORMATION.

Whether forecasting is empiric or based on fundamental principles, it is easy to see that a knowledge of the conditions over a wide area is essential to the forecaster. Complete representation of atmospheric conditions at any one time would require an infinite number of observations. Practical considerations impose the necessity of selecting a network of stations. Ideally, places ought to be selected to give the best possible representation for the district in which they are situated. Again, practical considerations make it necessary to select places at which telegraphic communication exists and at which people able to make observations can live. For example, this rules out most mountain peaks and isolated islands. Further, the network of stations cannot be a national network, it must be international. It is often said that the atmosphere has no frontiers ; it has fronts or physical frontiers, where there is a change from one regime to another, but they are usually moving frontiers and are certainly not political frontiers.

Before the war the exchange of information was made by telegram. It was a very restricted exchange. For example, in London, reports were received from six or eight French stations and about the same number of German stations. To-day, reports are available for fifty or sixty stations from each of these two countries. Moreover, reports arrived very late—sometimes four or five hours or more after the time of observation—and, as we have seen in the first international code, many of the evening reports were not received from other countries until the next morning.

The first great step was made at the Peace Conference at Paris. A convention was agreed upon for the regulation of International Air Navigation and a Meteorological Annex was included in the convention in which the following general principles were incorporated. Reports from each country should be transmitted within $1\frac{1}{2}$ hours of the time of observation to meteorological offices of other countries within a radius of 1,000 miles. Further, a selection of reports from a region embracing several countries should be transmitted from a central transmitting station of world-wide range within three hours of the time of observation. Although it was a long time before

these principles were put into actual operation, their formulation acted as a guide and stimulus to later developments. This annex was largely the work of Major Blair, of the U.S. Meteorological Service in France, Lieutenant Rouch, of the French Meteorological Service, Group-Captain Blandy, of the Signals Department of the Air Ministry, and Lieutenant-Colonel E. Gold, of the Meteorological Office, London.

At the meeting of the C.S.W.I. (then the Commission for Weather Telegraphy) in London, in November, 1920, a timetable was prepared in which the times at which the different countries of Europe should issue the reports from their stations by wireless telegraphy were definitely specified. The times were so arranged that not more than two issues were being made simultaneously and the transmissions were completed about $2\frac{1}{2}$ hours after the time of observation. In this table the time allotted to Great Britain was the interval from 1 hr. to 1 hr. 20 mins. after the time of observation. A second table gave the number of stations which should be included in each issue—*e.g.*, 20 for France, 20 for Italy, 8 for Norway.

This scheme was generally adopted, though some modification was made at the C.S.W.I. meeting at Utrecht in 1923 to ensure a more rapid issue of the reports. This modification permitted three simultaneous transmissions instead of two, and aimed at getting the transmission practically completed within two hours of the time of observation.

Under this system it was necessary for each service to arrange for the reception of the issues from every country in order to get a complete set of reports for the whole European area. But in 1927 the C.S.W.I. sent a delegation to the Radio-Telegraphic Conference at Washington and obtained the consent of the Conference to the allocation of two wave-lengths exclusively for the transmission of Meteorological Reports in the European area. As a result of this it was decided at the Conference at Copenhagen in 1929, on the recommendation of the C.S.W.I., to change the system and replace it by the following plan.

The Northern Hemisphere was divided for the purpose of the distribution of synoptic meteorological reports into two great divisions: (1) Europe and the Eastern Atlantic, (2) North America and the Western Atlantic and Eastern Pacific. (The division is a broad one; the region within the tropics is not specifically included, nor the major part of the Pacific Ocean.) The reports from a selection of stations and ships in these regions

were to be issued in abridged form in two great collective messages by Great Britain and the United States of America.

Further, the region (1) was sub-divided into two sub-regions (both of substantial extent and including many different countries), viz., 1 (a) Western Europe, which embraced Iceland, British Isles, France, Holland, Belgium, Switzerland, Italy, Spain, Portugal, the Azores and North Africa bordering the Atlantic and Western Mediterranean, and 1 (b) Central Europe, which embraced Norway, Sweden, Denmark, Finland, Poland, Esthonia, Lithuania, Latvia, Czechoslovakia, Austria, Germany and Hungary. The reports from the synoptic stations in these two regions were to be issued more frequently in complete code by France and Germany on the two reserved wave-lengths of 6,660 metres and 3,350 metres respectively. (These wave-lengths have been subsequently modified and the number increased to four. They are now 7210 m. ; 7100 m. (FLE) ; 3352 m. (DDX) ; 3005 m.)

Under this arrangement it was no longer necessary for any country to receive the individual messages for each of the other countries in Europe ; it was necessary only to receive the issues from France and Germany.

There was a further message which completed the arrangement, but which did not fall precisely into either of the two general categories mentioned. This was the collective message issued by the U.S.S.R. for the great area in Europe and Asia which is included within its regime. This message, issued from Moscow, gives reports in full code for a selection of stations distributed over the area mentioned.

The messages from France (Eiffel Tower), Germany (Berlin) and U.S.S.R. (Moscow) were issued simultaneously, while those from Great Britain (Rugby) and North America (Arlington) did not overlap the other issues. The arrangement therefore made it possible for any meteorological service with two receiving sets to get the synoptic reports necessary for a detailed meteorological map of Europe (excluding Russia) and a general meteorological map of the Northern Hemisphere, and with three receiving sets the detailed map could be extended to Russia and Siberia.

The plan was further extended at the Conference at Warsaw in 1935 by the inclusion of a third collective message for the European area, viz., a message from Rome for the Region 1 (c) Eastern Mediterranean, which embraced reports from Italy,

Yugoslavia, Albania, Malta, Greece, Turkey, Rhodes, the Dodecanese, Libya, Syria, Palestine, Iraq and Egypt. At the same Conference it was agreed that Bulgaria and Roumania should be added to the list of countries given in the Region 1 (b) Central Europe.

This arrangement effectively completed the International Scheme of collection and distribution of reports in the European area, so far as the space element is concerned. We must turn for a moment to the time element.

As already mentioned, when synoptic meteorology began, observations were sent in the morning only. If evening observations were made, they were kept and added to the morning message. This was soon found to be unsatisfactory, and a selection of stations sent their evening observations in the evening so that they could be used for the weather forecasts supplied to newspapers for publication the following morning. Next, a third observation in the middle of the day was added for a few stations, but still the main network of stations reported only once daily. When the system of exchange by broadcast issues by wireless telegraphy was introduced in 1920, the reports from practically all stations were issued three times daily and reports of observations at or about 1 a.m. were issued for a selection of stations. As the application of meteorology to aviation extended, and as aviation itself developed, more frequent synoptic reports were found necessary, and to-day observations are made at most stations four times daily and at a selection of stations eight times daily; and the arrangements for international exchange of information provide for the issue of these observations within $1\frac{1}{2}$ hours of the time at which they are made. For example, the collective issue of 7 a.m. observations from Paris or Berlin begins immediately after 7 a.m. and goes on continuously until 8.30 a.m. The observations are grouped in such a way that it is possible with one receiving apparatus to obtain a selection of reports from stations distributed over the whole region covered by these two collective issues. This is achieved in the following way. The stations in any country are divided into two categories A and B—the more important stations being in category A. When reports from A stations in the Western European region are being issued from Paris, reports from B stations in the Central European region are being issued from Berlin, and *vice versa*. Consequently the reports from A stations in the two areas are not being issued

simultaneously and can be received by switching over from one issue to the other.

The main issues are made from reports of observations at 1 a.m., 7 a.m., 1 p.m., 6 p.m. and supplementary issues from reports of observations at 4 a.m., 10 a.m., 4 p.m., 10 p.m.

IV. PRESENTATION OF THE INFORMATION.

When reports are received at a central office, although some idea of their importance might be gained from an examination of a table of the reports, it is found better in practice to decode the reports and plot them on a chart. The scale of the chart should be selected in such a way that the chart will be of manageable size, will cover a large enough area, and will permit the information to be entered on it without overcrowding. None of these conditions can be completely satisfied in practice—a compromise has to be effected. The area to be covered was until recently governed largely by the period of time which the forecasts had to cover. Forecasts for a few hours ahead for a given place can be made best by using a comparatively restricted area and a dense network of stations. Forecasts for longer periods of a day or two require a larger area and a less dense network. Recently, owing to the increase of speed and range of aircraft, it has become necessary to make forecasts for a comparatively short period of time, but covering a great distance or area ; and this has necessitated further compromise. Thus the scales of charts recommended internationally are $1/5,000,000$ for dense networks over a restricted area; $1/10,000,000$ for general charts for making forecasts such as those broadcast by the B.B.C. ; $1/30,000,000$ for charts covering practically the whole hemisphere and used to obtain general guidance and “directives” in regard to developments in the meteorological situation. The recent compromise scales are $1/7,500,000$ and $1/15,000,000$.

It is customary on all the charts to show the contours of the land, and the high ground is shaded because, naturally, high ground has an important influence on the motion of the atmosphere and the weather resulting from the motion, particularly from the vertical motion.

The information entered on charts used to be entered by each of the meteorological services, according to the manner which the particular service found most convenient. But owing to the development of aviation it has become more and more

necessary that charts should be the same in all countries of the world, so that the aviator who flies from one capital to another will find the same kind of chart and the same method of entering the information on it in all the places where he has to consult meteorologists or their maps. Accordingly, a method of entering the information on the charts has been agreed upon internationally. As already mentioned, figures provide an international language for use in the exchange of reports. But figures alone are not sufficient for the entries on charts. A clear picture of the meteorological situation could not readily be obtained from a mass of figures. Accordingly, the information for each station is plotted on the chart around the position of the station in a conventional way which was approved at the conference at Warsaw in 1935. Thus the wind, which is telegraphed by figures, is shown on the chart by means of an arrow, the direction of which represents the direction of the wind and the number of feathers represents the force of the wind. The remaining information is grouped according to the plan below—called the station model—in which the letters have the meaning already described in the section on Codes and are replaced in the actual chart by figures or symbols.

TABLE I.

Station Model.

Station Model.—The circle denotes the position of the station. *In the Station Model the letters have the following customary meanings :*

C_H (E)	PPP = Pressure. pp = Tendency.
TT C_M PPP	TT = Temperature. T_1T_1 = Sea Temperature.
V_{ww} (N) \pm ppo	ww = Present Weather. W = Past Weather.
T_sT_s C_LN_h W(w)	a = Characteristic. E = State of Ground.
T_1T_1 h (RR)	$C_LC_M C_H$ = Form of Low, Medium and High Cloud.
	T_sT_s = Dew Point Temperature.
	N = Total Amount of Cloud. V = Visibility.
	N_h = Amount of Low Cloud. RR = Rainfall.
	h = Height of Low Cloud.

Station Model.

Also (w) = That part of ww which refers to the last hour but not to the time of observation.

U = Humidity is alternative to T_sT_s .

Where lack of space necessitates a modification of the Station Model a deformation of it without permutation of the places allotted to the individual elements is permissible.

If only one colour is used it should be black. If two colours, black and red, are used, then red should be used for one or more of the following:—

- (1) For C_H .
- (2) For W (Past Weather).
- (3) for TT, T_sT_s .
- (4) For V.
- (5) for pp when pp is negative.

Red should *not* be used for PPP, ww, C_M , C_L , T_1T_1 , N_h , h.

Thus the weather ww is represented by symbols, mainly pictorial, and arranged according to general principles, readily understood. For example, two symbols, of which one is to the right of the other, mean that the weather represented by the second symbol succeeded (in time) the weather represented by the first symbol. Two symbols, one over the other, mean that the weather represented by the one symbol was co-existent with the weather represented by the second symbol. There are also symbols for the form of the cloud and for the way in which the barometer is changing. The amount of cloud is represented by the proportion of a circle which is shaded or blacked. Figures are used for the barometer pressure, the distance of visibility, and the amount and height of cloud. Some of these are entered in black and some in red to facilitate differentiation at a glance.

The complete table of symbols is given below, Table II. It appears sufficiently complicated and may serve to indicate the technical skill required both by those who make meteorological maps and by those who interpret them.

TABLE II.

ww	O	1	2	3	4	5	6	7	8	9	W	N	C _L	C _m	C _h	C	E	a		
00				==	∞	∞	∞	∞	∞	∞							-	□	∧	0
10	⊙	(R)	(S)	∇	∧	∧	∧	∧	∧	∧			D	∠	∠	∠	∠	□	∧	1
20	⊙	]	]	*	*	∇	∇	∇	∇	∇			D	∠	∠	∠	∠	□	∧	2
30	⊙	S	S	S	S	⊕	⊕	⊕	⊕	⊕	S		D	∠	∠	∠	∠	□		3
40	⊙	≡	≡	≡	≡	≡	≡	≡	≡	≡	≡		D	∠	∠	∠	∠	*	∧	4
50	⊙	,	∴	∴	∴	∴	∴	∴	∴	∴	,		∠	∠	∠	∠	∠	□	∧	5
60	⊙	•	••	••	••	••	••	••	••	••	•		∠	∠	∠	∠	∠	□	∧	6
70	⊙	*	**	**	**	**	**	**	**	**	*		D	∠	∠	∠	∠	□	∧	7
80	⊙	∇	∇	∇	∇	∇	∇	∇	∇	∇	∇		D	∠	∠	∠	∠	□		8
90	⊙	R	R	R	R	R	R	R	R	R	R		D	∠	∠	∠	∠	□	∧	9

V. FORECASTS.

It is no part of my purpose to give here an account of the principles and methods of forecasting. I am concerned only with describing why international arrangements are necessary in regard to the distribution of forecasts and what they are. For the most part, forecasts and their issue are purely local or national matters, but there are certain aspects in which they require international action.

The first is in regard to the exchange of forecasts for aviation. It was realised immediately international civil aviation commenced that a code for forecasts was essential. This was devised and has the following form :

$$\text{PREVI YYGG } t_1 L_1 L_1 L_1 1 \quad D_1 D_1 F t_2 2 \quad h_1 d_1 v_1 3 \\ W_1 N_1 h_2 t_2 4 \quad Y_c V L_1 t_2 5 \quad R_1 R_2 L_1 t_2 6$$

where the last figure in each group indicates the character of the information contained in the group, *e.g.*, if the last figure is 3 the group contains information about upper wind, 4 to the state of the sky, etc. This arrangement permits more than one group of each type to be used where it is necessary to do so. This is often the case, especially with groups 2, 4, 5 and 6.

YYGG = date and time.

t_1 = time to which forecast refers.

$L_1 L_1 L_1$ = route or area to which forecast refers.

$D_1 D_1, F$ = direction and force of wind, forecasted wind.

t_2 = time to which $D_1 D_1 F$ refers.

$d_1 d_1 v_1$ = direction and speed of wind at height H.

$W_1 N_1 h_2$ = anticipated weather, cloud and cloud height at time t_2 .

$Y_c V L_1$ = visibility and changes of visibility expected in places L_1 at time t_2 .

$R_1 R_2 L_1$ = precipitation, its character and intensity in places L_1 at time t_2 .

This code enables the forecaster to give to anyone, whatever his nationality or however remote his language, who has a copy of the decode, reasonably precise information as to what the weather conditions are likely to be along the route for which he requires the information, *i.e.*, it gives the wind in the upper air, the weather, the height of the cloud, the visibility, and the variations and changes expected. The value of the code is not only that it solves the difficulty of language, but it also serves

to guide or to remind the forecaster of the elements about which it is necessary for him to give information in his forecast and of the kind of forecast which is required.

A second direction in which a code for forecasting is necessary is in forecasts for shipping. Although English is nearly an international language at sea, it does not completely meet the case, and meteorological services, such as those of Norway or Iceland, find themselves asked to repeat the forecasts, which they issue in their own language, in other languages too. A simple code has therefore been devised to enable forecasts for shipping to be given in an international form. The code is at present a trial code. It is already used in certain countries and its use is likely to extend as its value becomes more widely known. The symbolic form of the code is

IDFWV GDFWV GDFWV

when

I = an index number to represent the region concerned.

D = forecasted direction of wind.

F = forecasted force of wind.

W = forecasted weather.

V = minimum visibility expected.

G = time of commencement of weather indicated in the group.

I hope this account will give you some idea not only of the subject of synoptic meteorology, but also of the way in which the practical need for international co-operation has indicated how in this department of human activity the barriers of language and race can be and are being surmounted.

DISCUSSION.

The CHAIRMAN said he was certain the audience would agree that they had listened to a most fascinating account of a very interesting but complicated subject. To his mind the paper opened up two distinct although related matters. There was, in the first place, the utilisation by meteorological scientists of the mass of data now available every day, for the furtherance of meteorological knowledge, for the elaboration of hypotheses and theories, and so building up an ever more complete science of meteorology. In the second place there were the technical and administrative problems of specifying the nature of the observations to be taken and the complicated questions connected with the procedure for communicating

these observations in a kind of shorthand form as rapidly as possible for use in forecasting. A high degree of international collaboration was necessary for the smooth functioning of this second aspect of the subject, and Col. Gold had given an impressive account of the extent to which the nations concerned co-operated for this purpose. The Chairman's own experience of international work had been mostly in connection with agricultural science—a subject which was one of the first in which international contacts were resumed after the Great War, but in recent years he had also taken part in similar meetings in connection with meteorology, and he had been struck by the curious but perhaps comforting fact that the less important and fundamental the matter under discussion the more vehement was the controversy and the more difficult was it to secure agreement between rival proposals. Of course, at international meetings very much was done by private conversations and informal discussions taking place outside official hours, and in this connection he had been much impressed by Col. Gold's ability. No one could be more tenacious than he was in holding to a point of view that he regarded as fundamental and in persuading others to adopt it, and he felt sure that international collaboration in meteorology would not be in its present stage had it not been for his sustained efforts in this direction. On behalf of the meeting he proposed a hearty vote of thanks to Col. Gold for the interesting and important paper they had had the privilege of hearing that afternoon.

Lt.-Col. T. C. SKINNER, F.R.Met.S., asked the Lecturer to what extent the international co-operation would be affected by serious political disturbance in Europe? Would it make impossible the collection of information of vital importance to our own meteorologists? Or would it merely interrupt the distribution of information to continental countries from Great Britain? Suppose that the majority of European powers were at war, would we be able to carry on effectively without their co-operation?

Mr. L. C. W. BONACINA said that he remembered seeing a few years ago synoptic weather charts of the entire Northern Hemisphere prepared in Germany in connection with the International Polar Year 1933.

The charts were for noon G.M.T., which meant, of course, that the observations in the Pacific region referred to midnight. He asked if Col. Gold could throw light on this confused system of day and night observations, and how it was to be interpreted.

He added the following note later in writing:—"In paying tribute to the usefulness, thoroughness and comprehensiveness of the code in use by the Meteorological Office for forecasting, so clearly explained by Col. Gold, I should like as a non-official meteorologist to indicate where it seems to me it may be a little dangerous for members of the general public to think too much in terms of official codes.

The distinction, for instance, between "rain" and "drizzle" is all to the good for certain purposes, but there is a risk that by sheer pressure of circumstances and force of usage the ordinary person may cease to think of drizzle as a form of rain at all. In this way violation would be done to common language and rudimentary conceptions. Drizzle (defined as precipitation in very small drops) can be both persistent and heavy in hill districts, and has as much right to be called rain as varieties found of larger drops.

Then as to the pellets of frozen rain, which as Col. Gold said is called "sleet" in America, I do not know whether there is any official name for it, but in plain English it is one of several varieties of hail, though its mode of origin is different from that of ordinary soft hail or true thunderstorm hail. These frozen rain-drops often form severe ice-storms in the United States and are not unknown in England.

Again the Air Ministry's visibility code is no doubt of the highest utility to airmen for whom it was designed, but I think there is an increasing tendency for this code to be adopted in other fields in which it is not always so suitable. Statistics about the distribution of fog and mist, for example, based on this code must necessarily be arbitrary. A landsman's idea of a "dense fog" is different from that of an airman or a seaman.

I have merely made these comments because I feel that a non-official meteorologist is in a favourable position to see the disadvantages of the unrestricted adoption of official terms and usages.

Mr. F. ENTWISTLE said: The previous speaker referred in his remarks to the requirements of aviation. It is not always realised,

perhaps, to what extent aviation has contributed to the development of synoptic meteorology. It is very largely due to the demands of aviation services for detailed and accurate information regarding present and future weather conditions that such an intense and seemingly complex system of meteorological observations, and of the international exchange of these observations, has been built up. This intense organisation has helped not only aviation but other services and even individuals who make use of weather forecasts, for the detailed information which is now available at frequent intervals from such a large area of the globe has furthered the study of weather phenomena and has led to more accurate and useful forecasts.

I should like to endorse the remarks which have already been made regarding international co-operation in meteorology. It speaks volumes for the mutual confidence and goodwill which are invariably exhibited at international meteorological meetings that such complete agreement on the intricate details of which we have heard this afternoon has been found possible. It is indeed remarkable that representatives of so many national services can meet together with a common object before them and be prepared to compromise in order to reach unanimity.

It will have been gathered that the lecturer has been intimately associated with this international development for the last twenty years but he has not told us how much meteorology is indebted to him for the leading part he has played in the International Meteorological Organisation, particularly in regard to the aspect of the subject which he has been describing to us. That such complete agreement has been reached internationally is due in no small part to his wise leadership.

Mr. R. A. WATSON WATT said : It is far from being an accidental coincidence that the advances which Colonel Gold has described this afternoon have taken place in the period in which he himself has been the recognised international leader of synoptic reporting. To his zeal and skill we owe, in very great measure, that vast increase in content, in clarity and in utility of the synoptic weather reports which pass over the international network of co-operative meteorology.

Colonel Gold has shown how a great mass of detailed "longhand" information about the state of the weather in any one place is now compressed into a "shorthand" message of great compactness. I would like to ask whether the international system is now providing, or is about to provide, for the next stage of compression. The lecturer has referred very briefly to the diagnosis and description of the general weather situation over an area in terms of cold fronts, warm fronts, occlusions and the machinery of that system which bears in some places the unlovely name of frontology. I am aware that the diagnosticians differ, here as in other professions, but I wonder whether provision is being made for the immediate interchange of information on their diagnoses as a natural extension of synoptic weather reporting.

COMMUNICATION.

Mr. J. M. SMYTH, M.Inst.C.E., wrote: In the course of work as an Electrical Engineer, the writer has had experience of many different weather conditions in Brazil, Guianas, Colombia and West Africa, and for Hydro-Electrical power work accurate records of rainfall in a given district are essential.

In the tropical regions within 10° of Latitude North and South of the Equator, the dry and wet seasons of the year are so well defined as to be capable of being forecasted within a week or two at a given period of the year, and the annual rainfall all occurs within the wet season.

During the "rains" it was noticed that the heaviest storms were always preceded by wind of hurricane force, followed in an hour or two by calm weather and sunny sky. Occasional heavy showers occurred from an apparently clear sky at this season. At intervals of a month or so, when humidity reached 90 per cent. to 100 per cent., rain would fall steadily for a week.

During the dry season, masses of heavy, thundery-looking cloud often collect, but rain never falls during this period.

Will Col. Gold kindly throw some light on these conditions, if possible, chiefly with reference to the reason why tropical weather is so well defined as to season, but sub-tropical and temperate conditions much less certain?

Then as to thunderstorms. Has the Royal Meteorological Society any system of recording these weather phenomena? In

U.S.A. I believe they take a series of records called "Isoceraunics" (Keraunos-thunderbolt), *i.e.*, lines based on an equal average number of "Thunderstorm Days" in different regions over the whole country for a period of years. These records are used to give some indication of the relative protection required against lightning for electric power lines, and it is not clear whether they are of use in any other direction.

Looking at such a chart of U.S.A. for the period 1904-23 (20 years), a line near the west coast from north to south shows an average of five "Thunderstorm Days" per year, being the lowest recorded. The highest average is 70 thunderstorm days per year in a small area of the State of Colorado and also along a region bordering on the Gulf of Mexico between the States of Texas and Florida.

Apart from thunderstorms, has the electrical tension of the atmosphere any appreciable effect on weather conditions, and is it possible that an instrument may be devised to measure this, just as a barometer by indicating changes in the weight of the atmosphere, is some guide in forecasting the weather?

AUTHOR'S REPLY.

Lieutenant-Colonel GOLD said: With regard to the points raised by Colonel Skinner, the arrangements which have been described in the lecture apply only to peace-time conditions. In case of war, countries usually discontinue or restrict the issue of their meteorological reports.

Mr. Bonacina's reference to the terms rain and drizzle brings to my mind discussions which I listened to at the International Climatological Commission at Zoppot in 1935, when the Commission had before it a proposed definition of rain. It proved as difficult to define rain as it was proverbially difficult to define a cow. Mr. Bonacina's fear that the official definitions might lead to a change in the meaning of words would, I think, be justified if the official definitions differed substantially from the common meaning. My experience has been that official meteorologists have been very reluctant to use common terms with a technical meaning and have endeavoured to use technical terms where a limited technical meaning was necessary. Actually, the distinction between rain and

drizzle has been made by ordinary people in this country for generations, and the meteorologist is not changing but stabilising the practice. Drizzle is technically useful as well as linguistically expressive.

I am glad that Mr. Entwistle emphasised the inter-dependence of meteorology and aviation. Meteorology is not only like chess, a game which exists for the interest of those who play it. Meteorology is also a service which exists for those who will use its results. It is the aviator who makes most use of meteorology in his work and who is prepared to spend money, so that his needs shall be met.

Mr. Watson Watt asked about the exchange of diagnoses. This is, as he says, the natural extension of the exchange of synoptic reports. But it is at present in the experimental stage. Diagnosis is actually intermediate between the weather report and the weather forecast, and it might be expected that exchange of diagnoses would precede exchange of forecasts. Actually, an international code is in use for the exchange of forecasts for aviation purposes, but the codes for the exchange of diagnoses have hitherto been national and experimental, and have not reached the stage at which international agreement on a formal code for the exchange of diagnoses has been practicable.

I am interested to see Mr. Smyth's note about his experiences in the dry and wet seasons in the tropical regions. It is rather outside the subject of my lecture. I think the main reason for the seasonal variation to which he refers is the North and South movements of the thermal equator and the consequent movements of the belts of trade winds. Broadly speaking, in the tropics north of the Equator the rainy season on land is in the middle months of the year, June, July, August, and in the tropics south of the Equator the rainy season is in December, January, February. But the division is not clear-cut. At St. Helena and other tropical ocean islands, there is rain all the year round : and the same is true of Singapore, where the lowest monthly average is 168 mm. (nearly 7 inches), and at other places on the Equator. Taking the countries Mr. Smyth mentions : at Bogota in Columbia, rain falls in every month of the year, and in substantial amounts : the lowest monthly average is in July, 52 mm. (just over 2 inches). At Georgetown, British Guiana, rain falls heavily all the year round : the smallest average monthly fall is in October, 75 mm. (just under 3 inches) ; in May,

June and December, the fall is over 280 mm. (11 inches). The rainfall in Paramaribo, Dutch Guiana, is similar. At Recife, in Brazil, the smallest average monthly fall is 26 mm. (1 inch), in October, and occasionally even October has 3 or 4 inches. At Accra, Gold Coast, the smallest average monthly rainfall is 15 mm. in August, but even in August 100 mm. (4 inches) or more may fall. Thus, these places, all within 10° of the Equator, are exceptions to Mr. Smyth's statement that "the annual rainfall all occurs within the wet season."

With regard to the effect of the electrical state of the atmosphere on weather conditions, Mr. Smyth might be interested in the papers written by Dr. Bureau, of the National Meteorological Office of France, on the relation between atmospherics and fronts.

In conclusion, I should like to express my appreciation of the kind remarks of the Chairman and of the other speakers.

822ND ORDINARY GENERAL MEETING,
HELD IN COMMITTEE ROOM B, THE CENTRAL HALL,
WESTMINSTER, S.W.1, ON MONDAY, MAY 23RD, 1938,
AT 4.30 P.M.

S. H. HOOKE, ESQ., M.A., B.D., IN THE CHAIR.

The Minutes of the previous meeting were read, confirmed and signed.

The CHAIRMAN then called on the Rev. Charles W. Cooper, F.G.S., to read Mr. Chappelow's paper entitled "Biblical Sites in the Cuneiform Records of the later Assyrian Empire."

*BIBLICAL SITES IN THE CUNEIFORM RECORDS OF
THE LATER ASSYRIAN EMPIRE.*

By E. B. W. CHAPPELOW, ESQ., M.R.A.S., F.R.S.A.

THE period of my paper is that of the divided monarchy of Judah and Israel when the menace of Assyria, that rod of God's anger (Isaiah x, 5), was drawing ever nearer and nearer to both.

The term "Later Assyrian Empire" applies, strictly speaking, to Assyrian history from 745 B.C. onwards; whereas the first contact with Israel was in 854, but to gain a correct perspective it will be necessary to extend my period and briefly deal with the earlier contacts of both Babylonia and Assyria with the Holy Land.

The Mediterranean was reached by Lugalzaggisi, king of Erech (Ass. *Uruk*) (about 2720 B.C.), Sargon of Agade (2700 B.C.), and his third successor, Narâm-Sin, Gudea, priest-king of Lagash (about 2350), who cut cedar in the Amanus Mountains and the west, possibly, by Khammurabi (1950, that is if he be Amraphel).

There were, of course, other great influences at work, Egyptian in the Fourth, Sixth, Twelfth and Eighteenth Dynasties, and Hittite and Canaanite (late Eighteenth Dynasty). Yet this, the Amarna period, witnesses through the general use of cuneiform to the prevalence of Mesopotamian civilisation.

The first Assyrian king to cross the Euphrates (Ass. *Purattu*) was, so far as we know, Shalmaneser I (1280–1260), who subjugated Mutsri hard by the Amanus Mountains.

Tiglath-pileser I (1115–1103) overran Meshech (Ass. *Mushku*),* Commagene (Ass. *Qummukh*), at the sources of the Euphrates, Melitene (Ass. *Melid*), the land of the Hittites (Ass. *Khatti*), whose capital was Carchemish (Ass. *Gargamish*), and Mutsri as far as the Bay of Issus, and, according to the Broken Obelisk of Ashur-natsir-pal II (I R. 28, ll. 2 and 3), went on board a ship of Arvad (Ass. *Aruadâya* or *Aruada*) and slew a dolphin (Ass. *nakhiru*) in the great sea (the Mediterranean).

The decline of Assyria after Tiglath-pileser's death and the contemporary stagnation in Babylonia coincided with the settlement and development of the Hebrews, the age of the Judges and the undivided monarchy, and also with the migration from Northern Arabia of the Aramæans who established settlements along the western bank of the Euphrates as far as Amid, among which was Pethor (Ass. *Pitru*), seized Hamath (Ass. *Amâtu*) and Damascus (Ass. *Dimashqi*), and dominated the Assyrian and Babylonian trade routes to the west. Nevertheless, Ashur-rabi II (c. 1012–995), according to Shalmaneser III (Balawat Inscription, col. ii, l. 3), appears to have penetrated to Phœnicia, whilst Tukulti-Enurta II (889–884) again reached Qummukh, thus precluding the wide and victorious activities of Ashur-natsir-pal II.

The importance of the reign of Ashur-natsir-pal II (883–859) for Assyrian relations with the Holy Land lies in the fact that by his conquests east, north and on the Euphrates, particularly of the Aramæan Bit-Adini (Biblical Beth-Eden) between the Balikh and the Euphrates, by his system of border fortresses and provincial organisation, he was able in 876 to reach the Mediterranean. In his Annals (I R., pl. 25, col. iii, ll. 84–90) Ashur-natsir-pal says:—

At that time I reached Lebanon and went up to the Great Sea of the Amorites ; in the Great Sea I washed my weapons and offered victims to the gods.

* The trade of Tyre with Javan, Tubal (Ass. *Tabdlu*), Meshech, Togarmah (Ass. *Tilgarimmu*) (the capital of Melid), is noticed in Ezekiel, xxvii, 13, 14.

In citations R. refers to Rawlinson, *Cuneiform Inscriptions of Western Asia*, 1861–1891, and L. to Layard, *Inscriptions in the Cuneiform Character*, 1851.

The tribute of the kings of the sea-coast, from Tyre (Ass. *Tsurraî*), Sidon (Ass. *Tsidunâi*), Gebal (Ass. *Gubalai* : Byblos), Makhallatâi, Maitsâi, Kaitsâi, Amurri (Ass. *Amurraî*) and Arvad, which lieth in the midst of the sea I received and they clasped my feet. I went up to Mount Amanus (Ass. *Khamani*) and cut down beams of cedar (Ass. *itsu erinu*), cypress (Ass. *itsu shurminu*), juniper (Ass. *itsu dapranu*) and pine (Ass. *itsu burâshu*).

At this point a few words may be devoted to the various nations which inhabited or bordered on the eastern half of the Fertile Crescent.

I shall make no mention of Assyria and Babylonia themselves, the Biblical references to the former being almost entirely rhetorical or confined to her western campaigns, whilst, with the exception of Genesis, the Old Testament only deals with Babylonia after the fall of Nineveh.

Between Tilmun, the Paradise of the Babylonians,* the modern Bahrein, in the Persian Gulf, which Sargon so picturesquely describes as lying "30 double hours in the sea of the sunrise like a fish" (*sha XXX kasbu ina qabal tâmtim nipikh ilu shamshi kima nîni shitkunât* : Winckler, pl. 23, No. 48, ll. 1 and 2), and the headwaters of the Euphrates lay the Sea Land or Kaldu, Babylonia, Assyria, and to the east of these Elam, the Medes, and south and east of Lake Urumiyah the Mannâi, the Scythians (Ass. *Ashguzâi*), and the Cimmerians (Ass. *Gimîrrâi*, Biblical *Gomer*), and north of Lake Van Urartu (*Ararat*).

The Persian Gulf was known as the Sea of the Rising Sun (Ass. *tâmtim tsît ilu shamshi* : IR, pl. 45, col. i, l. 32), and the country about its northern shore Kaldu (Chaldæa), Bit-Yakin, a province of which Sargon describes as being on the salt sea shore (*sha kishad nâr marrati* : Winckler, pl. 27, l. 25), which is possibly the Merathaim of Jeremiah 1, 21.

The Sea Land was formed into an independent state during the latter half of the Dynasty of Khammurabi. Assyria came into contact with Kaldu as early as the ninth century B.C. Sargon and Sennacherib had a long but eventually successful struggle with Kaldu under the Biblical Merodachbaladan, who at intervals held the throne of Babylonia. Esarhaddon adopted a conciliatory policy, but Ashur-bani-pal was again at war with Kaldu owing to the support it afforded to his rebellious brother Shamash-shum-ukin, king of Babylon, but with only temporary

* T. G. Pinches : *The Tablet of the Epic of the Golden Age*, Victoria Institute, 18/4/32.

success, as it was from Bît-Yakin that the Neo-Babylonian dynasty of Nebuchadrezzar sprang.

Herself ravaging or backing Babylonia against Assyria, was Elam (Ass. *Ēlamtu*) across the Tigris (Ass. *Idiglat*, Biblical *Hiddekel*), beyond the Uknû river, whose capital Susa (Ass. *Shushan*) was the Shushan, the palace, of Nehemiah I.

It was not until 644 B.C. that Ashur-bani-pal completely wiped Elam out, thus removing a valuable bulwark against the Medes and Persians.

In ch. xxiii, 23, Ezekiel mentions the Koa, the Shoa, and Pekod. The Koa are the Assyrian Qutu and the Shoa the Assyrian Suti, both of which lay east of the Tigris.

Pekod is the Assyrian Puqudu which probably lay south-west of Susa at the foot of the Elamite hills.

The Suti were among those whom Merodachbaladan seduced from their allegiance to Assyria and are called by Sargon "nomad folk" (Ass. *tsábe tsêri*: Winckler, pl. 19, No. 41, ll. 1-4) and "warriors of the bow" (Ass. *tsáb itsu qáshti*: Winckler, pl. 33, No. 69, l. 82).

Tiglathpileser III says that he overwhelmed the Puqudu "as with a net" (Ass. *kima sapâri*)*.

The Medes are first mentioned by Adad-nirari III. Subdued by Tiglathpileser III, who calls them the "mighty Medes" (Ass. *Madâi dannute*), and Sargon, who also calls them the "distant (*ruquti*) Medes." Esarhaddon had to fight a series of strenuous campaigns against the Medes, who were allied with the Mannâi, hitherto a loyal Assyrian buffer state, and the Cimmerians (678-673). Chastised by Ashur-bani-pal in his fourth campaign (Cylinder B, col. iii, l. 102, and col iv, l. 1 ff.; Smith, pp. 97, 98), they soon took a leading part in the destruction of Nineveh.

The Mannâi are the Minni of Jeremiah li, 27, where they are summoned with Ararat (Urartu), and Ashkenaz (*Ashguzâi*, the Scythians) to the destruction of Babylon. The Cimmerians, to the east above Urartu in the days of Sargon, soon after split into two streams, west and south-east. The western stream was checked in 678 and deflected into Phrygia, whilst the south-eastern conquered or amalgamated with the Medes and formed the alliance with them and the Mannâi already referred to.

The Scythians (*Ashguzâi*) are possibly the people from the

* Layard, pl. 17, l. 12, Rost, p. 48, ll. 6 ff., and II R., 67, l. 13.

north referred to by Jeremiah in I, 41, and towards the end of Ashur-bani-pal's reign swept over the Near East to the border of Egypt.

According to Ashur-bani-pal's Annals* it was the Cimmerian raids which led Gyges (Ass. *Gugu*) of Lydia (Ass. *Lüddu*) to seek his alliance as the result of a dream sent by the god Ashur, but when his ambassador reached Nineveh,

"A master of his language there was not; his tongue . . . they could not understand." (Cylinder E., ll. 1-12: Smith, pp. 76-77.)

Gyges subsequently supported Psammetichus of Egypt in his repudiation of Assyria and is referred to by Ashur-bani-pal as having been slain by the Cimmerians in response to his own call for vengeance to his gods:

"Before his foes his corpse was thrown down, and his bones were carried away."

His son Ardys sent an embassy of submission to Nineveh in terms (of course according to Ashur-bani-pal) of the most exemplary humility (Annals, col. ii, lls. 95-125).

North of Lake Van was Assyria's great opponent, the kingdom of Urartu. Urartu was founded in the ninth century by a race movement from the north-east. Thither fled the murderers of Sennacherib (II Kings, xix, 37, and Isaiah xxxvii, 38). First referred to by Ashur-natsir-pal II,† Urartu in the ninth century B.C., a period of Assyrian decline, advanced as far as Melid and diminished Assyrian influence east of Lake Van and Lake Urumiyah, but allied with Mita (Midas) of Mushki, was effectively broken by Sargon.

South, south-west and west of Urartu were Nairi, Guzanu (Biblical Gozan), Melid, Meshech, Qummukh, Tubal, Bit-Adini (Biblical Beth-Eden), Khatte and Mutsri, and south of Khatte from north to south Arpad (Ass. *Arpadda*), Aleppo (Ass. *Khalab*, *Khalman*), Hamath (Ass. *Amātu*), Hadrach (Ass. *Khatarikka*), Damascus, and Israel with, in the ninth century, suzerainty over Judah, Moab (Ass. *Ma'ba*) and Edom (Ass. *Udumu*).

Nairi figures in the campaigns of Tiglath-pileser I, Ashur-natsir-pal II,‡ and Tiglath-pileser III,§ and the latter also made Melid tributary.

* K. 2675, rev. ll. 13-31 (Smith, pp. 73-76).

† Budge and King, Ashur-natsir-pa-III, No. IX col. ii, l. 15.

‡ Annals, col. ii, ll. 13-14, 97, 117 (Budge and King).

§ Rost, p. 24, l. 141; p. 32, l. 180; Layard, pl. 18, l. 36.

At the accession of Shalmaneser III (859–824) the three great powers in the west were Hamath, Damascus and Israel.

The policy of Aza of Judah in calling in Damascus against Baasha of Israel had made the latter subject to her suzerainty and both Omri and Ahab ruled under Damascene overlordship, while both Damascus and Hamath had trade alliances with Phœnicia; Judah, Edom and Moab revolved within the lesser orbit of Samaria.

In the cuneiform records general terms for the west are *mātu Martu*, "land of the west," *mātu Amurri*, "land of the Amorites," *mātu Khatti*, "land of the Hittites." According to Adad-nirari III (810–782) Amurri included Tyre, Sidon, Israel (Ass. *mātu Khumri*, "land of Omri"), Edom and Philistia to the Mediterranean, which latter is called by Ashur-natsir-pal II *tâmti rabiti sha mâtu amurri*, "the great sea of the land of the Amorites," but under Ashur-bani-pal the term had become restricted to Phœnicia and Palestine (Philistia), *i.e.*, coast region.

Philistia is represented in the inscriptions by *mātu Palastu** and *mātu Pilishta*.†

Shalmaneser III's famous campaign to the west took place in 854.

Operations began with the revolt in 859 of Akhuni of Bit-Adini (Biblical Beth-Eden), who had built up an anti-Assyrian alliance. The crushing of this brought with it tribute from Carchemish, Sama'al and Patini. Colonising his conquests, Shalmaneser fixed his headquarters at Aleppo, and thence tried conclusions with Hamath, Damascus and Israel. The indecisive character of the ensuing battle of Qarqar led to anti-Assyrian revolts further north and the chastisement of Carchemish and Bit-Agusi south of it in 850. Further attacks on the Syrian confederacy in 849 and 846 were also inconclusive, whilst a successful campaign to the Amanus in 843 left the confederacy undisturbed. The murder of Adad-idri (Benhadad) of Damascus by Hazael and the extermination of the house of Omri by Jehu encouraged Shalmaneser to make a fresh effort. Leaving Aleppo, Hamath and Damascus on his left, he repulsed an attack of Hazael east of Mount Hermon but, unable to take Damascus, ravaged down to the Hauran. Tyre, Sidon, and Israel sent tribute.

* Adad-nirari III, I R., pl. 35, l. 12.

† Tiglath-pileser III, II R., pl. 52, Obv. l. 40.

Another Assyrian invasion in 839 had like results, and Shalmaneser had to confine his conquests to North Syria where he subdued Cilicia (*mātu Qué*) and captured Tarsus (Ass. *Tarzi*, 840, 835, and 834), Tubal (838) and Melid (837), and through his *turtan* reduced a revolt in Patini (832), thus controlling the north-west route into Asia Minor. Shalmaneser III's campaign of 854 is described in the *Obelisk Inscription* (Layard, pls. 89-90, ll. 54-66) and in greater detail in the *Monolith Inscription* (III R., pl. 8, ll. 78-102).

According to the *Monolith Inscription*, he marched in the sixth year of his reign (the eponym of Dayan-Ashur), against the cities of the lands watered by the River Balikh, whose inhabitants at his approach murdered their prince Giammu, and, having crossed the Euphrates for the second time in sheepskin boats (*ina elippé^{pl} mashak takhshie*) in flood (*ina méli-sha*), received the tribute of the kings beyond it, e.g., of Sângar of Carchemish, Kûndâshpi of Qummukh, Arame of Gusi (Bit-Agusi), Lalli of Melid, Khaiani of Gabar, Kalparuda of Patini, and Kalparuda of Gurgum, silver, gold, lead, copper, and copper vessels, in Pethor, whose Assyrian name was *Ashur-uttir-atsbat*. He then advanced on Aleppo, which submitted and to whose god he offered sacrifices.

He next proceeded against the kingdom of Irkhuleni of Hamath and took and plundered his royal city Arganá, and approached Qarqar, which he sent up in flames.

"At which time," he says, "Adad-idri, king of Damascus, Irkhulina of Hamath, and the kings of the Hittite country and the sea-shore (*akhât tâmti*) were leagued together (trusted in each other's might: *ana idâti akhâish itaklu*) and advanced against me to make war and strife. By the command of Ashur, the great lord, my lord, I fought with them and defeated them." (*Obel. Insc.* ll. 59-64; Layard, pl. 90.)

Shalmaneser tells us the names and armed strength of the confederates: 1,200 chariots, 1,200 cavalry and 20,000 men of Benhadad of Damascus, 700 chariots, 700 cavalry and 10,000 men of Irkhuleni of Hamath, 2,000 chariots and 10,000 men of Ahab of Israel (Ass. *Akhâbbu mâtu Tsirlâi*), 500 men of the Guæans, 1,000 men of Mutsri (in the north-west), 10 chariots and 10,000 men of the Irqanatæans, 200 men of Mattan-Baal of Arvad, 200 men of the Usanatæans, 30 chariots and 10,000 men of Adonibaal the Shizanian,* 1,000 camels of Gindibu, the

* Usually read Shianian, but III R., pl. 8, l. 94, has plainly the sign for za 𐎶𐎶 and not that for a 𐎶 , unless this be a misprint.

Arabian, 1,000 men of Baasha, the son of Rukhubi of Ammon (Ass. *Amanâi*), a total of 3,940 chariots, 1,900 cavalry, 62,900 foot, and 1,000 camels. The king naturally claims a complete victory: "From Qarqar to Gilzau I accomplished their defeat; 14,000 of their troops I smote with the sword; like Adad (the storm-god) I rained a deluge upon them . . . with their bodies (lit. men) the Orontes (*nâru Arântu*) as with a dam I blocked."

In the *Bull Inscription* Shalmaneser says that after defeating the confederates, he took ship (like Tiglath-pileser I before him) and went out upon the sea (*ina elippé arkâb adi qabal tâmti allik*), i.e., the Mediterranean. The *Black Obelisk* and the *Bull Inscription** give the number of enemy slain at Qarqar as 20,500, the *Berlin Inscription*† 29,000 and the *Monolith Inscription* 14,000. Shalmaneser states that Benhadad forsook his land (abdicated) and that the throne was seized by Hazael (Ass. *Khaza'ilu*), the son of a nobody (*mâr lâ mamâna*), whereas the Bible says that Hazael assassinated Benhadad. Shalmaneser claims to have defeated Hazael and to have pursued him to Damascus.

The campaign of 850-49 is mentioned in the *Obelisk Inscription* (lines 85-89), and in the *Bull Inscription* (lines 84-96). Shalmaneser says that in his tenth year he captured the cities of Sângar of Carchemish and Arame of Bit-Agusi (850), "In the eleventh year of my reign," says the king, "I crossed the Euphrates for the ninth time and captured cities numberless. I marched to the cities of the Hittite country and of Hamath and captured eighty-nine cities. Adad-idri of Damascus and twelve kings of the Hittite country trusted to their arms; I accomplished their defeat."

The *Bull Inscription* gives the events of the tenth and eleventh years in slightly fuller detail, but in similar terms, and closes with an account of cedar-cutting on Mount Amanus.

In 846 Shalmaneser‡ called out the general levy of Assyria ("called out the land": *mâta adki*) and again invaded the west, successfully, he claims, defeating twelve kings of the Hittite country. Benhadad must have been murdered prior to 842, for in the *Obelisk Inscription*, lines 97-9, which gives an account of

* Layard: Pls. 14-16, 46-7, ll. 67-74.

† Messerschmidt: *Keilschrifttexte aus Assur*, as quoted and translated in Rogers: *Cuneiform Parallels*.

‡ *Obelisk Inscription*, ll. 91-2, and *Bull Inscription*, ll. 99-102.

So the *Obelisk Inscription*, but the *Bull Inscription* has *mâtu rapashtu adki*: "I called out the broad land," and gives the total as 120,000 men.

the western campaign of 842, it is stated that "Hazael of Damascus marched out to battle; 1,121 of his chariots (and) 470 of his horsemen with his camp I took from him." Details of this campaign are given in the *Annalistic Fragment* (III R., 5, No. 6), where Shalmaneser says that Hazael took up his position on Mount Hermon (Ass. *Saniru*), where the Assyrian defeated him, slaying 16,000 of his troops and capturing chariots, horsemen and his camp as already narrated. Shalmaneser goes on to say: "He fled away to save his life: I pursued him and shut him up in Damascus, his royal city. I cut down his plantations and marched to the mountains of the Hauran (Ass. *Kha-urani*). Cities without number I wasted, destroyed and burnt with fire, and carried away booty uncounted. I marched to Mount Ba'lira'si, at the head of the sea, and there had my royal image cut. At that time I received the tribute of the Tyrians (*mātu Tsurâi*), the Sidonians (*mātu Tsidunâi*), and of Jehu of the Land of Omri (*Ia-u-a mâr Khumrî*: Jehu. son of Omri')." This tribute is depicted on one of the scenes of the Black Obelisk, the inscription referring to Jehu reading:

"Tribute of Jehu, son of Omri, silver, gold, a cup (or bowl) of gold, a vase of gold, goblets of gold, pitchers of gold, lead, sceptres for the hand of the king, bdellium, I received from him."

The *Obelisk Inscription*, lines 102-4 (Layard, pl. 92), describes a last western campaign of 839 against Hazael, in which four cities were captured, and as a result of which tribute was received from Tyre, Sidon and Byblos (Ass. *Gubalâi*).

Nevertheless, Damascus was unbroken and Assyria confined to North Syria.

The last years of Shalmaneser III were troubled by the revolt of his son Ashur-danin-pal, which was only quelled after six years of fighting by his successor, Shamshi-Adad VI. Assyrian power was maintained both by this latter and by Adad-nirari III (810-782), but after that a period of gradual decline, revolt and anarchy set in, which was only brought to an end by the usurpation of Tiglath-pileser III, the Biblical Pul.

Adad-nirari III claims that he subdued and taxed "from above the Euphrates, Khatti, Amurri, to its whole extent, Tyre, Sidon, the land of Omri, Edom, Palastu (Philistia) as far as the great sea of the setting sun" (I R., pl. 35, ll. 10 ff.). He invaded the kingdom of Damascus, besieged king Mari' in Damascus city and received from him an extensive tribute. This period

is immediately anterior to the resurgence of Israel under Jeroboam II, which was evidently due to the growing weakness of Damascus under the assaults of Assyria.

In his first expedition Tiglath-pileser III crushed the Aramæan tribes of the Euphrates including Pekod.

Checking the Medes, he next (743) broke the power of Urartu which had been steadily expanding west, reduced Qummukh and then Rezin of Damascus, Hiram of Tyre, Quê, Pisiris of Carchemish, and Gurgum to their former position of vassalage, concluding his labours with the conquest of Arpad (743-40), Kullani (Calno ?), and Hamath, North Syria being brought to submission under Panammu of Sama'al and Iaudi, a north-western state. Tribute was received from Arabia and Menahem of Israel. The year 735 saw the devastation of Urartu and 734 the attack on Judah from Pekah of Israel, Rezin of Damascus, Hanon of Gaza, Philistia and Edom. Tiglath-pileser answered the appeal of Ahaz of Judah and campaigned in the west from 734 to 732, two outstanding events of these campaigns being the assassination of Pekah and the succession of Hoshea, the fall of Damascus and the end of the Syrian kingdom.

II Kings, xv to xviii, relate the contacts with the west of Tiglath-pileser III and Shalmaneser V.

The annals of Tiglath-pileser III are defective owing to the fact that Esarhaddon partly defaced the slabs on which they were written for his own unfinished palace at Calah.

Beginning in the third year, Tiglath-pileser says in his Annals (Rost, lines 59 ff.) that he crushed a revolt of Urartu, Agusi, Melid, Gurgum and Qummukh and pursued Sarduri of Urartu to the bridge of the Euphrates (*tituri nâru Purattu*). Lines 83 ff. give a broken account of the tribute of the nearby states, Qummukh, Hiram (*Khirûmmu*) of Tyre, Quê, Pisiris of Carchemish, Tarkhulara of Gurgum, including three talents of gold from Rezin of Damascus (*Ratsunni mâtu Dimashqi*), which the Assyrian king received at Arpad (*Arpadda*), which had fallen after a three-years siege. The defeat of Tutammu of Unqi follows and then in line 104 there are several broken references to the campaign of 738, which mention tribute from Azriau of Jaudi, who may be Azariah of Judah. Next follow in lines 125 ff. the subjection of nineteen districts of Hamath on the coast of the western sea, in short North Syria, the allies of Azriau, a fact which militates against identification with Azariah of Judah.

In line 150 we have the payment of tribute by Qummukh, Rezin of Damascus, Menahem of Samaria (*Menikhîmme alu Samerinâi*), Hiram of Tyre, Sibittibi'li of Gebal (Byblos), Quê, Carchemish, Enilu of Hamath, Panâmmu of Sâma'al, Gurgum, Melid, Kask, Tabal, Tuna, Tukhan, Ishtûnda, Kushinma, and Zabibi, queen of Arabia. These records contain accounts of the system of deportation which Tiglath-pileser III introduced.

Lines 195 ff. deal with the fall of Damascus (733-2). The account opens with broken references to the defeat of Rezin's troops. Rezin himself fled and "entered the gate of his city like a mouse (?) (*aitsu*). To intimidate him prisoners were impaled in sight of the city, where he was shut up "like a bird in a cage" (*kima itstsâr qûppi*); the orchards around the city were completely destroyed. Khadara, the home-town of Rezin's father, was also taken. "Sixteen districts of Damascus," says Tiglath-pileser, "like a deluge I destroyed." The submission of Samsi, queen of Arabia, "which is in the land of Saba," followed, as well as that of, among others, the Hittites and Idiba'al "in the territory of the west, whose dwelling is afar off." The tribute of these regions included, it is interesting to note, spices (the "spices of Arabia").

From one of Tiglath-pileser's smaller inscriptions (Rost, p. 78, l. 8), it appears that Hanon of Gaza (*Khâzzâtu*), one of the confederates, fled to Egypt (*Mutsri*). The Assyrian king plundered Gaza and set up his royal couch in Hanon's palace. Among the cities taken at this time was Abilakka at the entrance of Israel (*shâ pâtu mâtu Bît-Khûmria*: "which is before the land of the house of Omri"), and in the next line to this, l. 6, Tiglath-pileser says that he "added the broad land of . . . li to the borders of Assyria," which Hommel restored as (*Nap-ta*)-li, i. e., Naphtali, and set his officials over it. In l. 16 the tribute of Israel and the deportation of the entirety of its people (*pukhur nîshe-shu*) are mentioned. Tiglath-pileser then goes on to say: "Pekah (*Paqakha*) they had deposed and Hoshea (*Ausi*) as king over them I set, ten talents of gold and silver I received from them." Another inscription (II R., pl. 67, ll. 57 ff.) contains the first definitely authenticated mention of Judah in the Assyrian records; the passage reads:—

"The tribute of Kûshtaspi of Qummukh . . . Matânbi'il (Mattan-baal) of Arvad, Sanipu of Beth-Ammon (*Bit-Ammanâi*), Salamanu of Moab (*Ma'bâi*), Mitinti of Ashkelon (*Asgalunâi*), Jehoahaz of Judah (*Iaukhazi mâtu Iaudâi*), Qaushmalaka of Edom (*Udumâi*), Mutsri . . . and Hanon (*Hânûnu*) of Gaza (I received)."

The Assyrian had penetrated almost to Egypt, had made Judah and Israel tributary, and had reduced the kingdom of Damascus to a province. Israel and Judah were being encompassed on all sides. It is not, therefore, surprising that in the next reign, that of Shalmaneser V (727-722), the siege of Samaria, which with its immediate environs was all that remained to the heirs of Jeroboam I, was formally begun. Israel and Tyre had refused tribute, relying on Egypt, and Shalmaneser apparently overran Phœnicia and then besieged Samaria.

From II Kings, xviii, it would appear that the siege began about 725. When the city fell in 722 Shalmaneser was no longer king of Assyria, but had been replaced by Sargon, the founder of the last and most brilliant of Assyrian dynasties.

II Kings, xviii, does not state the name of the king who took Samaria, and it is probable that its capture was effected by the *turtan*, Sargon himself being occupied with affairs in Babylonia, his opponent there, Merodachbaladan of Bit-Yakin being assisted by Elam. It was to Samaria that some of the Aramæan tribes of the Euphrates, who supported Merodachbaladan, were transported.

The first effort of Sargon in Babylonia met with failure, which had repercussions in the west due to the loss of prestige involved. Egypt, which had been the prey of disunion, had now recovered some of her ancient energy. The south was held by Ethiopia, and this fact compelled Bokenrenf of Sais, the only monarch of the Twenty-fourth Dynasty, who held the north, to attempt to expand in Palestine, where he accordingly began to stir up anti-Assyrian feeling. Thus instigated, Ilubidi or Yaubidi, who had usurped the throne of Hamath, in alliance with Hanon of Gaza and the Bedouin, secured the adhesion of Arpad, Tsimirra, Damascus and Samaria, the last two of which had been so recently conquered, actively backed by Egypt. Ilubidi was defeated at Qarqar and Hanon and the Egyptians at Raphia (720). Tribute was received from Egypt, the Aribi (Arabs) and Saba, and Hanon was captured and sent to Nineveh in chains. It was at this time that the people of Samaria were deported. In the meantime the Ethiopian Shabaka (Biblical So?) had become king of all Egypt and renewed Bokenrenf's intrigues, particularly in Edom, Moab, Philistia, Ashdod, and Judah, where, however, Isaiah opposed the Egyptian alliance. A revolution in Ashdod led to open revolt, which was, however,

crushed by the Assyrians in 711, Ashdod becoming for a while an Assyrian province.

The middle years of Sargon's reign (719-708) were occupied with combating the alliance of Rusas of Urartu and the Phrygian Mita of Mushku, to which I have already referred. This struggle drew into its mesh some of the north-western tributary states, Quê, Tabal, Qummukh, Melid, Gurgum, and Carchemish, and all became Assyrian provinces, Melid being peopled by Suti (Shoa).

In 709 Mushku itself made peace and seven kings of Cyprus sent tribute, Sargon setting up a triumphal stela there. The state of Sama'al lost its liberty at this time, so that only Palestine and Phœnicia retained a limited independence.

The campaigns of 718 to 709 paralysed both Elam and Mero-dachbaladan, who had remained independent since Sargon's campaign in 722-1. So complete was the Assyrian king's success that the king of Tilmun sent tribute. The rest of the reign (708-705) was apparently spent in building the new palace-city of *Dûr-Sharrâkîn*. Soon after its completion the great king met a violent death, of what nature is unknown.

The Bible tells us that the king of Assyria transported Israel into Assyria and put them in Halah and Habor by the river of Gozan and in the cities of the Medes. Halah was probably somewhere in the neighbourhood of the river Habor (Ass. *Khabur*), which joined the Euphrates at Circesium, and Gozan (Ass. *Guzanu*) was the land embraced by the Habor's two main tributaries. The Bible further says that Assyria settled Samaria with Babylonians, Avvites, Hamathites and men from Cuthah and Sepharvaim. Cuthath is the Babylonian Kutû, the sacred city of Nergal, the god of pestilence and war. Sepharvaim was the two Sipparas of Babylonia, *Sippar sha Shamshi* (Sippara of Shamash, the sun-god) and *Sippar sha Anunitum* (Sippara of the goddess Anunit). Avva is unidentified.

The only Biblical mention of Sargon by name is in Isaiah xx, 1, the passage beginning "In the year that Tartan came to Ashdod, when Sargon the king of Assyria sent him."

The fall of Samaria is recounted in the Annals, lines 10-17 (Winckler, pl. I, ll. 11 and 14-7), e.g., "In the beginning of my government, I besieged and took Samaria [*alu Samerindî (alme akshud)*] . . . 27,290 of its inhabitants I carried away, 50 chariots I collected there as a royal force . . . I set (Samaria) up again and made (it) more populous than before; people from

lands which I had conquered, I settled therein ; my official as governor I set up over them ; tax and tribute like that of (imposed on) the Assyrians I laid on them."

Another passage (Winckler, pl. 30, No. 64, l. 24) states that after the restoration of Samaria Sargon allowed the remainder of the population to retain their property (*Sítúti inushunu ushakhíz*) and that the tribute which he imposed was that of the former king.

The campaign against Ilubidi of Hamath and Hanon of Gaza is recounted in the Annals, lines 23-31 (Winckler, pl. 2, No. 3) ; this states that in the second year of the reign Ilubidi of Hamath collected his numerous troops at Qarqar and made Arpad, Tsimirra, Damascus and Samaria rebel against Assyria. Sib'u (perhaps the Biblical So), his *turtan*, he called to his side and marched against Sargon to deliver battle and death. "In the name of Ashur, my lord, I defeated him and Sib'u fled alone like a shepherd whose sheep are stolen (*kî ré'u sha tsínashu khabta edânúshshu ipparshid*)." Sargon adds that he took Hanon (*Khanunu*) of Gaza and carried him in chains to his city of Ashshur. He also took and wasted the city of Raphia (*Rapikhu*) and deported 9,033 of its inhabitants with their goods. In Winckler, pl. 31, No. 65, l. 25, Sib'u is described as *turtan* of Egypt. He may be the Pharaoh Shaboka. These events took place in 720. In the *Cylinder Inscription* (Winckler, facing pl. 43, l. 19) Sargon describes himself as "conqueror of the broad land of Israel (*mátu Bit* ^{det} *Khâmria rapshi*) who defeated Mutsri at Raphia (*sha ina alu Rapikhi abiktu mátu Mútsri ishkuwu*) and took Hanon prisoner to Ashshur.

The Annals also tell us that Sargon overthrew the far-off tribes of Tamud, Ibádidi, Marsimanu, and Khaiapa of the Arab country, who dwelt in the desert and knew no learned man or scribe, settled those who were left in Samaria, and received the tribute of Pir'u of Mutsri (Pharaoh of Egypt?), Samsi, queen of Arabia, and It'amara of Saba, sovereigns of the sea-coast and desert (715 : Winckler, pl. 4, No. 8, ll. 94 ff.). We then have the battle of Qarqar against Ilubidi or Yaubidi of Hamath and his allies. Ilubidi, the record tells us, had usurped the throne of Hamath, *e.g.*, "Ilubidi of Hamath, a man of the people, who had no claim on the throne, a Hittite, a bad man, had set his mind on the kingdom of Hamath (^{det} *ilu Yaubi'di mátu Amatái tsáb khubshi la bél itu kussi awélu khattú limnu ana sharrút mátu Amátti libbashu ikpád*)."

After the fall of Qarqar Sargon flayed Yaubidi alive (*shâshu mashakshu akuts*: "as for him, his skin I tore off"). 200 chariots and 600 horsemen were collected among the Hamathites and added to the Assyrian army (Winckler, pl. 31, Nos. 65-66, ll. 33 ff.).

The second revolt in the west was that of Ashdod, at the instigation of Shabaka of Egypt, in 711. Sargon says that Azuri of Ashdod planned in his heart to refuse tribute and stirred up enmity to Assyria among the neighbouring states. Sargon at once deposed him in favour of his twin brother Akhimiti, who was in turn deposed by the Hitties (*awêlu khâttê*, i.e., westerners), in favour of Yamani who was not of royal birth ("had no claim to the throne") and who, like his supporters, had no reverence for authority (*palakh bêluti lâ idû*: "fear of lordship knew not"). Taking only his guard with him ("those who leave not the place of aiding my body": *awêlu quradi-ia sha ashar sâlme iddai lâ îpparkû*), Sargon advanced on Ashdod. Yamani, on the mere rumour of his approach, fled to the border of Egypt which is beside Melukhkha, and his place knew him no more ("his place was seen no more": *lâ innamir asharshu*). Ashdod and Gath fell and the household, people and treasures of Yamani were carried off as spoil. Ashdod and Gath were made into provinces under Assyrian governors and were settled with transportees from the east. The king of Melukhkha, in terror of Assyria, cast Yamani into chains and handed him over, and he was deported to Assyria (Winckler, pl. 33, No. 70, l. 90 ff., No. 71 and beginning of pl. 34, No. 72). It further appears from the same inscription that the Assyrians in besieging Ashdod dug a moat round the city more than 20 cubits deep. Thereafter Philistia, Judah, Edom and Moab, who were tributaries, repudiated allegiance and sent for help to Pharaoh of Egypt, "a prince who could not help them" (*maliku lâ mushezibishunu*) (the "bruised reed" of Kings II, xviii, 21). C. H. W. Johns (*Ancient Assyria*, p. 114) regards Yamani as meaning a Yemenite and identifies Melukhkha with Amalek, but H. R. Hall (*Ancient History of the Near East*), reading *ma* as *ua*, which is quite permissible, interprets the name as a Yavanite, i.e., a Greek.

Sennacherib (705-681) is from the Biblical standpoint the best known of all Assyrian kings on account of his campaign against Judah.

The reign was distinguished by two centres of activity, Babylonia, where claimant after claimant sought the throne and

where Chaldæan, Aramæan, and Elamite fished in the troubled waters of disorganisation, and the west, where Egypt under the Ethiopian was ever intriguing to recover her lost Palestinian hegemony. Both centres reacted on each other. Beyond this, Babylonia, where events culminated in Sennacherib's destruction of the capital in 689, does not really concern my subject, except that the intrigues of Merodachbaladan, who, it will be remembered, sent an embassy to Hezekiah, were a contributory cause of anti-Assyrian revolts. In the west Luli (Elulæus) of Sidon had obtained a position of predominance in Phœnicia, whilst Hezekiah was anxious to reverse the pro-Assyrian policy of his father Ahaz and the prophet Isaiah. Revolutions broke out in Ashkelon and Ekron, the Assyrian vassal king of which, Padi, was sent in chains to Hezekiah.

Sennacherib appeared in the west in 701, substituted Ethbaal for Luli, received the submission of Ammon, Moab, Edom, and Ashdod, took Ashkelon, Bethdagon and Joppa, and drew near to Egypt, whose army he defeated at Eltekeh, near Ekron, reduced Ekron, secured the liberation of Padi, and took Lachish. Hezekiah was isolated in Jerusalem and Judah ravaged. The siege of Jerusalem was then begun, but Sennacherib himself returned to Nineveh, leaving the conduct of affairs to three high officers, the *tartan*, *rabshakeh* (chief cup-bearer) and *rabsaris*.* Deserted by his Arab mercenaries, Hezekiah at last bought Assyria off. Immediately after he received Merodachbaladan's embassy against the good sense of Isaiah. According to H. R. Hall (*Ancient History of the Near East*, 1932), on whom I have based my summary of the reign, the unrecorded years of Sennacherib's reign (689-681) are those probably in which he experienced that disaster to his arms which is recounted in II Kings. After Eltekeh, the new king of Egypt, Shabataka, signed a treaty with Assyria, but himself dying in 689, his successor Tirkakah again intrigued against Assyria, although Hezekiah seems to have stood aside, with the result that Sennacherib again appeared in the west in 687 or 686 and, taking Libnah, advanced to the siege of Pelusium, but his army being smitten with pestilence, returned to Nineveh. Other Assyrian campaigns during this reign were that to crush a revolt in Cilicia in 698, and to Tabal in 695 whose capital Tilgarimmu (Biblical Togarmah) was captured. The murder of Sennacherib was probably directly

* Chief of the eunuchs. The *tartan* was the commander-in-chief.

due to the supersession of the crown prince Ardibelit by a younger son Esarhaddon who was acting as viceroy of Babylon.

The Biblical account of Sennacherib's campaign against Judah is contained in II Kings, xviii, etc.

"In my third campaign," says Sennacherib,* "I marched against the land of the Hittites. The fear of the splendour of my dominion overwhelmed Luli, king of Sidon, and he fled far away into the midst of the sea and met his death. Sidon the Great, Sidon the Less (*Tsidānu rabu u Tsidānu tsikhru*), Bitzitte, Sariptu (Zarephath), Makhalliba, Ushû (mainland Tyre), Ahzib (*Akzibi*), Acre (*Akkû*), his strong-walled cities, his places for pasturage and water, his garrison cities, the might of the arms of Ashur, my lord, overwhelmed them and they bowed at my feet. I placed Tuba'lu (Ithobaal) on the royal throne over them and fixed upon him yearly unchanging taxes and tribute for my dominion. Minkhimmu (Menahem) of Sham-simuruna, Tuba'lu of Sidon, Abdili'ti of Arvad, Urumilki of Gebal, Mitinti of Ashdod (*Azdudâi*), Puduilu of Bit-Ammanâi (Beth-Ammon), Kammûsunâdbi of Moab (*Ma'bâi*), Airammu of Edom (*Uâûmmâi*), the kings of the west land (*mātu Martu*^{kl}), all of them, districts of great extent, brought their heavy tribute before me for the fourth time and kissed my feet. But Tsidqâ, king of Ashkelon (*Isqâlluna*), who had not submitted to my yoke, I carried away the gods of his father's house, himself, his wife, his sons, his daughters, his brothers, his seed of his father's house, and I took him to Assyria, Shurruludari, son of Rukibtu, their former king, I set over the people of Ashkelon, and the payment of taxes, presents to my dominion, I laid upon him that he might bear my yoke. In the course of my campaign I besieged Beth-Dagon (*Bit-Daganna*), Joppa (*Iâppû*), Benebarqa (*Banâibarqa*), and Azuru, cities of Tsidqâ, which had not submitted quickly to my feet; I captured them and carried off their booty. The governors, princes and people of Ekron (*Amqarruna*), who had cast into fetters of iron Padi their king (who had been faithful to the commands and compact of Assyria), and had given him over to Hezekiah of Judah (^{det} *Khazaqiyau mâtu Iaudûi*) as a foe, and shut him up in prison; their hearts were afraid. They summoned the kings of Egypt, the bowmen, chariots, and horses of the king of Melukhkha (Amalek?), forces numberless, and they came to their aid. In the neighbourhood of Eltekeh (*Altaqû*) their line of battle was drawn up against me, they clamoured for their arms. With the help of Ashur, my lord, I fought with them and accomplished their defeat. The commander of the chariots and the sons of the king of Egypt with the commander of the chariots of the king of Melukhkha my hands captured alive in the battle. I besieged and captured Eltekeh and Timnath (*Tâmna*) and carried off their spoil. I drew near to Ekron; the governors and princes who had committed sin, I slew and hung their bodies on stakes round the city; the townsfolk who had committed wickedness and offence I counted as spoil; to

* Sennacherib's campaign against Judah is described in I R., pls. 38/39 (Col. ii, l. 34, to col. iii, l. 41) and in I R., pl. 43, ls. 13-19).

the rest of them, who had not committed sin and wickedness, in whom no guilt was found, I extended pardon. Padi, their king, I brought out of Jerusalem (*Urusalimmu*) and set him on the throne of dominion over them and the tribute of my dominion I laid upon him. And of Hezekiah, the Judæan, who had not submitted to my yoke, 46 strong cities with walls and the smaller cities which were around them, without number, by the battering of rams and the assault of engines, the attack of footsoldiers, mines, breaches, and axes, I besieged and captured. 20,150 people, young and old, male and female, horses, mules, asses, camels, oxen and sheep without number I brought out from them and counted as spoil. Himself (Hezekiah) I shut up like a caged bird within Jerusalem, his royal city. I cast up entrenchments against him and whosoever came out from the gate of his city I turned back by command.* His cities which I had plundered, I separated from his land and gave them to Mitinti, king of Ashdod, Padi, king of Ekron, and Tsilibeli, king of Gaza (*Khaziti*), and diminished his land. Over and above the former tax, their yearly tribute, I added the tribute and presents of my dominion and laid these upon them. As for Hezekiah, the fear of the majesty of my dominion overwhelmed him, and the Urbi (Arabian mercenaries ?) and his regular troops, whom he had brought to strengthen Jerusalem, his royal city, took their discharge. With 30 talents of gold and 800 talents of silver, precious stones, rouge, *dakkasu*, *angume*-stones, couches of ivory, state chairs of ivory, elephant hide, ivory, *ushu*- and *urkarinnu*-wood, diverse objects, a heavy treasure, and his daughters, palace women, male and female temple-singers, he despatched after me to Nineveh, my capital city. He sent his ambassadors to give tribute and make submission."

In I R., pl. 43, l. 15, Sennacherib says :—

"I destroyed the broad district of the land of Judah; I laid a yoke upon Hezekiah, the king (*ushalpit rapshu nagû mâtu Iaudi det Khazakiau sharrushu emid apshâni*)."

A famous bas-relief in the British Museum (Assyrian Saloon, No. 28) depicts Sennacherib on his throne at Lachish receiving that city's tribute. The slightly mutilated epigraph reads :—

"Sennacherib, king of the world, king of Assyria, seated himself upon a throne, and the spoil of Lachish passed before him (*det Sin-akhe-erba shar kishshati shar mâtu Ashshur ina itsu kussi nimédi ushîma shallât alu Lakisu makhârshu etiq*)."

At some time during the years 689–681 a final campaign drove into flight Telkhunu, queen of Arabia.

The magnificent passage in Isaiah x, 28, beginning "He is come up to Aiath," is thought to enshrine at least a memory of Sennacherib's advance on Jerusalem.

* The exact interpretation of the Assyrian is problematical here.

With the death of Sennacherib Biblical references to Assyria practically cease. Thus Esarhaddon is only mentioned thrice, *i.e.*, his accession in II Kings, xix, 37, Isaiah xxxvii, 38, and Ezra iv, 2, and Ashur-bani-pal only once (Ezra iv, 9-10),* yet both played an important part in Palestinian and Egyptian affairs.

Esarhaddon (681-669) reversed Sennacherib's Babylonian policy, rebuilt the capital and maintained his position there against both the Chaldæans and Elam.

Another important activity of his reign was his long struggle from 678 to 673 against the league of the Gimirraî, Man and the Medes, which has already been referred to.

However divergent may be the judgments which historians have passed on Sennacherib's reign, his campaign of 701 was followed by more than twenty years of peace in the west, and was not broken until the revolt of Sidon in 678.

The main activities of Esarhaddon and Ashur-bani-pal were devoted to the conquest of Egypt, but the space allowed me will not permit me to deal with them, interesting as they are.

It was not to be expected that wars and alarums in Egypt would leave the west unaffected, especially when they were succeeded in Ashur-bani-pal's case by a long war to the death with Elam (655-644), and in conjunction with it a four-years revolt in Babylonia (652-648), where his brother, Shamash-shum-ukin, king of Babylon, rebelled. Even as early as 678, before the invasion of Egypt, Abdimilkutti of Sidon, which Sennacherib had favoured as a counterpoise to Tyre, relying on Egypt and in alliance with Cilicia, rose in a revolt whose only result was the destruction of Sidon and the erection nearby of a new city *Kâr-ashur-akh-iddina* ("Esarhaddon's Castle") (676) with the help of the kings of the Hittite country and the sea-coast (I R., pl. 45, ll. 29-30). *Esarhaddon's Castle* was peopled with colonists from the hill country and the eastern sea. The tributary rulers who contributed to the building of Esarhaddons' palace at Nineveh were those of Edom, Moab, Gaza, Ashkelon, Ekron, Gebal, Arvad, Ba'al of Tyre, Manasseh of Judah, Samsimuruna, Beth-Ammon and Ashdod, and ten kings of Cyprus (III R., pl. 16, col. v, ll. 13-28).

The destruction of Sidon is described in Esarhaddon's *Cylinder Inscription*, col. i, ll. 9-12 ff. (I R., pl. 45). Esarhaddon says :

* Where the peoples whom he settled in Samaria are enumerated.

“ its (Sidon’s) walls and dwellings I tore down (*dûrushu u shubatsu assukh*); into the sea I cast it ” (*kirib tâmtim addîshu*). Abdimilkutti fled into the sea, but Esarhaddon drew him up therefrom like a fish and beheaded him (*kima nâni ultu kirib tâmtim abarshuma akkisa qaqqasu*). His ally, Sanduarri of Kundi (in Cilicia), met a like fate and the heads of both were hung round the necks of their great men and paraded through the public square of Nineveh [*ribit Ninua* ^{kl} (l. 53) : cf. Rehoboth Ir].

The year after the Assyrians were first expelled from Egypt (673), Baal of Tyre promptly revolted and apparently successfully resisted the Assyrian arms. The other states of Palestine remained loyal and hastened to pay tribute, when at the beginning of his reign the new king, Ashur-bani-pal advanced on Egypt. Tyre, still, however, remained defiant and against it Ashur-bani-pal directed his third campaign. He says : “ Siegeworks around him I erected ; I took control of his means of communication by land and sea ; their (the Tyrians’) lives I reduced to straits and made wretched ; to my yoke I subjected them (*khaltu* ^{pl} *elishu urrakis ina tâmtim u nabâli girriêtishunu utsabbit naphâtusunu usûq ukarri ana itsu nîri-ia ushahnîssunuti*.) Baal surrendered as hostage his son Iakhimilku “ who had never crossed the sea ” (*sha matêma tiâmat lâ ebira*). There had evidently been some unrest elsewhere at this time for submission was also received from Arvad, Tabal and Cilicia (here called *Khilakku* instead of *Quê*). Iakinlu of Arvad, however, was deposed in favour of his son Azibaal (V R., pl. 2, col. ii, lls. 49 ff.) ; Manasseh of Judah must also either have been plotting or causing trouble, for according to II Chron., xxxiii, 11. he was deposed and deported to Babylon.

It was only to be expected that Assyria should have had trouble with the Arabs, whose government was settled by Esarhaddon.

The Arabs responded to the invitation of Shamash-shum-ukin, who during the great revolt of 652-648 had, like Merodach-baladan before him, intrigued in the west, and besides sending contingents to his aid in Babylonia, had raided the Assyrian provinces and tributary states in Palestine and Syria.

Prominent among them were the Kedarenes (Ass. *Kîdrâi*) and the Nabatæans (*Nabâtîiai*).

The Arabian wars are recorded in columns vii-ix and the beginning of x of Ashur-bani-pal’s Annals (*Cylinder Inscription A* ; V R., pls. 7-10). The story is long and complicated and I

will merely note in passing that among the places in which Ashur-bani-pal fought the Arabs was *Tsubiti*, which has been identified with the Zobah of II Samuel, x, 6, 8, and I Kings, xi, 23-4. The Arab tents, which, of course, went up in flames, are called *bît tsêri*, "houses of the desert," and *zirtarâte*, "pavilions."

A point to be noticed is the constant appearance of queens of Arabia, reminding us irresistibly of Solomon and the Queen of Sheba. Thus under Tiglath-pileser III there is Zabibi, queen of Arabia, under Sargon Samsi, under Sennacherib Telkhunu and under Esarhaddon Tabûa.

History records a last victorious exploit of Assyrian troops in the west after the completion of the Arabian wars, the returning legions taking mainland Tyre (*Ushû*) and Acre (*Akkû*) (V R., pl. 9, col. ix, ll. 115-125).

The records of Ashur-bani-pal's reign fail us after 640. It is probable that from this time Assyrian power in the west, weakened by the Elamite wars, the revolt of Shamash-shum-ukin, and the incursions of the Scythians, began to fail, and in the next two reigns progressive weakness ended in catastrophe (612).

So in blood and fire ends the tale of Assyrian conquest.

The details of the final fall of the Assyrian empire are given in the Babylonian Chronicle, British Museum, No. 21,901, and it is interesting to note that the last glimpse we have of Assyria and her mighty men is before a city which occurs in the life of the father of the Hebrew nation.

Abraham went up out of Ur of the Chaldees, a centre of moon-worship, to Kharran where the same cult also obtained, and in lines 49 and 50 of the reverse of this new document we are told that after the sack of Nineveh "Ashur-uballit in the city of Kharran for the governing of Assyria sat on the throne (*ina alu Kharrânû ana sharrût mâtu Ashur Ashur-uballit ina kussi ittashab*)."

The Scythians and Babylonians drove him out, however, and the last we see of him is attempting to retake it with the help of an Egyptian army (609).

FOOTNOTE.—In preparing this paper my leisure has only permitted me to consult such original sources as I have to hand in my own library, but wherever these have availed I have checked all statements and quotations made. The sources I have consulted are: Layard, *Inscriptions in the Cuneiform Character*, 1851, *The Cuneiform Inscriptions of Western Asia*, Vols. I, II, III and V, and both editions of Vol. IV (1861-91), the late Prof. Pinches' copies, with autograph emendations and marginalia, Rost, *Keilschrifttexte Tiglat-Pileasers III*, 1893, Winckler, *Keilschrifttexte Sargons*,

1889, the late Prof. Langdon's copy with autograph emendations and marginalia, Budge and King, *Annals of the Kings of Assyria*, 1902, Geo. Smith, *History of Assurbanipal*, 1871, Lau and Langdon, *Annals of Ashurbanipal*, 1903, and *The Fall of Nineveh* (Chronicle No. 21, 901), ed. C. J. Gadd, 1923. I have also consulted Schrader, *The Cuneiform Inscriptions and the Old Testament*, 1885; Pinches, *The Old Testament in the Light, etc.*, 1908; Rogers, *Cuneiform Parallels to the Old Testament*, 1925; Barton, *Archæology and the Bible*, 1933; the histories of Goodspeed, Rogers and Olmstead; King, *History of Sumer and Akkad*, 1916, and *History of Babylon*, 1919; Hall, *Ancient History of the Near East*, ed. C. J. Gadd, 1932; *Cambridge Ancient History*, Vol. III, 1925; Bezold, *Ninive und Babylon*, 1903; and Johns, *Ancient Assyria*, 1912. I have followed the British Museum *Guide to the Babylonian and Assyrian Antiquities*, 1922, for the dates and sequence of the Assyrian kings.

It will be noticed that the spelling of the Assyrian place names varies. This is so in the inscriptions, and I have given them as in the inscriptions referred to or quoted from. The ending *âi* is gentilic. Thus: *mātu Amātu*, the country (of) Hamath, *mātu Amatâi*, the country (of) the Hamathites, *mātu Iaudu*, the country (of) Judah, *mātu Iaudâi*, the country (of) the Judæans.

ADDENDA.

Page 263. *Date of Sargon of Agade*.—I have used the British Museum date (1922); Dr. R. C. Thompson prefers *c.* 2400, and Sir Leonard Woolley (*Abraham*, 1936) *c.* 2528. Dr. Thompson admits that it is very uncertain.

Page 264. *Broken Obelisk*.—Prof. Weidner writes me that this is no longer ascribed to Ashurnatsirpal II, but either to Tiglathpileser I himself or his son Ashurbêlkala.

Page 265. *Tilmun*.—Dr. Thompson writes me that there is now a little doubt as to the exact location of this.

Kasbu, a double hour's journey; this, the older reading, is now superseded by *bêru*, which Dr. Thompson tells me is now held to be possibly the Greek $\delta\rho\zeta$.

Page 266. *The Suti*.—These were to the west not east of the Tigris. The older Assyriologists (Pinches: *Amherst Tablets*; Schrader, quoting Delitsch: *Paradies*) located them to the east of it.

Elam.—Dr. Thomson doubts whether Elam was really wiped out by Ashurbanipal, but Mr. S. A. Smith (*Cambridge Ancient History*, Vol. III, 1925, p. 126) maintains the traditional view that it was.

Page 267. *Urartu*.—Prof. Weidner draws my attention to the fact that Urartu is first mentioned by Shalmaneser under the form

Uratru, which Mr. S. A. Smith (*Early History of Assyria*, p. 278) reads as *Uruatri* or *Uratri*, and that *Patini* on page 7 is now read as *Khattini*: *pa* and *khat* are expressed by the same sign in cuneiform.

Page 269. *Sheepskin boats*.—Dr. Thompson reminds me that these are the modern *keleks* or skin rafts.

Shianian.—Dr. Thomson tells me that this is the correct reading, the $\begin{smallmatrix} \vee\vee \\ \vee\vee \end{smallmatrix}$ in III R being a misprint.

Page 277. *Yauani*.—Dr. Thompson confirms Dr. Hall's reading, an Ionian, not *Yamani* a Yemenite.

[It is regretted that, owing to his early departure abroad, the Chairman's interesting comments, which had not been previously committed to writing, could not be obtained. There was no other discussion.]

At the instance and with generous assistance of Mr. E. B. Chappelow, M.R.A.S., F.R.S.A.—supplemented by the further gift of an anonymous donor—the Council are enabled to publish below, in English, another valuable fragment of work by the late Prof. T. G. Pinches, already published in German by Dr. E. F. Weidner of Berlin, to whom as well as to Mr. Chappelow their warm thanks are due.

THE CREATION OF MAN AND THE FIXING OF THE ANUNNAKI.

By ERNST F. WEIDNER, Berlin.

Translator's Note.

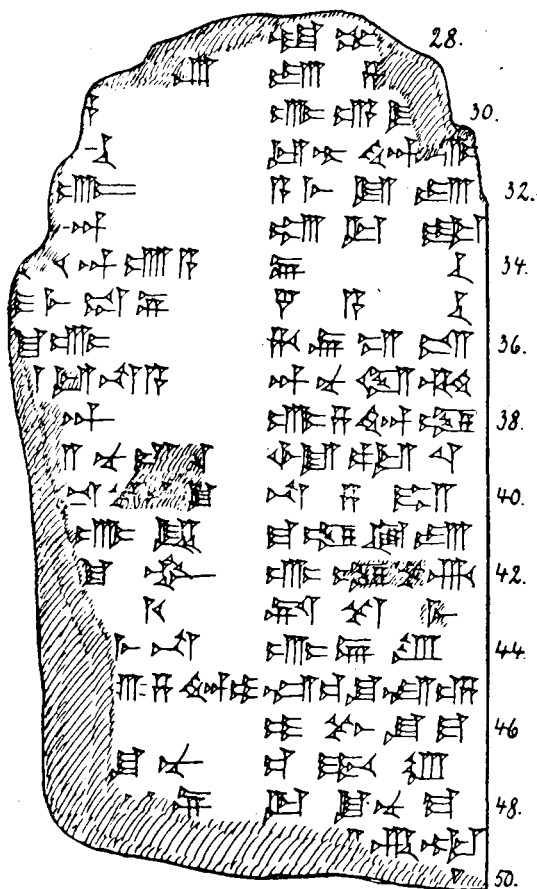
On March 7th, 1927, the late Professor T. G. Pinches, LL.D., M.R.A.S., read before the Institute a paper entitled "The Completed Legend of Bel-Merodach and the Dragon."

On pages 16 and 17 of that paper Dr. Pinches gave a translation of that part of the Sixth Tablet of the Creation Epic which deals with the fashioning of man, so far as it was then known, closing with the lines describing the division of the Anunnaki. Dr. Pinches then pointed out that the next lines were imperfect and difficult of interpretation.

Among a large number of copies of cuneiform inscriptions which he had made over a period of many years and which were handed to me after his death by his brother, Mr. Ernest Pinches, was one which, dealing with this particular passage, filled up the gaps existent at the time he wrote his paper, and which he had no doubt overlooked.

The fragment in question has removed the difficulties to which Dr. Pinches referred.

Through the medium of Dr. Campbell Thompson, I was put in touch with Dr. Ernst Weidner of Berlin, the editor of the *Archiv für Orientforschung*, who had been making inquiries as to any unpublished Assyriological work which Dr. Pinches might have left. As a result Dr. Weidner published in the *Archiv*, Band XI, Heft 1/2 (1936), the article which I have, with his consent, translated below.



It is interesting to note that among the papers which, after classification, I was able to send to him were more than thirty copies of unpublished cuneiform texts, which he is now printing in successive issues of his paper under the title *Cuneiform Texts from Copies by T. G. Pinches*.

The fragment of Tablet VI copied by Dr. Pinches has not only completed the Assyro-Babylonian account of the creation of man but also, if, as Dr. Weidner suggests, it may be interpreted in an astronomical sense, relates the allocation to the Anunnaki by Murduk of their stations in the zodiacal belt, reminiscent of Genesis i, 16 :

“He made the stars also.”

In view of Dr. Pinches' long and close association with the Institute this further and posthumous contribution of his to the science to

which he devoted his life, supplementing, as it does, the paper which he read before the Institute more than ten years ago, may be of interest.

E. B. W. CHAPPELOW, M.R.A.S., F.R.S.A.

We have gained a knowledge of the Sixth Tablet of the Creation Epic *Enuma eliš* through a tablet from Assur (VAT 9676—Ebeling KAR IV, No. 164).

With the help of this it has been possible to establish that three fragments of tablets which are preserved in the British Museum, namely, K. 3449A (*Cuneiform Texts*, XIII, 23), K. 12000B (*Cuneiform Texts*, XIII, 24), and British Museum 92629 (King: *The Seven Tablets of Creation* II, Pls. XXXV—XXXVII), likewise contain parts of the Sixth Tablet. The two first-named fragments came from Aššurbânapi's library. But the British Museum possesses at least one other fragment of the Sixth Tablet from the same source. I owe my knowledge of it to a copy made by the English Assyriologist, Theo. G. Pinches, to whom science owes so much, which was found among his literary remains. It bears the designation "K. unnumbered" and was made more than fifty years before the cataloguing of the clay tablets from Aššurbânapi's library. I have not been able to ascertain its present number. Whether K. 3449A, K. 12000B and "K. unnumbered" should happen to belong to the same tablet can only be decided if "K. unnumbered" is successfully identified.

The fragment "K. unnumbered," the significance of which only becomes apparent with the publication of the texts of Ebeling and Langdon, contains parts of lines 28–50¹ (=KAR IV, No. 164, Vs. 23–28) of *Enuma eliš*, Tablet VI. But it was just this piece which was hitherto very mutilated, and the united labours of scholars completely failed to arrive at a conclusive understanding of it.²

It is a very fortunate occurrence that the new fragment now fills up all gaps.

I subjoin a transliteration and translation of lines 28–50 in which only what is enclosed in square brackets is to be found in none of the three copies.

28. *d*qin-gu-ma ša ib-nu-u tu-qu-un-tu
29. u ti-amat uš-bal-ki-tam-ma [i] q- u-ru ta-ḥa-zu
30. ik-mu-šu mah-riš ^de-a u-kal-lu-šu
31. an-nam i-me-du-šu-ma da-me-šu ip-tar-'-u
32. ina da-me-šu ib-nu-u a-me-lu-ta
33. i-mid dul-li ilâni-ma ilâni um-taš-šir
34. ul-tu a-me-lu-ta ib-nu-u ^de-a ir-šu
35. dul-lu ilâni i-me-du-ni ša-a-šu
36. šip-ru šu-u la na-ṭu-u ḥa-sa-si-iš
37. ina nik-la-a-ti ša ^dmarduk ib-na-a ^dnu-dim-mud

38. *^dmarduk šar ilāni u-za'-az*
 39. *^da-nun-na-ki gim-rat-su-nu e-liš u šap-liš*
 40. *u-ad-di- a-na ^da-nim te-r[i]-tuš na-ša-ra*
 41. *5 Uš ina šamê^e u-kin ma-aš-šar-ta*
 42. *uš-taš-ni-ma al-ka-kat iršitim^{tim} u-aš-šir*
 43. *ina šamê^e u iršitim^{tim} 600 uš-te-šib*
 44. *ul-tu te-ri-e-ti nap-ḥar-ši-na u-ir-ru*
 45. *a-na ^da-nun-na-ki ša šamê^e u iršitim^{tim} u-za'-i-zu is-gat-su-un*
 46. *^da-nun-na-ki pa-a-šu-nu i-pu-šu-ma*
 47. *a-na ^dmarduk be-la-šu-nu šu-nu iz-zak-ru*
 48. *i-nanna³ be-li ša šu-bar-ra-ni taš-ku-nu-ma*
 49. *mi-nu-u du-muq-ga-ni ina maḥ-ri-ka*
 50. *i ni-pu-uš pa-rak-ki ša na-bu-u zi-kir-šu*

Translation.

28. "Qingu⁴ it was who planned the revolt,
 29. Tiamat caused to rebel, enkindled the strife."⁵
 30. They overpowered him, before Ea they set him in bonds.
 31. Punishment they laid upon him, his blood they let (his veins they cut open).
 32. With his blood he⁶ created mankind,
 33. Imposed on them the service of the gods; the gods themselves he made free (thereof).
 34. When Ea the Wise had created mankind,
 35. Had laid upon them the service of the gods,
 36. This work incomprehensible (to men)⁷
 37. Nudimmud⁸ performed through the wisdom of Marduk---
 38. Marduk, king of the gods, halved⁹
 39. The company of the Anunnaki, above and below;
 40. He appointed them to fulfil the behests of Anu;
 41. 300 he set in heaven as wardens;
 42. 300 in the underworld (lit. he repeated it);¹⁰ the limits of the underworld he laid firmly;
 43. In heaven and earth he made 600 dwell.
 44. When he had proclaimed the whole of (his) decrees,
 45. Among the Anunnaki of heaven and the underworld their portions had shared out,
 46. Then the Anunnaki opened their mouths,
 47. To Marduk, their lord, they said:
 48. "Now, my lord, thou who has achieved our deliverance,
 49. What good deed shall we (do) for thee in return?¹¹
 50. Lo! We will build for thee a high seat whose name shall be named."

The information as to the creation of man (11, 30-37) is now quite clear. Ea, on the counsel of Marduk, creates mankind from Qingu's blood, and man must now assume the burden of service for the great gods, which formerly the Anunnaki had had to perform. The Anunnaki are freed therefrom and show themselves grateful for it (11, 48 ff.).

The Anunnaki, whose number amounts to 600, were then placed under the care of Anu; 300 were to keep watch in heaven and 300 in the underworld. This statement is to be understood, perhaps, in an astronomical sense. Anu is the sovereign of a "Way" in the heaven of fixed stars, a way which lies on both sides of the equator and also comprises one half of the zodiacal belt.¹² One half of this belt reveals itself to the observer above the horizon, whilst the other half is hidden under the horizon. In this way the division of the Anunnaki into the 300 Anunnaki of heaven and the 300 Anunnaki of the underworld would be well explained.¹³

Whether it was also directly believed that the Anunnaki manifested themselves on both sides of the equator is a question which can for the present scarcely be decided.

A conjecture may, however, be made here. In astrological texts which deal with eclipses of the sun, it is said that the sun *ina purussi a-nun-na-ki*,¹⁴ "by the decree of fate of the Anunnaki,"¹⁴ weeps (*i-bak-ki*)¹⁵ or abases itself (*ip-pa-al-sah*)¹⁶. It might be thought from this that the sun was closely interknit with the Anunnaki if it came near their appointed province in the Anu-way (a province on both sides of the equator) or pursued its apparent daily path therein.

The dates of the months mentioned both in the text and commentaries only partly agree with this, it is true, and this question, too, must remain open.

Abbreviations.

VAT. = Vorderasiatische Abteilung (Berliner Museum), Tontafel.
 KAR. = Keilschrifttexte aus Assur religiösen Inhalts.

Notes.

¹ I have adopted the numbering of the lines in Furlani's *Il Poema della Creazione*, pp. 103-5.

² The following works may be compared:

E. Ebeling, *Altorientalische Texte und Untersuchungen II*, 4, S. 56-9 and *Altorient, Texte zum Alten Testamer* ², S. 122

S. Smith, *The Babylonian Legends of Creation* (London, 1931), pp. 64 ff.

St. Langdon, *Oxford Editions of Cuneiform Texts*, VI, p. 96 ff.

G. Furlani, *Il Poema della Creazione*, pp. 103-5.

A. Deimel, *Enuma eliš und Hexaëmeron*, pp. 59, 63.

³ Dr. Weidner gives technical arguments as to why this cannot be translated *nannaru*, "light." (E. B. C.)

⁴ Qingu, the successor of Apsu as the spouse and right hand of Tiamat, to whom she gave the Tablets of Fate (E.B.C.).

⁵ In l. 28 f. the Igigi reply to Marduk's question.

⁶ *Ib-nu-u*, which can only mean "they created," but a comparison with l. 34 supports the translation "he created."

⁷ That is to say: not to be understood by the human mind.

⁸ Nudimmud: another name for Ea (E. B. C.).

⁹ Marduk had already announced this halving of the gods in line 10 of Tablet VI.

¹⁰ This is clearly to be understood as meaning that Marduk also established another 300 Anunnaki, this time as watchers in the underworld.

¹¹ The Anunnaki here ask Marduk how they can show their gratitude for their deliverance from the burden of service; interpreted otherwise, but scarcely correctly by Ebeling, *Altoriental. Texte zum Alten Testament*², p. 122, note f.

¹² Weidner: *Archiv für Orientforschung*, VII, p. 171.

¹³ Cf. Zimmern, *Die Keilinschriften und das Alte Testament*, 3rd edition (Berlin, 1902), pp. 451-3, who has already declared himself in precisely the same sense. (There is a good collection of material on the Anunnaki in Deimel, *Pantheon*, p. 57 ff.)

¹⁴ Cf. Landsberger, *Der Kultische Kalender*, p. 143; somewhat differently, Weidner, *Babyloniaca*, VI, p. 101 f.

¹⁵ Virolleaud, *L'Astrologie Chaldéenne*, 2 Suppl. XIX, 25, and XL 1-7; Weidner, *Babyloniaca*, VI, p. 98, line 5 f.

¹⁶ Virolleaud, *L'Astrologie Chaldéenne*, 1 Suppl. XX, 25 = 2 Suppl. XL, 8 = VAT. 5740, obverse 3-5 (unpublished).

*THE INVESTIGATION OF THE PERIODS IN
SCRIPTURE PROPHECY.*

By WILLIAM BELL DAWSON, M.A., D.Sc., M.Inst.C.E.

*A brief explanation of the material on this subject donated to the
Victoria Institute, comprising tabulated results and diagrams,
classified in sections and contained in a portfolio.*

IT may be allowable to give some notes to show what these prophetical diagrams indicate, and to outline the results of these investigations in Bible Prophecy, which have occupied most of my spare time during thirty years of my life from 1896 onward. For they bring out an aspect of the truth as revealed in Scripture which certainly deserves study, in showing that the communications which the Great Revealer gives to His servants the Prophets is marked by order and method.

We thus recognise that nothing in the Word of God, not even a date, is mentioned without purpose ; and the periods predicted show that there is system in the providential dealings of God. In the light of such Divine orderliness, the audacity of the Critic who denies prediction and displaces the dates given in Scripture, can only be regarded as a form of sacrilege. For many of these dates mark the time chosen of God at which to make a revelation to one of His Prophets.

One cannot carry on such prophetical investigations with preconceived ideas, or to prove some new theory. On the contrary, the only sound method is to recognise the foundations laid in the past by capable and painstaking investigators, beginning with Sir Isaac Newton ; and in the last century, such comprehensive works as those of Dr. William Hales, Rev. E. B. Elliott, Professor T. R. Birks, and the researches of Dr. H. Grattan Guinness. We may thus expect to find that there is

system in the Prophets, and method in the way that fulfilment takes place.

(1) There is a systematic "time-structure" in the books of the Prophets, which also results in correlation between them. This is the outcome of their own dating, and is independent of any system of Bible chronology. For example, Jeremiah specially emphasises the twenty-third year since the beginning of his prophesying, when he reproaches the people for not heeding his message from the Lord (Jer. xxv, 3). This same interval runs on a second time to the last date at which captives are taken to Babylon, as mentioned in the supplementary chapter to his book. This chapter is thus plainly needed to complete the structure of Jeremiah, and it also makes the above remonstrance the central point of the book. Again a third time, this interval runs on to the uplift of Jehoiachin, which is accurately dated; and indicates the first dawn of Restoration. (Jer. lii, 31.)

There are thus four prominent dates connected by equal intervals; and the one specially emphasised is found to be the year when God gives to another Prophet, Daniel, the first intimation of the Times of the Gentiles, through the Dream of the Image at the opening of his book. The next of these dates in Jeremiah is the central year in the twenty of Ezekiel's prophesying, from "the fifth" to "the twenty-fifth" year. This indicates the principle of centrality which so strongly characterises Ezekiel, and brings his careful dating into relation with the feasts of the year, from Passover to Tabernacles. Such correlations are full of significance in the development of Divine purpose, if we could enlarge upon this. (*See the diagrams for all the notable time-relations between these three Prophets.*)

(2) If we believe there is purpose throughout the Word of God, the question arises forcefully as to why it is that so many books of the Bible are grouped around the Captivity of Babylon and the Restoration following. The three notable books, Jeremiah, Ezekiel and Daniel, stand at the beginning of the Captivity and continue into it; Haggai and Zechariah are related to the Restoration; and Ezra and Nehemiah continue later. It is also in these books that so much definite dating occurs.

The evident answer is that the Captivity era stands at the beginning of the long period of Seven Times, or the "Times of the Gentiles," as explained in Daniel and referred to by Christ. And the prediction of the Seventy Years of Captivity was fulfilled

in such a way as to be a type of the longer fulfilment of the Seven Times, and to afford the primary key to its understanding. It is also surely providential to find just in these times, from 721 to 491 B.C., that seven eclipses were very accurately recorded which fix the dating of the reigns of the kings at this epoch. The dates are thus specially reliable from which the age-long periods run. The references to eclipses in the centuries following are mostly so vague and unrelated to the years of reigning kings that they have little value.

We have already seen that a period mentioned in Scripture may furnish a clue which may go much farther than what is definitely stated. This answers the objection of literalists, that no deduction can be made from periods indicated, beyond what is found in the actual words of Scripture. Yet, in all great movements in history, there may be several beginning points in the rise of an empire or a system of dominance, and corresponding endings. This occurred at the beginning and end of the Captivity (as the diagrams show) and it is a marked feature in the Times of the Gentiles, which have already reached incipient endings, notably since the French Revolution. The remarkable divisibility of the number 2520 which represents the Seven Times, corresponds with their fulfilment; for the New Testament Era stands at one-fourth of the way along their course (*see* the diagram); and it is found that the last "Time" of the Seven extends from the Reformation to our own day. It is thus our part in studying these periods, to learn how prediction comes to pass; rather than to lay down rules ourselves as to how fulfilment ought to take place.

(3) The periods predicted serve also to define the power or system referred to in the prophecy. For this accords with a general principle that the domination of evil is limited (Psalm xxxvii, 10-13) which we find exemplified by predicted periods throughout the Bible. The Servitude in Egypt, the Forty Years in the Wilderness, as well as the Captivity in Babylon, were all limited in advance. How helpful also to the servants of God to know that a limit was set to the devastations of the Mohammedan power, and the persecutions of the Papal system. The significance of this came to light in the Reformation Era, and in the wars of a century and a half that followed, by which the Papacy undertook to crush the Reform movement. This great apostate system is now clearly identified by its predicted duration for "a Time, Times and a half," which form the latter half

of the Seven Times, or 1260 years. This period extends from the three initial points in its rise, to corresponding endings; beginnings at the French Revolution. The fulfilment is so plain in history that the identification cannot be controverted; especially as these three initial points represent the characteristics of the system as originally depicted in Daniel.

(4) In studying the features found in the original revelations made to the Prophets, and the manner of their fulfilment, we should realise that prediction in Scripture is not only a foretelling of future events, showing that all is in God's hands; but it is given to the servants of God for their enlightenment and guidance down the centuries.

We cannot enlarge further upon many points of interest which the diagrams bring out, such as the details of the last "Time" that extends from the Reformation to the close; and two series of Jubilee periods, in a succession of 50-year intervals, that are found to run in parallel during this Last Time. This accords with the remarkable character of the primary number 2520 as noted, and its seventh part, as well as shorter periods. It even seems possible that the Seven Vials may be depicted as a system of successive periods; for nations are dealt with in this world, in the chastisements that fall upon them in God's providence; as the ordinary historian may acknowledge. For God will not allow evil systems to triumph without a check, or injustice to continue for ever in His world. This the Scriptures constantly assert; and a limit is set by the periods allotted.

It is much to be desired that this aspect of Truth could be adequately taught in all Theological Institutions and Bible Colleges; to exalt the justice of God and to encourage confidence and endurance. For the time shall come when the kingdoms of this world shall become the kingdom of our Lord and of His Christ; and "here is the patience and the faith of the saints."

Montreal, Canada.

16th May, 1938.

NOTE.—For further explanations, see the following Book and Papers by W. Bell Dawson, in the Library of the Victoria Institute:—

The Time is at Hand; book of 141 pages. Thynne & Co., London.

“The New Testament Era in the Sequence of Prophecy.”
Trans. Victoria Institute, Vol. LX, pages 77-91. 1928.

“Light on Ezekiel,” from the Significance of its Dates.
Hebrew Christian Q'tly (in two parts) Jan. and Apr., 1934.

“Dates of the Bible,” and the structure of Jeremiah, Ezekiel,
and Daniel. *The Fundamentalist*, London; Aug., 1934.

“Prophetical Numbers in Daniel, in relation to Celestial
Cycles.” *Trans. Victoria Institute*, Vol. LXVII, pages 129-
149. 1935.