



2-16

# PROCEEDINGS

OF

## THE CANADIAN INSTITUTE,

### TORONTO,

BEING A CONTINUATION OF THE "CANADIAN JOURNAL" OF  
SCIENCE, LITERATURE AND HISTORY.

OCTOBER, 1887.

Whole No. Vol. XXII.]

[No. 148.

### CONTENTS:

	PAGE.
FIRST MEETING, 6th November, 1886 .....	1
CONVERSAZIONE, 12th November, 1886.—PRESIDENT'S ADDRESS .....	2
SECOND MEETING, 13th November 1886, 12.—1. PHYSIOLOGY AND PSYCHOLOGY. W. F. W. CREBLMAN, B.A., 14.—2. INDIAN MORTUARY CUSTOMS. REV. JOHN MCLEAN, B.A. ....	20
THIRD MEETING, 20th November, 1886, 24.—1. SOCIOLOGY. W. HOUSTON, M.A., 25.—2. A NEW PLANIMETER. C. FESSENDEN, B.A. ....	27
FOURTH MEETING, 27th November, 1886, 30.—1. CANADIAN APATITE. F. T. SHUTT, M.A., 30.—2. REICHERT'S DISTILLATION PROCESS. A. MCGILL, B.A., B.Sc., 30.—3. TANNIN IN SPICES. W. H. ELLIS, M.A., M.B. ....	44
FIFTH MEETING, 4th December, 1886, 44.—1. JURISPRUDENCE OF INSANITY. D. A. O'SULLIVAN, D.C.L., 44.—2. BLOWPIPE ANALYSIS. H. R. WOOD, B.A. ....	56
SIXTH MEETING, 11th December, 1886, 57.—1. AMERICAN LANGUAGES. A. F. CHAMBERLAIN, B.A., 57.—2. LANGUAGE OF BRITTANY. REV. DR. McNISH .....	76
SEVENTH MEETING, 18th December, 1886, 84.—1. THE ETRUSCAN QUESTION. REV. PROF. FERGUSON, 84.—2. ESKIMO NUMERALS.....	105
EIGHTH MEETING, 8th January, 1887, 105.—1. THE COREA. A. GÖRGENYI, 105.—2. DUPLEX TELEPHONY. DR. ROSEBRUGH, 106.—3. BAROMETRIC PRESSURES. R. F. STUART ..	111
NINTH MEETING, 15th January, 1887, 111.—1. MAMMALS AND BIRDS OF PRINCE OF WALES SOUND. F. F. PAYNE, 111.—2. NATURAL WATERS OF ONTARIO. DR. ELLIS .....	123
TENTH MEETING, 22nd January, 1887, 124.—1. STONE IMPLEMENTS FROM LAKE ST. JOHN. DR. WILSON, 124.—2. THEORIES OF HEREDITY. A. B. MACALLUM, B.A. ....	124
ELEVENTH MEETING, 29th January, 1887, 124.—1. GEOLOGY IN THE PUBLIC SCHOOLS. J. T. B. IVES, F.G.S., 125.—2. THE EGGOUBINE TABLES. PROF. CAMPBELL .....	129
TWELFTH MEETING, 5th February, 1887, 130.—1. THE QUICHUA LANGUAGE. PROF. DUNLOP, 130.—2. THE ALASKAN BOUNDARY. T. B. BROWNING, M.A. ....	132
THIRTEENTH MEETING, 12th February, 1887, 132.—1. CANADA IN SCULPTURE. DR. SCADDING, 132.—2. DEXTRINE-MALTOSE IN BEER WORTS. C. GORDON RICHARDSON ..	133
FOURTEENTH MEETING, 19th February, 1887, 135.—1. ANTAGONISMS IN SOCIAL FORCES. W. A. DOUGLAS, B.A., 136.—2. PREVENTION OF CRUELTY. J. J. KELSO .....	142
FIFTEENTH MEETING, 26th February, 1887, 144.—1. PREHISTORIC ETHNOLOGY. A. F. CHAMBERLAIN, B.A., 144.—2. GEOLOGY OF MOUNT GREYLOCE. PROF. T. NELSON DALE..	145
SIXTEENTH MEETING, 5th March, 1887, 145.—1. CENTRIFUGAL FORCES OF THE PLANETS. JOHN PHILLIPS, 145.—2. NOTES ON ASTRONOMY. J. A. LIVINGSTON .....	145
SEVENTEENTH MEETING, 12th March, 1887, 146.—SOME PATHOLOGICAL GROWTHS. A. B. MACALLUM, B.A. ....	146

AS 12  
AS 7  
A 14  
V 5  
1

# OFFICERS

OF THE

# CANADIAN INSTITUTE

1886-1887.

---

President:

W. H. VANDERSMISSEN, M.A.

Vice-President:

E. A. MEREDITH, LL.D.

Secretary	ALAN MACDOUGALL, F.R.S.E.
Treasurer	JAMES BAIN, JUN.
Editor	GEORGE KENNEDY, M.A., LL.D.
Librarian	GEO. E. SHAW, B.A.
Curator	DAVID BOYLE, Ph.B.

## Members of Council:

W. H. ELLIS, M.A., M.B.

ALEX. MARLING, LL.B.

WM. BRODIE, *Chairman of the Biological Section.*

W. E. MIDDLETON, *Secretary of the Biological Section.*

HENRY STEELE, *Chairman of the Architectural Section.*

HUGH NELSON, *Chairman of the Photographic Section.*

REV. J. F. McCURDY, Ph.D., *Chairman of the Philological Section.*

W. H. MERRITT, *Chairman of the Mining Section.*

## Assistant Secretary and Librarian:

R. W. YOUNG, M.A.

## Editing Committee:

GEORGE KENNEDY, M.A., LL.D., *Editor.*  
GEO. E. SHAW, B.A.

W. H. VANDERSMISSEN, M.A.  
W. H. ELLIS, M.A., M.B.

---

THE CANADIAN INSTITUTE is not responsible for the views expressed in the papers or abstracts of Papers published in its Proceedings.

PROCEEDINGS  
OF  
THE CANADIAN INSTITUTE,  
TORONTO,

BEING A CONTINUATION OF "THE CANADIAN JOURNAL OF  
SCIENCE, LITERATURE AND HISTORY."

---

THIRD SERIES. VOLUME IV., 1885-86.

---

TORONTO:  
PRINTED FOR THE CANADIAN INSTITUTE  
BY THE COPP, CLARK COMPANY, LIMITED, COLBORNE STREET.  
1887.



OFFICERS  
OF THE  
CANADIAN INSTITUTE  
1885-1886.

---

*President :*

W. H. ELLIS, Esq., M.A., M.B.

*First Vice-President :*

GEORGE MURRAY, Esq.

*Second Vice-President :*

GEORGE KENNEDY, Esq., M.A., LL.D.

*Third Vice-President :*

E. A. MEREDITH, Esq., LL.D.

Treasurer - - - - -	JOHN NOTMAN, Esq.
Recording Secretary - - -	JAMES BAIN, JUN., Esq.
Corresponding Secretary - -	W. H. VANDERSMISSEN, Esq., M.A.
Librarian - - - - -	GEO. E. SHAW, Esq., B.A.
Editor - - - - -	REV. H. SCADDING, D.D.
Curator - - - - -	DAVID BOYLE, Esq.

*Members of Council :*

DANIEL WILSON, Esq., LL.D., F.R.S.E., F.R.S.C.  
PROFESSOR RAMSAY WRIGHT.  
JAMES LOUDON, Esq., M.A., F.R.S.C.  
P. H. BRYCE, Esq., M.A., M.B., L.R.C.P. & S.E.  
ALAN MACDOUGALL, Esq., C.E., F.R.S.E.  
ALEXANDER MARLING, Esq., LL.B.

*Assistant Secretary and Librarian :*

R. W. YOUNG, Esq., M.A.

*Editing Committee :*

REV. H. SCADDING, D.D., <i>Editor.</i>	W. H. VANDERSMISSEN, Esq., M.A.
GEO. E. SHAW, Esq., B.A.	W. H. ELLIS, Esq., M.A., M.B.
GEORGE KENNEDY, Esq., M.A., LL.D.	

---

THE CANADIAN INSTITUTE is not responsible for the views expressed in the papers or abstracts of papers published in its Proceedings.

# PRESIDENTS

OF THE

CANADIAN INSTITUTE SINCE ITS FOUNDATION IN 1849.

---

Hon. H. H. KILLALY.....	1849-50
CHARLES RANKIN, C.E.....	1850
<i>(Royal Charter granted November 4th 1851.)</i>	
WILLIAM (afterwards Sir WILLIAM) E. LOGAN, C.E., F.R.S., &c ...	1850-51, 1851-52
Captain (afterwards General Sir J. HENRY) LEFROY, R.A., F.R.S., &c.	1852-53
Hon. Chief Justice (afterwards Sir JOHN BEVERLEY) ROBINSON.	1853-54, 1854-55
G. W. (afterwards Hon. G. W.) ALLAN .....	1855-56
Ron. Chief Justice DRAPER, C.B.....	1856-57, 1857-58
Hon. G. W. ALLAN.....	1858-59
Prof. DANIEL WILSON, LL.D., F.R.S.E.....	1859-60, 1860-61
Hon. (afterwards Chief Justice) J. H. HAGARTY.....	1861-62
Rev. J. McCAUL, LL.D.....	1862-63, 1863-64
Hon. OLIVER MOWAT, Vice-Chancellor .....	1864-65, 1865-66
Prof. HENRY CROFT, D.C.L .....	1866-67, 1867-68
Rev. Prof. WILLIAM HINCKS, F.L.S.....	1868-69, 1869-70
Rev. HENRY SCADDING, D.D.....	1870-71, 1871-72, 1872-73, 1873-74, 1874-75, 1875-76
Prof. JAMES LOUDON, M.A.....	1876-77, 1877-78
Prof. DANIEL WILSON, LL.D., F.R.S.E.....	1878-79, 1879-80, 1880-81
JOHN LANGTON, M.A.....	1881-82
J. M. BUCHAN, M.A .....	1882-83, 1883-84
Prof. W. H. ELLIS, M.A., M.B....	1884-85, 1885-86

# CONTENTS.

---

	PAGE.
OFFICERS OF THE CANADIAN INSTITUTE, 1885-6.....	iii
PRESIDENTS SINCE 1849.....	iv

---

## PAPERS.

I.—THE ARCHÆOLOGICAL OUTLOOK: David Boyle, Ph.B. ....	1
II.—CLASSICAL NOTES: Prof. Hutton .....	17
III.—THE LAW OF HABIT: A. S. Johnson, M.A. ....	26
IV.—AERIAL NAVIGATION: Alan Macdougall, F.R.S.E., M. Inst. C.E. ....	57
V.—RENT—A CRITICISM: W. A. Douglas, B.A. ....	58
VI.—THE VILLAGE COMMUNITY IN MODERN POLITICS: Wm. Houston, M.A. ....	61
VII.—NEW ENGLAND UPPER SILURIAN: T. Nelson Dale, M.A. ....	69
VIII.—ETRURIA CAPTA: Prof. Campbell. ....	71
IX.—HYPNOTISM: Dr. Joseph Workman. ....	80
X.—MECHANICAL VALUE OF COAL: J. Davies Barnett .....	82
XI.—ANALOGY BETWEEN CONSONANTS AND MUSICAL INSTRUMENTS: M. L. Rouse. ....	92
XII.—THE ESKIMO OF STUPART BAY: R. F. Stupart. ....	95
XIII.—GNEISSIC FOLIATION: A. C. Lawson. ....	115
XIV.—SAVAGERY IN CIVILIZATION: David Boyle, Ph.B. ....	129
XV.—THE MOUND-BUILDERS IN CANADA: C. N. Bell. ....	131

XVI.—DESTRUCTION OF WILD ANIMALS : J. B. Williams.....	142
XVII.—CONVERTIBLE SECURITIES : J. A. Livingston . . . . .	147
XVIII.—CAMPAIGN OF 1815 : R. E. Kingsford, M.A....	149
XIX.—THE FISHERY QUESTION : T. B. Browning, M.A.....	175
XX.—THE AIR TELEGRAPH : Dr. A. M. Rosebrugh.....	177
XXI.—EARLY DEVELOPMENT OF ABORIGINAL WOMEN : P. W. P. Matthews, LL.D.....	181
XXII.—PHONETIC SPELLING : Wm. Houston, M.A.....	188
XXIII.—IRON IN SALINE SOLUTIONS : F. J. Roche, M.A.....	190
XXIV.—ANCIENT CELTIC ART : Dr. D. Wilson.....	191
XXV.—MARBLE ISLAND : Dr. R. Bell.....	192
XXVI.—FOOD-PLANTS OF PLATYSAMIA CECROPIA : Wm. Brodie.....	211
XXVII.—TANNIN IN CLOVES : W. H. Ellis, M.A., M.B.....	214
XXVIII.—THIRTY-SEVENTH ANNUAL REPORT . . . . .	204
XXIX.—REGULATIONS AND BY-LAWS . . . . .	74
XXX.—LIST OF EXCHANGES.....	216

## INDEX OF AUTHORS.

---

	PAGE.
Barnett, J. Davies .....	82
Bell, C. N.....	131
Bell, Dr. R.....	192
Boyle, David, Ph.B. . . . .	1, 129
Brodie, William.....	211
Browning, T. B., M. A .....	175
Campbell, Prof .....	71
Dale, T. Nelson, M. A .....	69
Douglas, W. A., B. A .....	58
Ellis, W. H., M. A., M. B.....	204, 214
Houston, Wm., M. A .....	61, 188
Hutton, Prof .....	17
Johnson, A. S., M. A .....	26
Kingsford, R. E., M. A .....	149
Lawson, A. C. ....	115
Livingston, J. A. ....	147
Matthews, P. W. P., LL.D. ....	181
Macdougall, Alan, F. R. S. E., M. Inst. C. E .....	57
Roche, F. J., M. A .....	190
Rosebrugh, Dr. A. M.....	177
Rouse, M. L.....	92
Stupart, R. F.....	95
Williams, J. B.....	142
Wilson, Dr. D. ....	191
Workman, Dr. Joseph.....	80

## INDEX TO PAPERS &c.

	PAGE.
Aboriginal Women, Early Development of .....	181
Aerial Navigation .....	57
Air Telegraph .....	177
Analogy between Consonants and Musical Instruments .....	92
Ancient Celtic Art .....	191
Archaeological Outlook .....	1
By-laws .....	80
Campaign of 1815 .....	149
Canada, Mound-Builders in .....	131
Celtic Art, Ancient .....	191
Civilization, Savagery in .....	129
Classical Notes .....	17
Cloves, Tannin in .....	214
Coal, Mechanical Value of .....	82
Community, The Village, in Modern Politics .....	61
Consonants, Analogy between, and Musical Instruments .....	92
Convertible Securities .....	147
Destruction of Wild Animals .....	142
Early Development of Aboriginal Women .....	181
Eskimo of Stupart Bay .....	95
Etruria Capta .....	71
Exchanges, List of .....	216
Fishery Question .....	175
Foliation, Gneissic .....	115
Food-Plants of Platysamia Cecropia .....	211
Gneissic Foliation .....	115
Habit, Law of .....	26
Hypnotism .....	80
Iron in Saline Solutions .....	190
Marble Island .....	192
Mechanical Value of Coal .....	82
Mound-Builders in Canada .....	131
Musical Instruments, Analogy between Consonants and .....	92
New England Upper Silurian .....	69
Navigation, Aerial .....	57
Phonetic Spelling .....	188
Platysamia Cecropia, Food-Plants of .....	211
Regulations .....	74
Rent, A Criticism .....	58
Report, Thirty-seventh Annual .....	204
Savagery in Civilization .....	129
Stupart Bay, Eskimo of .....	95
Tannin in Cloves .....	214
Village Community in Modern Politics .....	61

PROCEEDINGS  
OF  
THE CANADIAN INSTITUTE,  
SESSION 1886-'87.

---

FIRST MEETING.

First Meeting, Saturday, 6th November, 1886, the President in the Chair.

The following donations were announced to Nov. 6th, 1886 :

1. Dominion Church of England Temperance Journal, Vol. I, Nos. 1-7.
2. Report of the Second Hudson's Bay Expedition, Lieut. A. R. Gordon, R.N., with Charts.
3. Report on Canadian Archives for 1885, by Douglas Brymner, Archivist.
4. Annual Report of the Superintendent, Toronto Water Works, for 1885.
5. Report of the Entomologist, Canada, 1885, James Fletcher, F.R.S.C.
6. Phenomena of Suggestion in Hypnotic Sleep, &c., by Giuseppe Seppilli, translated by Dr. Workman.
7. The Origin of Languages, by Horatio Hale.
8. Algonkin Forest and Park, by A. Kirkwood, Esq.
9. The Educational System of Ontario, 1886.
10. Quaritch's Catalogues, Nos. 367, 368, 369.
11. Edinburgh Astronomical Observations, Vol. XV., 1877-86, Star Catalogue.
12. Bergens Museums Aarsberetning, for 1885.
13. Ward's Natural Science Bulletin, May 1, 1886.
14. Appleton's Literary Bulletin, Nos. 45, 46, 48.
15. Report of Third International Geographical Congress, Venice, 1881, from G. M. Wheeler, Capt. Engineers, U. S. Army (2 copies).
16. Bibliotheca Americana, for 1886, from R. Clarke & Co., Cincinnati.
17. Powdered Anthracite and Gas Fuel, from the Lackawanna Institute.
18. Indiana Historical Society, Pamphlet No. 2.

The following summary of Exchanges since the last Annual Meeting, 1st May, 1886, was presented :—

Exchanges--America .....	251
“ Europe .....	601
“ Asia and Australasia .....	50
“ Africa .....	16
	<hr/>
	918
Same period last year .....	617
	<hr/>
Increase .....	301

On motion by Mr. James Bain, seconded by Mr. J. Herbert Mason, it was resolved: “That this General Meeting authorize and empower the Council to mortgage the land and premises of the Canadian Institute, situate at the corner of Richmond and Berti Streets, Toronto, for a sum not exceeding \$1,000, upon such terms and conditions as to time or times of payment and rate of interest as to the Council shall seem expedient, the sum so raised to be expended by the Council in fitting up the upper story as a Museum, and in necessary additions for the use of the Institute.”

On motion by Mr. J. H. Pearce, seconded by Mr. J. C. Dunlop, it was resolved: “That the President, Hon. G. W. Allan, Dr. Ellis, Prof. Wilson, Prof. R. Ramsay Wright, J. Herbert Mason, the Secretary, the Treasurer, and the mover, be a Committee for the purpose of devising ways and means for raising funds to complete the building, to report at a future meeting.”

#### ANNUAL CONVERSAZIONE.

A Conversazione was held in the Library on the evening of Friday, 12th November, 1886, when the President, W. H. VanderSmissem, M.A., read his Inaugural Address.

After returning thanks for his election, and referring to some of his distinguished predecessors, such as Sir Wm. Logan, Gen. Sir Henry Lefroy, Rev. Dr. McCaul, and Dr. Daniel Wilson, the Address continued as follows:—

#### THE PRESIDENT'S ADDRESS.

The aims and object of the Canadian Institute are succinctly defined in our Constitution as “The Promotion of Pure and Applied



Science." Let us then enquire, first, why science should be promoted at all, and secondly, whether and how this Institute has been and is promoting it, and how its activity in this matter may and ought to be extended in the future. It should not be necessary, at this advanced date, and in this city, which is fond of boasting of its enlightenment and intellectuality, to defend the claims of science to public sympathy and support, but unfortunately the history of the Institute and its struggles abundantly shows this necessity. Yet nothing is more plain than that science is the greatest promoter of the material well-being, at least, of the human race. Without it no bridges can be built, no public works carried on, no increased facilities for traffic or intercommunication are possible. The musical instrument maker cannot dispense with the labours of the adept in the science of sound, which is itself founded on pure mathematical laws; the public health is directly dependent on the aid of chemistry and biology.

The application of science to practical results is, of course, impossible without pure science. Pure science is the foundation of applied science; and if the former be not properly fostered the latter will infallibly languish.

But pure science, if we except the mathematics, which rest on self-evident truths, is built upon experiment and investigation. Wherever science is cultivated, she has an army of indefatigable investigators in every portion of her wide domain, engaged in laborious and minute researches into the various manifestations and phenomena of nature in her various forms.

Investigation, however, is not in itself sufficient. Laborious Wagners may go on forever adding to the heap of our knowledge, and may catalogue them and lay them out, as Goethe said of the scientific men of his youth, in different lots and parcels, giving to each a name; the world is but little richer for such knowledge as this. This is but *knowledge*; to make it *science*, the dead bones of the heap must be clothed with living flesh and breathed upon by a life-giving spirit. The investigator, indispensable though his labours be, must be followed by the philosopher. The highest type of the scientific man must have the qualities of the poet, the maker, the creator—the very noblest powers of the intellect. What Shakespeare, Dante, Goethe are in literature, he must be in science.

Of him we may say what Goethe says of the poet, that

When nature winds her endless threads along  
 The spindles, heedless how they cross or tangle,  
 When all created things, a jarring throng,  
 In chaos intermingling, clash and jangle,  
 He parts them till each living fibre takes  
 Its ordered place, and moves in rhythmic time,  
 And in the general consecration makes  
 Each unit swell the symphony sublime.

He reveals to us the macrocosm, and shows us :

How all things live and work, and, ever blending,  
 Weave one vast whole from Being's ample range.  
 How powers celestial, rising and descending,  
 Their golden pitchers ceaseless interchange,  
 Their flight on rapture-breathing pinions winging,  
 From heaven to earth their genial influence bringing,  
 Through the wide sphere their chimes melodious ringing.

Like the archangels, he

On the floating forms of earth and sky  
 Stamps the fair type of thought that cannot die.

\* \* \* \* \*

Assuming then that the promotion of science, both pure and applied, is a desirable object, I shall now endeavour to show that this Institute has faithfully pursued this object in the past, and is still pursuing it in the present. With a view to investigating the question of our past activity, I have taken the trouble of examining the published "Proceedings of the Institute," from their inception in 1852, and I find that in both branches of science, in the field of the patient investigation and accumulation of facts, as well as in that of philosophical deduction and induction, the Institute, in its Journal, has a high record. Here are to be found investigations, more especially into the geology of our own country, in the labours of Sir Wm. Logan and Professor Chapman, into its archæology and philology by Prof. Wilson, Sir J. H. Lefroy, Rev. Charles Dade and others, including two native Indians, Francis Assiginack, who described the language and customs of the Ottawas, and Oronhyatekha, who treated of his own Mohawk language; in mathematical and physical science we have the brilliant papers of Professors Young and Loudon, which have attracted considerable attention; in the domain of classical archæology, Dr, McCaul contributed those remark-

able interpretations of Britanno-Roman inscriptions which, even before their publication as a separate work, gained for him the position of the first English scholar in classical epigraphy.

\*            \*            \*            \*            \*            \*

The chief use of the Journal has been to disseminate the views and investigations of our members by means of exchange among the members of the various learned societies of the world. The societies with which we are thus connected extend over the whole civilized world, including not only every country in Europe, but India, Japan, Australasia, and South and Central as well as North America. Publication in our "Proceedings" ensures a hearing for the author of a paper wherever scientific men are gathered together; and the Institute may therefore claim that it has in the past fulfilled honourably, with small means at its command, its pretensions to be an institution for "the promotion of pure and applied science," as far, at least, as dissemination of knowledge is concerned. Nor has the Canadian Institute ever been narrowly local, or shown any jealousy of kindred institutions in other parts of the country. It has, on the contrary, more than once extended a helping hand to its weaker or younger sisters, and has encouraged individual workers in all parts of Canada to come forward with the results of their investigations. Thus, in the columns of the *Canadian Journal*, there were published in 1855 the proceedings of the Quebec Literary and Historical Society and of the Montreal Natural History Society, though both were older societies than our own, the former established in 1834, the latter as early as 1827, or more than twenty years before the first inception of the Institute. Again, in the volumes of the Journal throughout will be found papers contributed from all parts of Ontario, as well as from the neighbouring province. So far as the promotion of pure science, then, is concerned, it may safely be asserted that the Institute has done its fair share. How stands the matter with regard to applied science, the handmaid through whom pure science confers her most immediate benefits on mankind?

A further enquiry into the past history of the Institute will show, as to this point, that the members, individually and collectively, have constantly been alive to all questions of public moment, whether affecting this country as a whole, or only the city in which the Institute is situated; and this most effectually in two ways, viz., (1)

by the reading, discussion and subsequent publication of various memoirs or papers, and (2) by memorials presented to the Government of the province, or provinces, in support of various public institutions of a scientific character.

I.—PAPERS.

In the very first volume of the *Canadian Journal* will be found a series of able articles, copiously illustrated, on that most practical of subjects, the harbour of Toronto, by Mr. Sandford Fleming, Mr. Kivas Tully, and others. In the same volume is a paper on Toronto's water supply, a subject which has constantly engaged the attention of the Institute, and still continues to do so. Certainly no subject is of more direct importance to our fellow-citizens than this, and I am persuaded that the publication in the daily press of papers read before this Institute from time to time on this subject has been of great advantage to the civic authorities in deciding upon this vexed question, as well as on that of the disposal of our sewage. I believe that even more can and will be done in this direction, to the great benefit of the public. Continuing the examination of our past work, I find in Vol. I. again Mr. Kivas Tully suggesting plans for the improvement of our Esplanade, and Prof. Cherriman advocating, as early as 1853, the adoption of the decimal currency; in Vol. II. there appears the first geological map of Upper Canada, by Mr. (afterwards Sir) Wm. Logan, our first president; and Dr. Cottle gives an account of Canadian silk-producing moths—a subject to which the present chairman of our Biological Section, Dr. Brodie, has devoted further unwearied and valuable investigation.

In the third volume, 1855, I again find a practical paper by Dr. Bovell on the best modes of dealing with the terrible scourge of cholera, the first of a series of communications on public health which have been presented to the Institute from time to time, concluding, for the present, with the contributions of Drs. Oldright, Bryce, and Ellis. In the year 1870 a member of this Institute, Mr. Andrew Elvins, anticipated by at least two years the labours of other astronomers and meteorologists in investigating the connection of sunspots with rainfalls, as well as with other meteorological elements, and the result of his investigations seemed to hold forth some prospect of establishing such a connection between these natural phenomena as should ultimately enable the meteorologist to predict

for some time beforehand extraordinarily wet or dry years with some approach to certainty. The great practical benefit of such a prediction to a country so much interested in agriculture as our own will be plain to everybody; and I call attention here to the fact of Mr. Elvins's right of priority, because it has not been properly acknowledged in all quarters. In one quarter only has such acknowledgment been made, viz.: in Prof. S. F. Baird's "Annual Record of Science and Industry" for 1871. That Miss Clerke, in her lately published "History of Astronomy," should have overlooked this matter is, perhaps, not altogether surprising; but that Prof. Norman Lockyer, whom Mr. Elvins kept constantly informed as to his investigations, should have entirely ignored his claims to priority, and have given all the honours to Mr. Meldrum, of Mauritius, is, to say the least, unpleasantly remarkable. The fact that, for some reason unknown to myself, Mr. Elvins's results were never published in the *Canadian Journal*, has no doubt been the principal cause of this want of acknowledgment. Ill-health has for many years suspended Mr. Elvins's labours, but I am glad to say that, this cause being for the present happily removed, we may look for further valuable results from their resumption.

#### II.—MEMORIALS.

The selections I have just presented from the subjects of Papers read before this Institute abundantly prove that the members have always been in the habit of doing a good deal of pretty hard thinking on subjects of the most practical kind, and so contributing to the solution of problems of the greatest interest to the public; and a consideration of the number and nature of Memorials presented to the Canadian and Provincial Governments by the Institute from time to time will show that they were men of action as well as of thought, who were wide enough awake to give effect to their ideas, since we find that, in every instance but one, the memorials were successful. In the decade from 1853 to 1863 alone I find no less than five of these successful memorials recorded in our "Proceedings," as follows:

1. Up to the year 1853 the magnetic observing station at Toronto had been carried on at the expense of the Imperial Government, and under the direction of officers of the Royal Artillery. In this year, however, the observatory was about to be discontinued. Capt. (now

Gen. Sir Henry) Lefroy, at the time president of the Institute, was recalled, and the removal of the instruments had, I believe, already been begun, when the Council of the Canadian Institute came forward and represented to the Canadian Government the great loss which the country would sustain by the discontinuance of this long established observing station, urging its retention as a provincial institution, the purchase of such instruments as had not already been removed and of additional apparatus, and the extension of the station for meteorological purposes. All this was acceded to by the Government of the day, and the outgrowth of it is our present efficient Observatory in the Queen's Park.

2. In 1856, when the discontinuance of the Geological survey was contemplated, the Institute again memorialized the Government for its continuance as a permanent organization, and again its advice was not only listened to with respect, but followed in full.

3. In the following year, 1857, Professor Kingston presented before the Institute a scheme for utilizing the telegraph system of the country for the foretelling of storms, which was the foreshadowing of the present signal service. The Institute gave instant adhesion and support to his scheme by urging its adoption upon the Government, and it was adopted. With its present working and value every reader of the morning papers is familiar.

4. In the same year the Institute, with the same success, urged upon the Government the establishment of the Astronomical Observatory at Quebec, thus showing that it was truly Canadian, and watchful of the interests of science in every part of the country.

5. Early in the year 1862, the Institute urged upon the Government a proper representation of Canada at the Great Exhibition of that year, and again with success.

6. The recent memoirs of Mr. Sandford Fleming on the adoption of a system of uniform time were not merely allowed to repose in the receptacle of the Journal, but the Institute took immediate steps to bring this matter, through the medium of our then Governor-General, the Marquis of Lorne, and the Canadian and Imperial authorities, before the notice of the various Governments of Europe and America, and the principal learned societies in those countries. The practical value and importance of Mr. Fleming's suggestions were at once recognized in many quarters. Thus, in Spain, the officer who had

been delegated by the Government to devise some system of uniform time for the purposes of navigation presented a translation of this memoir as a complete solution of the difficulty. On this continent the adoption by American railway systems of the standard time belts, with the practical convenience of which every traveller is familiar, is largely the result of these papers, and I feel that we may with confidence look forward to the ultimate adoption ere long of the greater scheme of uniform time for the world.

7. In the course of last year a deputation, appointed by our Council, waited upon the Government of Ontario, and urged upon them the desirability of protecting such monuments of prehistoric times as are still to be found within the provincial boundaries, as, for instance, the mounds on Rainy River and others, and of encouraging and assisting in the collection and preservation of the fast vanishing relics of the Red Man. I cannot say of this application, as I did of the others, that it has as yet borne fruit; but let us hope that the next President may be able to record its complete success.

I trust that the foregoing sketch of the past history of the Institute will have sufficiently established its claim to have done good work for the promotion of pure and applied science, as well as the direct and indirect benefits conferred on the public by this work. I come next to the question of our present condition, and in the first place let me say that there is great reason for congratulation. The attendance at the meetings and the interest taken in the various subjects under discussion show a considerable and steady progress. The number and character of the papers read during the last session are highly satisfactory, and the prospects for the ensuing session very encouraging. Even at this early date the number of papers promised will more than fill every evening, and it may be confidently affirmed that our published "Proceedings" will be more varied in range of subjects, and perhaps more thorough in character, than ever before. The accession of new blood by the incorporation of the Natural History Society has already produced greater activity and enthusiasm in our institution. The creation of the new class of associates, consisting of young men, for the most part earning their daily bread in mechanical and commercial pursuits, is another pleasing feature which cannot fail to be of benefit to the youth of this city. The membership, though not largely increased, at least yields a larger income in pro-

portion to its apparent extent than was the case in former years. The balance sheet has at the first glance a pleasant look, since income and expenditure are duly equalized, and our assets are greatly in excess of our liabilities. But let us enquire more closely into the last item. Has our expenditure been what it ought to have been, so as to promote to the limit of our obligations the interests of pure and applied science? It is true that our financial condition is better than it was five or six years ago; but is it as good as it can and ought to be made? In order to answer this question, let us recur again to the means by which a scientific institution ought to promote the cause of science, and inquire whether in any department we have been cramped so as to impair our efficiency. These means of aiding science may be arranged under four heads, viz. :—1. The Published "Proceedings;" 2. The Library; 3. The Museum; 4. Public Lectures. Let us consider each of these items by itself:

#### I.—THE PROCEEDINGS.

The expenditure on this item forms a very large proportion of our total outlay, but it will have to be much larger in the future, if our deliberations are to be of any value, either to the world at large or to the investigators who contribute papers. I have dwelt above on a case in which priority of investigation on the part of one of our members has been ignored through failure of publication in the *Journal*, and it will be plain to everyone that no observer will care to contribute to a society which allows a year or more to elapse before the results of his investigations are sent forth to the world. Publication, however, is a costly thing, especially prompt publication; the cost will increase with the number and importance of our communications, and the Government grant to the institution for this purpose is even now no longer equal to what ought to be our expenditure.

#### II.—THE LIBRARY.

The Council has long since wisely abandoned the attempt to create a scientific library by the purchase of works as they are issued from the press, and our present efforts are confined to the incorporation in the library of the transactions of scientific societies which we receive in exchange for our "Proceedings." These, regularly bound, form a consulting library in every branch of science of inestimable value to the student; but the large increase in the number of our exchanges,



to which I have called attention above, renders the cost of binding much heavier than before, and is a new and heavy drain upon our limited resources.

### III.—THE MUSEUM.

The educational value of public museums is so evident that I need not enlarge upon it. In the past history of the Institute many valuable and interesting specimens have been presented to its museum, both biological and archæological, but a great portion has disappeared, simply because we have been too poor to house them. At the present juncture there are awaiting us renewed gifts of very great value, which may be lost to the Institute and public for the same reason, unless vigorous measures are at once adopted. Some provision we have already made in this direction, and some further provision can be made without seriously increasing the load of our obligations. But if our museum is to be one worth visiting, it should have an income independent of that derived from members' fees. The mere collection of specimens, I may add, does not fulfil all the needs of a good biological museum. It should be supplemented by the purchase of a microscope of the best pattern and highest powers. Such an instrument, available to public use, is not to be found in the city of Toronto; yet it is indispensable for the purposes of applied biology and chemistry, for the proper examination of organic bodies, and for the study of disease germs. The cost of such a microscope is about \$500. I am happy to be able to state that, through the efforts of Mr. J. H. Pearce, one of our most active members, the sum of \$60 for this object has already been collected.

### IV.—PUBLIC LECTURES.

The inestimable value of free courses of public lectures, particularly to young men engaged in winning their bread by laborious toil, hardly needs a word of comment. Why should we not have such courses in Toronto as the Somerville lectures, for instance, at Montreal, held in connection with the Montreal Natural History Society? The Canadian Institute would be only too glad to provide this kind of public instruction. But again the answer is: "No funds!" Omitting the cost of publication, which we may fairly expect to defray from our present resources, our needs may be summed up as follows:—

1. The finishing of the library, and increased income for necessary expenses of binding, &c., connected therewith.

2. The fitting up of a museum, and a sufficient annual income to allow of the continuous purchase of specimens. The former we can accomplish, for present needs only, by fitting up the third storey at a cost of about \$1,000; but it is highly desirable that we should be able to build an addition in the rear, where the museum would be less cramped and more accessible. For its proper maintenance we require an additional income of at least \$500 per annum.

3. The endowment of courses of public lectures, and the building of a large lecture-room, fitted up with the proper apparatus. The sum required for this will be large: the proposed lecture hall would cost from \$4,000 to \$5,000, and a considerable annual expenditure would be necessary.

I think it will be evident from what I have just said that we are still, in spite of the improvement in our financial condition, much cramped in our promotion of science from want of adequate means.

The remainder of the address was taken up with suggestions, (1) as to possible sources of increased revenue in the future, (2) as to the extension of the influence of the Canadian Institute by the formation of branch societies in other parts of the province, and the affiliation of the various scientific associations among the students of University College.

---

## SECOND MEETING.

Second Meeting, Saturday, 13th November, 1886, the President in the Chair.

Exchanges since last meeting, 42.

The following donations of Eskimo implements, dresses, and other objects of interest from Prince of Wales' Sound, by F. F. Payne, Esq., were announced:

- 1 Cannon found on the shore of Prince of Wales' Sound.
- 2 Model Kayaks.
- 1 Stone Lamp.
- 1 Stone Kettle.
- 1 Woman's Dress.
- 2 Men's Coats.

- 1 Boy's Coat.
- 1 Pair of Trunk-hose.
- 1 Arctic Fox Skin.
- 1 Coil of Rope.
- 2 Pairs of Boots.
- 1 Duck Spear.
- 2 Whalebone Duck Traps.
- 1 Snow Shovel.
- 1 Pair of Snow Goggles.
- 1 Pair of Deerskin Mitts.
- 1 Eskimo Snow Knife, used in building houses.
- 1 Snow Duster, a stick carried by women to knock the snow off men's dresses.
- 1 Ivory Set of Eskimo Dominos.
- 1 Powder Measure, 1 Harpseal Skin, 2 Thimbles, and some small ornaments.

By Lieut. A. R. Gordon, R. N. :

A Sleeping Bag from Hudson's Bay.

By H. S. Howell, Galt :

A large Photograph of the keys of the Bastille, Paris.

By Prof. R. Ramsay Wright :

A Lamp.

By the President :

A Reading Desk.

Moved by Mr. Shutt, seconded by Mr. Elvins, and carried : That the thanks of the Institute be tendered to Messrs. Payne, Gordon, and the other donors for their valuable gifts to the Institute.

The following were elected members:—C. F. Durand, B.A., I. E. Martin, B.A., F. F. Payne, E. J. Kendail, G. B. Abrey, C. E., Benjamin Bayliss, jun., J. Robinson, M. D., Rev. Prof. Ferguson, William Burns, B.A., C. Fessenden, B.A., Horatio Hale, H. S. Howell, Prof. J. Hoyes Panton, Rev. John McLean, B.A., John Scath, B.A., Hugh Neilson, J. T. B. Ives, F. G. S.

Moved by Dr. Kennedy, seconded by Mr. Alan Macdougall, and carried : That a vote of thanks be tendered to the President for his interesting and instructive inaugural address delivered last night at the *Conversazione*, and that that part

of the address containing suggestions for new sources of income be referred to the Committee on Ways and Means appointed at the last meeting, and that the other suggestions of said address be referred to the Council.

Mr. W. F. W. Creelman, B.A., read a paper on "The Relations between Physiology and Psychology," of which the following is an abstract :—

The object of this paper is not the inculcation of any new theory, or of any definite theory, with regard to the relation that might be supposed to exist between what are ordinarily called Mind and Body, but rather a brief explanation of the course Philosophy has taken of late in the investigation of that relation, or of the general question as to whether any such relation in reality exists.

The question, from the point of view from which it is here considered, may be said to have recently arisen. Its importance was indeed recognized by the astute and polymathic Aristotle; but his investigations were crude, and neither they nor those of the thinkers and investigators of many succeeding centuries throw any light upon the problem as it is now understood in England, Scotland, France, Germany and America.

The advance in the study of the relation between Mind and Body has been one from abstract to concrete; from a study of the two sets of faculties (if we may so speak), commonly called mental and physical, as if those two sets of faculties were entirely independent, and should be treated as independent, to a study of them as exhibiting dependent, connected construction, and as throwing light upon one another mutually.

The four various theories which have been held with regard to the relation between the sciences which deal with the phenomena of Mind and Body respectively are set out in a work on "Mind and Body," by Prof. Alex. Bain, whose whole philosophy may be said to be the elaboration of a fifth position, that "a knowledge of the bodily workings has already improved our knowledge of the mental workings, and as the researches are further continued, will do so more and more."

That there is some mutual co-operation between the two natures—mental and physical—can now be assumed without argument. How intimate is the mutuality found to be?

It must be remembered that the brain is not the only substance having connection with mental functions. The entire bodily system shows such connection, though "in varying degrees."

The proof derived from the facts showing the completeness of the connection between the two natures is overwhelming. Bodily changes affect mental states; the condition of the stomach, the brain, or the nervous system shows its effects in the mental tone or condition, and affects not only the sensational part of man, but also the emotional, the moral and the æsthetic. And mental changes in their turn react upon the whole bodily organism; sorrow and fear show their effect no less upon the nervous system than upon digestion.

How readily do our emotions express themselves! And how close is the connection between them and their expression! Darwin tells us that they are so closely connected with their expression, that they hardly exist if the body remain passive.

And does not the capacity for thought, the rapidity or sluggishness of thought, depend upon both the quantity and the quality of the blood supplied to the brain? And does there not here display itself the dependence of our higher life upon the healthy tone of the stomach, and of the purifying and other organs connected with it?

Lengthened reference cannot now be made to the light thrown upon this question by investigations into disease and lunacy. Physicians now deal with Mind and Body as a practical unity. They are, avowedly or not, materialists.

The Mind is ordinarily dealt with as having a three-fold aspect—Feeling, Will and Thought—the mental trinity in unity. A separate consideration of these shows clearly their dependence upon bodily conditions and organisms.

The direct dependence of Feeling, and of feeling in its variations, upon bodily conditions and changes, need not be considered; only through the bodily medium can it be conceived as possible.

With regard to the Will, whatever may be our accepted theory with regard to the growth of volition, it is incontestable that the development, and manifestation, and direction of will, are all dependent upon bodily stimulus, acting through the nerves and nerve-centres, and thence outwardly upon the organs which the will may be said to use as its instruments.

Coming to the Intellect, we find it manifesting itself in various modes, called memory, imagination, reason, etc. Might it not appear that here at least we have risen above the physical encumbrances which surround the lower manifestations? Let us briefly examine two of what the Scottish philosophers would call "faculties," and see how far memory and imagination are independent of bodily conditions and changes. The philosophers referred to treated these mental states as God-given faculties, independent altogether of bodily influence. This was the only consistent position open to them. But their theory is now but seldom heard of, except through the still small voice of Dr. McCosh, of Princeton?

What we are concerned with here is not an analysis of Memory in the abstract, but the pointing out what may be said to be an incontrovertible fact, that the commencement of acquisition, the rules of acquisition, and the use of acquisition and recollection, are all directly, if not entirely, dependent on bodily states and organisms. The content of memory is but those impressions and feelings whose existence is dependent upon nervous action, and but represents the great mass of our nervous growths and nervous combinations. When a feeling or impression is renewed, what is its seat? Beyond a doubt, the renewed feeling occupies the very same parts, and in the very same manner, as the original feeling, and no other parts, and in no other manner, that can be assigned. The seat of the memory of an impression is the seat of that impression in its origin. Thus the persistent memory of a bright color fatigues the nerves of sight. There is no one seat of memory; but each memory has its own seat, appropriate to its character. Indeed, as has been said, there is no such thing as memory, but only memories. "Every tract of nerve tissue is its own autobiographer." Memory is not, as the vague phrase of common speech has it, "in the soul"; it is fixed in its birthplace, in the nervous system. Ribot may, after all, be right in saying that a well-stored memory is but a collection of impressions and of an assemblage of "dynamic associations," very stable and very readily called forth.

The pathology of memory is interesting here, mainly as shewing how subject is memory to the fundamental conditions of life, and to the varying condition of the bodily organism. Reference may be made to the many examples given by Ribot; one of the most curious of which, in this connection, is that of a Frenchman, living in

England, who spoke English fluently, but who, receiving a blow on the head, during his illness was able to answer questions only in French.

So with Imagination. We find that imagination differs from sensation in little but the recalling of past impressions, either in the same order, or in a different order, from that in which they appeared when actually present to the senses; so that with regard to the imagination it is not necessary to recapitulate the reasons indicated for the conviction that the pictures recalled depend as much upon action of the nerves and other bodily functions, as do the contents of the faculty, so called, of memory.

The moral sphere cannot be here considered at length. But this statement may be advisedly made, that the constituents of our moral being depend almost entirely upon our bodily organism. One instance only will be given of the influence of bodily changes upon the moral character and conduct of an individual. It is that of an officer in the United States army, who during the late war was noted for his dash and bravery in many battles, but who, being once knocked down by the concussion produced by a cannon ball, became from that hour as noted for cowardice as he had formerly been for bravery, and could never again be induced to go into a battle, or to resume his military career.

The question under consideration has assumed increased importance in connection with the comparatively-new, but firmly-established doctrine of Heredity. This doctrine assumes the fact of the transmission from generation to generation of both mental and physical tendencies, and of these in conjunction with, and dependent upon, one another, handed down through a progressive development of the nervous system. To understand the possibility of improvement from age to age, we must understand, in its "subtle materialism," this principle which makes transmission possible, this principle which plays upon the nerves of men, and makes them its instrument for the storing-up of power for future use, accumulation and development. It is this which makes possible the growth of civilization from age to age, which explains that element of good or evil in man, which no surroundings, no education, can entirely eradicate or overcome. It is thus that the sins of the fathers are visited upon

the children unto the third and fourth, and many generations, and thus that the doctrine of "original sin" acquires an intelligible interpretation.

A brief reference may be made to the phenomena of dreams, which have presented so puzzling a problem to thinkers of former times. Of all the absurd hypotheses framed for the explanation of subtle mental processes, none were more absurd than those framed to explain the phenomena of dreams. More light has been thrown upon them by the principle of the universal connection of the bodily organs with mental workings than by all previous theories together. In fact, without it dreams are unintelligible. Every person is familiar, in his own experience, with the stirring-up of imaginary pictures during sleep, connected with various parts of the body, and caused by disease, irritation or injury in the part interested. If the material of memory and imagination is given by bodily movement and modification, why not also that of dreams, which differs only in arrangement? If, during sleep, the falling of a poker, the rolling out of bed, the flicker of a candle before the eyelids, the sound of a voice, the smell of sulphur, or the taste of acid in the mouth, can call up, as they undoubtedly do, all sorts of clear or obscure images and scenes, why may not the whole of those images and scenes be connected with bodily organism? If sensation and nervous affection, irritation and combination, can cause so much of the content of dreams, why not all? Why seek a supernatural cause to explain what is capable of explanation by natural laws?

A few words may be allowed upon the practical importance which this question, rightly understood, assumes.

We have seen the importance of a due consideration of the relation now dealt with, in the study of medicine, and particularly in the study of lunacy. In these, rapid advance has resulted from a reversal of method, and the study of body and mind hand in hand. Hence, too, the light which has been thrown upon the question as to what has been called "moral insanity," and the wider question as to Responsibility for Crime.

We see, too, the influence of a correct theory, in this direction, upon Education. As the possibility of all education is based upon the existence of the power which the nervous system possesses of organizing conscious actions into more or less unconscious reflex operations, we see, in view of what has been said as to the influence



upon the ability to acquisition, of the healthy state of the nervous system, of blood circulation, and of nutrition, how important is equal attention, in education, to health and strength of body and mind.

And we can appreciate more and more, from the position of a correct understanding of this relation, the influence upon health, that is, upon mental and bodily strength, of scientific sanitation, and, what may not be so manifest, its influence upon morality. The London Commissioners pointed out, a few years ago, that the tendency in the lower parts of London to gin-drinking was owing mainly to the depression of the physical system caused by impure atmosphere. The teaching and practice of temperance philanthropy are not yet sufficiently scientific.

Nothing could be of greater importance to the practical purposes of life than a just apprehension of the influence which the body exercises over the conceptions of the mind. *Orandum est ut sit mens sana in corpore sano.* Happiness is the chief good of man. And the highest happiness has as its most necessary condition such a state of physical and mental health as will allow a free field for the exercise of the highest powers which we possess.

\* \* \* \* \*

No theory is here given as to the exact relation that exists between Mind and Body. What it has been attempted to urge and illustrate is, that the mind and body can only be thoroughly understood when studied together, as correlatives or complements, and that Psychology and Physiology can only surely advance when they advance hand in hand.

There is not room here to trace the history of the growth of the recognition of some connection between mind and body, however variously dealt with and explained, from its first crude acknowledgment down to the later developments, which have been in the direction of materialism, though a modified materialism, somewhat short of the position which one writer says is the prevailing one, that mind and matter, the two sets of properties, are but one substance with two sides—a double-faced unity.

Materialism came as a reaction wherever it appeared. And reactions run to extremes. Locke's doubt as to the materiality of the soul, while it woke Kant from his "dogmatic slumber," and thus produced the most profound system of philosophy yet elaborated, on

the other hand drove Hume to speak of "that little perturbation of the brain which we call thought." In France, as a reaction, came, among many, La Mettrie, with his clever and vivacious work on "Man a Machine," in which an attempt was made to explain the workings of the human mind on principles similar to those involved in the mechanism of clock-work. And in Germany, where transcendentalism soared to its loftiest heights, materialism fell the lowest, so that Hartmann can calmly say that "Man is what he eats."

But these positions have been extremes. Between them there have been the many who recognize that materialism cannot be ignored, and that the mind and body must be studied together that either may be perfectly known. And where formerly the teaching of philosophy began with the abstract consideration of the mental "faculties," or powers, the basis is now laid in a knowledge of those physiological conditions which render all knowledge possible, and which furnish the material of all we know.

Some writer has well characterized the later tendencies in this direction in the statement, that while the problems which presented themselves to Hartley and Priestly, to Berkeley and Hume, are the same which present themselves to Bain and Calderwood, to Darwin and Spencer, yet they present themselves to the latter in the light of an advanced physiology.

The President, on behalf of Rev. John McLean, B.A., Fort McLeod, Alberta, N.W.T., read the following paper on

#### THE MORTUARY CUSTOMS OF THE BLACKFEET INDIANS.

The Blackfoot Confederacy comprises three tribes, Bloods, Piegans and Blackfeet proper. Though now separated by means of different reservations, their customs and language are the same, the latter having a few dialectic differences. By studying the mortuary customs of one tribe, we learn those belonging to the confederacy, but in order to secure uniformity, our studies must have reference to the time preceding the overpowering influences of the civilization of the white man.

Three modes of burial have been practised by these Indians: platform or tree burial, lodge or house mode, and underground.

In the tree mode of burial a large tree of suitable proportions and location is selected, and the body is placed in one of its crotches, safely lodged from the depredations of wild animals, the covering of the corpse protecting it from the ravages of carnivorous birds.

On the plains the platform method is adopted through scarcity of timber, and even when in the vicinity of the timber patches that line the rivers, many prefer platforms to trees, this preference arising, no doubt, from long usage.

The platform method consists of four posts firmly placed in the ground, at a sufficient distance from each other to make a suitable platform upon the top as a receptacle for the corpse. The posts are from eight to twelve feet high. The body being properly prepared for burial is laid on this platform, and beside it the prized treasures of the deceased, together with the gifts of friends.

When a chief or notable warrior dies, a lodge is placed on an eminence or secluded spot, and the influential leader of his people is honoured with this conspicuous style of burial. As the buffalo-skin lodges are no longer in existence, many of the people are erecting small log buildings over the remains of their relatives, and these are used indiscriminately for young and old, male and female. Since the advent of religious teachers, the underground mode of burial is being resorted to, and although this detracts from the fascinations of Indian life for the students of American antiquities, it is preferable for the advancement of the red race. Button Chief, a famous Blood Indian chief, although adhering strongly to the principles of Christianity, said to his friends before his death: "Bury me not in the ground like a white man, I am an Indian. Lay me down as an Indian warrior, and there let me rest."

As soon as a person dies, the females in attendance upon the relatives begin to wail bitterly, and such is the grief of the female portion of friends and relatives that it is very difficult to obtain the body for burial. One or two blankets spread on the ground form the Indian's bed, and just as the deceased lies there, is he prepared for burial. Having been properly arranged, two or three blankets are used as a covering, which, being strongly tied or sewn together, constitute the Indian's coffin. Within the past few years, wooden coffins are being used, although the majority of the people adhere to the Indian mode of arranging the body in death. Well do I remem-

ber when nothing but buffalo robes were used for this purpose, and buffalo-skin lodges were extensively employed for Indian burial. When all the arrangements are completed, the corpse is placed on a *travaille*, the mourners proceed to the grave without any order of procession, the men, women, and children groaning deeply on account of their sorrow. The near relatives cry aloud plaintively, the burden of their funeral wail being the calling upon the deceased by name to return to his home and friends.

In former years horses were killed at the graves of warriors, that their spirits might follow their masters to the hunting grounds beyond; now the religious conservative spirit must yield to poverty and other influences, and the mourners are contented with cutting a part of the hair from the forelock, mane and tail of the favourite horses, and depositing it in the grave. The female relations cut their hair short, lacerate their legs and cut off a finger. The female attendants take the bereaved females, place the hand on a block of wood, lay a knife upon the finger, and with one blow from a deer's horn scraper or other instrument sever it by the first joint. The front parts of both legs from the foot to the knee are then cut with a knife until the blood trickles down and covers the front parts of the legs. No bandages are put on these, nature evidently aiding when art is discarded. A small piece of wood is placed in the palm of the hand having the severed finger, and this serves to keep it in position, after which ashes are sprinkled upon it. Sometimes the relations will visit the homes of their friends, and amid their wailing will go around the lodge kissing the females who weep with them. For several weeks after the funeral, the women go out to the grave at sunset, and again at sunrise, and continue their wailing. Should any persons die while the Indians are travelling and be buried a long distance from home, in after years when passing the grave the female relations will spend some time mourning their loss. The Indians move their camp when anyone dies. After erecting log buildings they kept up this custom and tore down their houses, rebuilding them in some other part of the reserve. Living as they have done for some time in lodges, they still move their lodges when their friends die. This arises from their dread of spirits. This custom has decided physical benefits, as it secures pure air, mental relaxation and exercise. These mourning customs exhibit many pleasant traits of character, and though not at all inviting to persons of

refinement, they are none the less interesting and worthy of study, if we would understand the social customs and native religion of these people. We learn something concerning the *native religious belief* of the Blackfeet from a proper study of their mortuary customs.

Their home of the spirits is the sand hills. A dying Indian will say: "*Nitakitupo sputsikwi*—I am going to die," literally "I am going to the sand hills;" and the bereaved will tell their friends: "*sputsikwi etupo*—He is gone to the sand hills." They believe in the communion of spirits with each other. Their *animistic* ideas are very crude. Spirits dwell in trees, rapids, peculiar stones, and many other strange things in nature. Dreams in which friends appear are the visits of the souls of the departed. These ideas are also transferred to the gifts of friends to the dead. In the grave are placed pieces of bread, meat, newspapers, relics of the deceased, furs, blankets, &c.

Several visits have I made to *dead lodges*, which revealed to me these ideas of object-souls. Entering a lodge that had been opened, I found the corpse lying as in life, wrapped in a buffalo robe. Beside the bed were placed a tin cup, pipe and tobacco, and some pieces of buffalo meat. There were also in the lodge a trunk for travelling with, bow and arrows, an old gun, and numerous Indian trinkets. Introducing this subject among the Indians, I asked why they placed those things for the dead. "For their use," they replied. "Yes, but I have gone months and years after they were placed there, and they still remained." "My friend, you do not understand the Indian's way of thinking. These are spirits, and they live on the souls of these things; we are material, and we live on the matter of these things. When one of our friends dies, we place our gifts beside his body; the spirit of our friend returns, and he brings with him his friends from the spirit-world, and there they feast together. They take with them the souls of these things for their use." The friends of the dead take their own clothes, finger rings, and ornaments and present them as gifts to the dead. In one grave I found buried a saddle, some excellent furs, and many trinkets. In others I have seen placed utensils of all descriptions, and the hair of prized animals. Remonstrating with them at different times for placing these things there and suffering in consequence themselves, they have replied to my question as to why they did not keep them: "What shall we do with them?" "Take them home." "We dare

not, they are not ours, they are *his*, and we cannot steal from him."

They are very superstitious and are afraid of the dead. In crossing dangerous streams in a boat or vehicle of which they know little, they will sing or pray. Passing the graves of their friends they will do the same. Several times have the Indians entreated me not to go home in the darkness, lest the spirits should follow me. Generally the people are restrained by fear and reverence from molesting the treasures of the dead. The pious heathen touches not these things, being sacred to the spirits, and those who are sceptical and immoral are afraid of the consequences of such a daring deed. Seldom do we hear of graves being robbed by the Indians themselves. Many adhere rigidly to their native customs, and follow the traditions of their native religion, yet gradually, and almost imperceptibly, we can notice the change that is taking place. Already when studying American antiquities have we to refer to the past few years to obtain facts to illustrate any Indian subject we may wish to discuss. It is well that this is so, if we hope for the development of the red race. Yet it is our duty to study these things with enthusiasm, for the years are not far distant when the transformation of life will be such as to hinder the lovers of science from obtaining facts illustrative of native customs among the Indians.

---

### THIRD MEETING.

Third Meeting, 20th November, 1886, the President in the Chair.

The Committee on Ways and Means reported, recommending that a canvass be made of the leading merchants and other citizens in this city for subscriptions at an early day, with the view of raising a sum of not less than \$10,000, to defray the cost of the necessary additions to the present building, and for increasing the general efficiency and usefulness of the Institute, which report was, on motion by Mr. Pearce, seconded by Mr. Macdougall, received and adopted.

On motion by Mr. Pearce, seconded by Mr. Bain, it was resolved: That the Committee appointed on the 6th November be further empowered to devise ways and means for increasing the efficiency of the Institute, and have power to add to their number.

Donations since last meeting :

From Messrs. Maisonneuve Frères, Paris :

“Traditions Indiennes du Canada Nord-Ouest, par E. Petitot.”

From H. S. Howell, Galt :

“Kennett's Antiquities of Rome.”

Exchanges since last meeting, 22.

The following were elected members:—J. H. McKinnon, Charles A. Walton, W. T. Jennings, C.E.

W. Houston, M.A., read a paper on “The Scientific and Pedagogic claims of Sociology,” of which the following is an abstract :

After defining the terms “Science” and “Scientific,” he went on to describe the scope of the term “Sociology,” including under it all that relates to the association of living beings together for mutual aid. The general principle of Sociology in this sense is coöperation, as that of Biology is the struggle for existence, and that of Cosmology is conservation of energy. This definition of Sociology would include coöperative associations of the lower animals, but it is convenient to limit the term to human society, and so limited it may be divided into (1) the Science of Civilization, (2) the Science of Government, (3) the Science of Law, (4) the Science of International Comity, (5) the Science of Material Prosperity, and (6) the Science of Language, or, in other words, into History, Politics, Jurisprudence, International Law, Political Economy and Philology. The claim of Sociology to scientific recognition rests partly on the nature of its subject-matter, its phenomena being amenable to scientific treatment; partly on the nature of the method to be employed—the inductive one; partly on the fact that its leading principles, like those of Cosmology and Biology, have been already ascertained and formulated; and partly on the further fact that it is progressive, new discoveries being made as rapidly in this as in any other field of knowledge. The researches in one branch alone, that of comparative politics, by such men as Maine, Morgan, Maclennan, Hearn and others have almost revolutionized, within the past quarter of a century, our views as to the origin and development of political institutions. The claim of Sociology to a prominent place in the curriculums of teaching institutions rests, in the first place, on its

educative value as a means of culture. It brings the student into contact with some of the greatest minds of all ages; it furnishes as good a field as can be had in either Cosmology or Biology for the exercise of the observing and reasoning faculties; it gives breadth of view in matters relating to social life, and teaches toleration; and, lastly, it corrects the tendency alike to exaggerated optimism and to exaggerated pessimism. The pedagogic claim of Sociology rests, in the second place, on the practical character of the various subjects it comprises. Civilization is the result of sociological progress. Portions of its subject matter are such sociological conceptions as those connoted by the terms "family," "property," "juridical institutions," "religious institutions," "civic institutions," "international relations," "socialism," "individualism," "anarchism," "tribalism," "communism," &c. In view of the deep practical interest which the community has in these and other sociological topics, they should be dealt with pedagogically in every part of the State educational curriculum from the primary school to the university.

In answer to a question from Mr. Squair, Mr. Houston replied that the science of Sociology embraced the whole science of Law, as well as Philology and Archæology.

Mr. Kirkland asked if any general principle ran through the whole of the science.

Mr. Houston said the principle was that of coöperation for a common end, which he illustrated by examples taken from the division of labour in the production of manufactured articles.

The President remarked on the many advantages that Canada presented for the study of Sociology, as in the case of Indian languages and archæology. Many of these advantages were passing away. He advocated the necessity of a publication society, as well as other measures for the promotion of archæological research.

C. Fessenden, B.A., exhibited a new Planimeter, the joint invention of himself and Mr. Butler, C.E., and read the following paper:—



## A NEW PLANIMETER.

Mechanical integrators are constructed on the assumption that if a wheel is moved over a smooth surface in the direction of its axis it will slide without revolving; if moved at right angles to its axis it will revolve without sliding, and if moved in any other direction it will both slide and revolve. For example, if it is moved a distance  $l$  in a direction making an angle  $O$  with its axis it will revolve through a distance  $l \sin O$  and slide through a distance  $l \cos O$ .

If the wheel is perfectly turned and truly mounted this assumption is absolutely accurate; and, from experiments that have been made, it has been shown that it is possible to turn a wheel so perfectly and mount it so truly that this assumption shall be verified to within less than one-tenth of one per cent. However, even slight imperfections in the turning and mounting will lead to results far from accurate, and it is therefore of the utmost importance in the construction of instruments for mechanical integration to make the wheel as perfect as possible.

To make an instrument for integrating any quantity it is necessary and sufficient to so arrange its parts that while a tracing pointer is describing a diagram involving the independent dimensions of the quantity the wheel shall revolve through a distance which varies as this quantity.

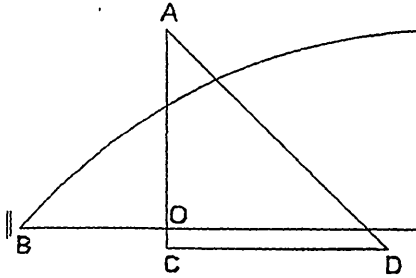
In the case of areas and other quantities of two dimensions this has been accomplished in several ways, some exceedingly ingenious, notably so that of Prof. Amsler, whose planimeter is widely known.

Lately a planimeter has been made from designs furnished by Mr. Butler, C.E., and the writer, on a plan, so far as I know, not hitherto adopted in any mechanical integrator. Moreover the same idea may be applied in constructing instruments for integrating quantities of more than two dimensions, such as volumes of embankments, moments of inertia, total pressure of water on irregular submerged surface not horizontal, and many others.

This planimeter is constructed as follows:—

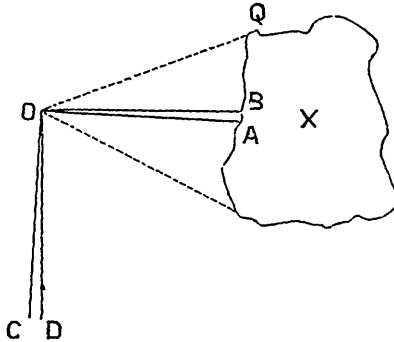
A semi-parabola is arranged to slide on a right angled triangle, so that the axis of the parabola shall be always parallel to  $CD$ , one side of the triangle. A wheel is placed at  $B$ , the vertex of the parabola, with its axis in a line with that of the parabola. A tracing

pointer is placed on CA, the other side of the triangle, on a slide so arranged that it shall always rest in contact with the curve. At O,



the intersection of CA with the axis of the parabola, is fixed an anchor pivot by which the triangle is anchored to the paper on which the area to be measured is plotted. The instrument is, when anchored, capable of revolving freely about O, while at the same time the parabola may be made to slide upon the triangle. By revolving the instrument and sliding the parabola the tracing pointer may be made to follow the boundary of any figure.

If the wheel is perfectly turned and mounted the sliding of the parabola will cause the wheel to slide without revolving, and the turning of the instrument about O will cause the wheel to revolve without sliding.



Let  $X$  be an area to be measured and let  $A$  and  $B$  be two positions of the tracing pointer very near together, and let  $C$  and  $D$  be the corresponding positions of the wheel. Let  $a$  be the circular measure of the angle  $BOA$ . We may suppose that the pointer is moved from  $A$  to  $B$  by revolving the instrument about  $O$  without

sliding the parabola. Now while the pointer is moving from A to B the wheel revolves through the arc CD.

$$\text{Measure of sector BOA} = \frac{1}{2}OA^2\alpha.$$

$$\text{“ “ arc CD} = OD\alpha.$$

But from the properties of a parabola

$$OB^2 = bOD.$$

Therefore

$$\text{Measure of sector BOA} = \frac{1}{2}bOD\alpha,$$

while

$$\text{Measure of arc CD} = OD\alpha.$$

Hence the distance through which the wheel revolves while the pointer is tracing the arc AB varies as the area of the sector BOA, and by suitably graduating the wheel the area of the sector BOA is registered on the wheel.

The boundary of the figure X may be considered as made up of an infinite number of infinitely small arcs having the centre O and different radii. As each arc is traced the wheel registers the area of the corresponding sector, while a change of radius causes the wheel to slide without revolving. Hence, while the tracing pointer is describing the boundary of the figure from P to Q in the direction of the hands of a watch, the wheel registers the area of the figure contained by OP, OQ, and the part of the boundary of X passed over by the tracing pointer. As the tracing pointer goes on from Q to P, the wheel revolves in the opposite direction, registering the area of the figure contained by OP, OQ, and the part of the boundary of X meanwhile traced. It is therefore easy to see that when the tracing pointer has described the whole boundary of X just once, the wheel will indicate the area of X.

Mr. G. B. Abrey exhibited one of Amsler's Planimeters and said that the introduction of the curve of the parabola was new so far as he was aware. Other curves could be introduced, and the principle extended indefinitely: He hoped to have an instrument made that would be a practical success. He explained the theory of another form of the instrument, simpler in practice, though more complex in theory.

Mr. Macdougall called attention to a Planimeter invented by Mr. John Say, of Kirkaldy, the leading feature of which was the employment of a cone, acting on an index-wheel

from which is read off the area of any figure whose outline has been followed by the tracer of the instrument. When the cone was employed as a multiplier it was easy to fix upon the proper proportions, so that the number of revolutions of the index-wheel in relation to those of the moving wheels and of the cone, being always directly in proportion to its distance from the apex of the cone, the area of the figure would be indicated. No Planimeter, however, had been invented in which the errors arising in using the instrument had been entirely got rid of, such as the retardation of the index-wheel by the compound sliding and revolving motion in the back-action.

---

#### FOURTH MEETING.

Fourth Meeting, 27th November, 1886, the President in the Chair.

Exchanges since last meeting, 45.

F. Chamberlain, B.A., and George Andrew McKinnon, were elected members.

F. T. Shutt, M.A., F.C.S., read the following paper on

#### CANADIAN APATITE.

Amongst the economic minerals that enrich the Dominion of Canada, Apatite (commonly known as "Phosphate") holds a prominent position.

The vast deposits of this valuable mineral, which occur in various parts of Canada, are now, and have been during the last fifteen years, extensively worked, until now phosphate mining is recognized as standing in the front rank of our mining industries. The annual "out-put" steadily increases, for while in 1875 only 3,701 tons were exported, in 1884 nearly 25,000 tons were mined. These figures go to show that this industry is fast becoming one of great commercial importance, and, considering the value of "Superphosphate" as a fertilizer, one which demands the highest scientific treatment.

The name "Apatite," derived from the Greek verb *ἀπατάω*, I deceive, was first given from the great similarity which this mineral

bears to many others, *e.g.*, pyroxene, beryl, etc., it having often been mistaken for these by mineralogists and miners.

Essentially, it is a tricalcic phosphate, its chemical composition being represented by the formula  $3\text{Ca}_3(\text{PO}_4)_2\text{CaF}_2$ . This formula shows the presence of calcium fluoride, which in our Canadian species amounts to about 7%. In many European species this is replaced by a somewhat larger percentage of calcium chloride. This fact makes our apatite the richer in phosphoric acid of the two, as the following figures will show:—

Canadian fluor-apatite.....	$3\text{Ca}_3(\text{PO}_4)_2\text{CaF}_2$	$\left\{ \begin{array}{l} \text{Ca}_3(\text{PO}_4)_2 \dots\dots 92.26\% \\ \text{CaF}_2 \dots\dots 7.74 \end{array} \right.$
European chlor-apatite....	$3\text{Ca}_3(\text{PO}_4)\text{CaCl}_2$	$\left\{ \begin{array}{l} \text{Ca}_3(\text{PO}_4)_2 \dots\dots 89.32 \\ \text{CaCl}_2 \dots\dots 10.68 \end{array} \right.$

These percentages have been calculated from the molecular formulae.

We find, however, that a small amount of the calcium fluoride is as a rule replaced by calcium chloride, and that the percentage of tricalcic phosphate is lowered by the presence of calcium carbonate to an extent of from .05 to 5%, apparently present in thin laminae in the cleavage planes.

The analysis of a specimen from the Templeton district, of a fair average quality, shows it to have the following composition:—

Tricalcic phosphate.....	89.85
Calcic fluoride.....	7.90
Calcic chloride.....	.37
Calcic carbonate.....	.49
Insoluble residue.....	.05

*Note.*—The difference, 1.34%, may be partly accounted for by the presence of moisture, and partly by the presence of small quantities of alumina and magnesia not estimated in this case.

The rocks in which this mineral occurs belong to the Laurentian period. They cover a vast area both in Ontario and Quebec, overlying a district in the northern portions of these Provinces from Labrador to the Arctic Ocean, and stretching down to the St. Lawrence between Kingston and Brockville. For the most part this district is exceedingly wild and rugged, often densely wooded, though in many places overlaid by rocks of the Palaeozoic Age and by glacial and post-glacial deposits, where agriculture to a greater or less

extent may be pursued. The origin of these rocks (the Laurentian) is still veiled in mystery, though it is generally conceded to have been a metamorphic one. Deposited in prepalæozoic seas, in similar manner to the later stratified rocks, they are supposed to have been subjected to the agencies of subterranean heat and vapour at high pressure, and of eruptive overflows. By such treatment they have become so metamorphosed that their stratification and chemical composition alone point to their sedimentary origin and character. They are highly crystalline and often much folded and contorted, and consist of quartzite, gneiss, pyroxene and other related silicious rocks. Traversing these, however, are to be found strata or bands of crystalline limestone and dolomite—the limestone often highly coloured—together with beds of many economic minerals. These latter consist principally of iron ores, graphite and apatite. It is always in connection with these bands of limestone that the phosphate is found, and therefore they have acquired the name of the “Phosphate-bearing Rocks.”

These are especially rich in the townships of Templeton, Hull, Buckingham and Wakefield (Ottawa Co.), Quebec, and North Burgess, Elmsley and adjoining townships in Ontario. These two districts are most probably, geologically speaking, one—the characteristics presented by one being recognizable in the other for the greater part. In the former district the rivers Gatineau, La Blanche and Aux Lièvres run, and in their valleys the largest deposits lie. By a reference to a map of Ottawa County it will be seen that the La Blanche at a distance of some ten miles from the Ottawa River widens into Lake McGregor, and proceeding northward we find a succession of narrowings and widenings—so typical of many of our rivers—forming a chain of connected lakes till we reach the northern boundary of Wakefield. This district is especially rich in phosphate, as is the district between the La Blanche and Aux Lièvres, where the Dominion Mining Co. and the Montreal Mining Co. have made extensive operations.

The origin of apatite is as debatable ground as that of the rocks in which it occurs. Many are fond of ascribing to phosphate an organic source and seem to see a necessary connection between phosphorus in its compounds and animal life. Prof. G. M. Dawson suggests its formation from coprolitic layers, becoming crystalline by

metamorphic action (before described). A discussion of this subject is of little practical benefit, but I would merely point out, in this connection, that *this* cannot be its primary origin. Coprolites, as we know, are the fossil excrement of animals. Now animals not being able to *create* any element, but only to assimilate and form new compounds, it is obvious that they obtained the phosphorus, which they possess as calcic phosphate, from the vegetable kingdom; the vegetable kingdom in like manner draws upon the mineral kingdom for its raw material. Hence in some form or other the phosphate existed before this Laurentian period, even granting that animal life was so abundant as to produce such a large deposit—a theory very untenable 'rom the general geology and palæontology of the period. It should be remembered that many other mineral phosphates occur in nature besides apatite. In a large number of cases the apatite is closely associated with pyroxene, and there is evidence to show that it has been derived, to a large extent, from this source. In small but appreciable quantities, phosphate of calcium has been shown to be a constituent of many metamorphic and igneous rocks.

Apatite occurs both crystalline and massive; the latter variety, however, may be said to be more or less crystalline in structure.

The crystals are usually found in a matrix of red limestone, and though presenting a very beautiful appearance are of little or no value, owing to the great difficulty in separating them from the limestone. Occasionally, however, large cavities of loose crystals are discovered, the matrix having become disintegrated and decomposed by atmospheric and other agencies.

The crystals consist of six-sided prisms with complete pyramidal terminations, though often possessing one pyramidal termination and one basal plane. In size, they vary greatly, viz., from those of less than half of an inch in length and corresponding thickness, weighing only a fraction of an ounce, to those of many hundredweights. A section of a good-sized crystal from this district is at the School of Science, Toronto.

The usual colour of crystals is green. Some, however, approach white, while others are of a pink, yellow, or violet tint, and others nearly black. Apatite in the massive condition shows the same variability, and in a more marked degree, with respect to colour. The colour appears to be purely accidental, and is due to various

impurities mechanically mixed with the minerals. Thus the red and brown varieties contain minute crystals of hematite; the blue and green, scales of chlorite; and the yellow and violet owe their tints to organic substances. Some few years ago crystals were a rarity, as much as \$5 being paid for one with good edges and terminations, though of small size; now they are so plentiful as to be practically valueless as specimens.

It would be well to mention here the so-called nodules, which appear to have been crystals, subsequently subjected to partial fusion, so that all exterior resemblance, except in size and rough outline, has been lost. It is possible that rounding of the edges is due to the solvent action of steam at high temperatures and pressure.

It is in the massive condition, as obtained from veins and "stocks" or "pockets," that it is extensively mined.

For some years it was supposed that apatite did not occur in true veins, but a study of the Templeton district has proved that such is the case. At Mud Bay, Lake McGregor, this is clearly shown by the phosphate deposit cutting the *strike* of the containing rocks; and again, in the same neighbourhood, there is a vein that has a true banded structure, the gangue consisting of alternating layers of calcite and mica and pyroxene. Examples are not wanting of veins consisting of alternate layers of pyroxene and apatite.

The veins are of various dimensions. Traversing the dead rock—limestone, pyroxene, &c.—they narrow and widen with great suddenness, and are characterized by an uncertainty of yield,—it being impossible to predict, by any formula, the "out-put" obtainable from any vein. The surface appearance may promise an abundant harvest, but at a few feet below the vein may become entirely "pinched" out. It is only right to add that the reverse of this has proved true—the vein increasing in width at the depth of a few feet. It is not uncommon to notice the phosphate in a vein, with an average width of say three feet for a depth of six or eight feet or more, suddenly narrowing to a thin streak only an inch or two in breadth. This may continue without much alteration for a further depth, and suddenly enlarging to a size equal to that of the upper deposit.

In some instances, large amounts have been obtained from veins—one in this district yielded eight hundred tons. It was situated on



the side of a hill—an eminence apparently being favourable for the outcrop of both veins and pockets. As an off-set against the uncertainty in quantity, the quality is usually better than that of the "stocks," the phosphate being less intermixed with gangue. Cavities in veins often contain large crystals of apatite.

The greater quantity is obtained, however, from lenticular masses or "pockets," which would appear to be segregations from the enclosing rock matter, and more closely related to veins than to beds, which latter they are supposed to be by some geologists. They are from two to forty feet deep, and usually expand to a depth of a few feet. Sometimes the phosphate is entirely surrounded by dead rock, and a sharp line of demarcation may be drawn between them. When such a pocket or stock is exhausted, the hole has often a basin shape, in the bottom of which may sometimes be seen a thin streak of phosphate, perhaps only a few inches in width. In others, it would be hard to say where the phosphate ended and the dead rock began, so intermingled is the gangue. In a few instances borings, in deserted pits, have revealed the presence of phosphate at depths of from ten to sixty feet. It is probable, therefore, that in many cases further large deposits exist at lower levels. Almost all the apatite hitherto mined has been obtained from surface deposits, and until these are exhausted, little will be done toward developing these subterranean beds, owing to the great expense in removing the superincumbent rock matter.

"Stocks" very often occur close together, say ten to twenty in an area of five acres, with large intervening, perfectly barren tracts.

The mineral, both of the veins and pockets, presents itself in many varieties, both as regards colour and texture. The more common are the following: (1) Very fine granular, white, known as "sugar." (2) Granular white, spotted with red, known as leopardite. (3) Coarse and fine crystalline varieties of green, often tabular in cleavage. (4) Crystalline red varieties. (5) Violet, lustrous, semi-translucent. (6) Pink, much harder variety, of feldspathic aspect.

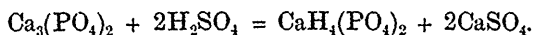
The operation of mining is extremely simple; it should rather be called a species of quarrying, except in a few cases where, quite recently, shafts have been sunk and underground workings employed for the extraction of apatite. Surface deposits being worked for the

most part, complicated apparatus is not required. A derrick for lifting the mineral and *débris*, and a pump to carry off the accumulated water, seem to constitute, in most places, the entire plant.

The process consists in drilling holes of various lengths—one man holding the drill, which may be of inch and a-quarter steel, and another, or two, hammering. In places where there is not sufficient room for the striker, a long drill is often attached to a spring-pole. The method of working in this case is obvious. The holes are charged with gunpowder or dynamite, and well tamped with sand and broken rock matter, and the adjacent area is loaded with heavy logs to prevent too much scattering of the phosphate. The fuse being left of sufficient length to allow the men to retire in safety, the charge is fired. After the explosion the lumps of pure phosphate are placed by themselves, and those containing intermixed rock matter are removed to the dressers' tables, where, with small hammers specially made for the purpose, the gangue is separated as far as possible; but the phosphate being much softer than the intermixed matter, this can only be approximately done. Hitherto a phosphate containing 70%  $\text{Ca}_3(\text{PO}_4)_2$  or over has been required, but probably in the future much of the stuff now in the "dump" will be used.

The gangue consists chiefly of quartz, feldspar, phlogopite (magnesian mica), pyroxene and calcite, and these, therefore, constitute the principal impurities in the commercial article. The predominance of calcite not only lowers the percentage of calcic phosphate, but decomposes much of the acid when the mineral is being converted into "superphosphate." The other impurities are insoluble in sulphuric acid, and consequently only lower the percentage of apatite present.

In this district (Templeton), if the mines are near navigable waters, the mineral is brought down in scows as far as possible, from whence it is teamed to the Ottawa River, where it is re-loaded on barges, or on the cars of the Canadian Pacific Railway for Montreal. It is shipped here as ballast principally, and exported to England, where it is treated with sulphuric acid, converting it into an acid phosphate of calcium, or "superphosphate," containing more or less sulphate of calcium, and sold either *per se*, or mixed with blood and other refuse for agricultural purposes. The action of sulphuric acid at a moderate temperature upon apatite may be thus depicted:



Strange to say, although much United States capital is involved in our mines, little or none of the raw material is shipped there direct, but after treatment in England, a considerable quantity is sent there. The reason for this appears difficult to find, as materials for sulphuric acid manufacture are cheap, both here and in the United States.

It is of the greatest importance to the prosperity of the country that our farmers should early become aware of the great value of superphosphate as a fertilizer. Now, not only is phosphorus exported in this condition, but large quantities of wheat containing much phosphoric acid are sent out of the country; and thus the land is impoverished without the concomitant addition of this valuable element in the form of a soluble phosphate. A proper balance between the phosphoric acid removed by vegetation and that returned in the form of a fertilizer must be maintained, if we are to expect such bountiful harvests in the future as we have enjoyed in the past. With the realization of the worth of superphosphate by agriculturists, the manufacturing industry of sulphuric acid will receive a healthy impetus, and then we shall be more fully able to estimate the great value of our Canadian apatite deposits.

This paper is the result of information gained and observations made while staying with the late John G. Miller, on his extensive phosphate mines in Templeton Township, a few years ago; and in reading this paper before the Canadian Institute, a society one of whose duties and privileges it is to place on record the work of Canada's benefactors, I think it not inappropriate to conclude with a word of tribute to the memory of a gentleman who contributed not a little to Canadian Geology and Mineralogy, and who occupied a position in the foremost rank of the pioneers of phosphate mining. Mr. Miller was an enthusiastic and skilful worker, and, possessing an untiring energy, he placed Canada under a lasting debt of gratitude by the assistance he rendered the authorities of the Geological Survey, by the able articles which he contributed through the Ottawa press, by the enterprise which he displayed in opening up and developing Canada's mineral resources, and lastly by the large and valuable collection of minerals which he made, and which is now known in the Museum of McGill College as "The Miller Collection."

Dr. Ellis in referring to the opinion that many entertained as to the animal origin of Apatite, said one reason of it was the curious fact that fluorine was also associated with phosphate of lime in the bones of animals. He showed by a formula on the blackboard how fluorine played a necessary part in the composition of the mineral.

Mr. T. Nelson Dale inquired what was the chemical difference between the Norwegian Apatite and the Canadian.

Mr. Shutt stated that in one of the publications of the Canadian Geological Survey the difference between the Canadian and European Apatite was given.

Mr Dale alluded to the Apatite locality of Kragerö, on the southern coast of Norway, which he had visited many years before. The Apatite was pinkish in colour and opaque, resembling some of the Feldspars. The associated minerals were Ilmenite, Hornblende, Praseolite, Rutile, Epidote, &c. This Apatite had also been exported to England for fertilizing purposes. Another well known locality in Norway was that of Snarum, further inland. The crystals at these places generally had the basal plane with the pyramid. At Arendal, near Kragerö, the bluish-green translucent variety of Apatite occurred in small crystals, and here the crystals, especially those of Colophonite, had the peculiar rounding of the edges alluded to by Mr. Shutt as characterising some of the minerals of the Canadian Apatite region, and due probably likewise to metamorphism, subsequent to crystallization.

Mr. Shutt remarked that as many as 30 species of minerals occurred associated with the Apatite of Canada. The opaque pink variety, closely resembling feldspar, mentioned by Mr. Dale as occurring in Norway, was also found in Canada.

The following paper by Mr. A. McGill, B.A., B.Sc., was then read by Dr. Ellis :

## NOTES ON REICHERT'S DISTILLATION PROCESS FOR THE IDENTIFICATION OF BUTTER-FAT.

An abstract of Reichert's original paper appears in the Chemical Society's Journal, Vol. 36, 1879, p. 406. The facts (1) that butter-fat is distinguished from other animal and vegetable fats likely to be used in the sophistication of butter, by containing about 6 to 7 per cent. of butyric acid (as butyric), and (2) that this acid is sufficiently volatile to make it possible to distil it over in a current of air, are made the basis of this process, which was originally carried out by Reichert as follows:—

2.5 grammes of the dry, filtered fat were weighed in the liquid state into a 150 c.c. flask, and saponified by the addition of 1 gram solid potassic hydrate dissolved in 20 c.c. of 80 per cent. alcohol; 50 c.c. water were then added, and then 20 c.c. dilute sulphuric acid (1 to 10 by volume). The mixture was then distilled, a slow stream of air being aspirated through. After 15 c.c.'s distillate was collected, this was returned to the distillation-flask, and the distillation continued till 50 c.c. was collected. This was titrated with deci-normal soda, litmus being the indicator. Reichert found that an average of 14 c.c. deci-normal soda was required to neutralize the acid in this distillate, with a variation of  $\pm 0.45$  c.c.

Medicus and Scherer (*Zeitschrift für Analyt. Chemie*, 1880, p. 159,) have examined this method, and highly recommend it. Various changes in it have been suggested, as by Meissl, who uses 5 grammes butter-fat, and a weaker alcohol for dissolving the alkali requisite for saponification in order to avoid the loss of volatile acid by etherization during saponification. Meissl collects 110 c.c. distillate, and finds a minimum of 26 c.c. deci-normal soda requisite for neutralization.

C. E. Schnitt uses phosphoric acid instead of sulphuric for decomposing the soap.

A. H. Allen (*Analyst*, Vol. X., p. 103,) has examined the process, and reports favourably upon it. He saponifies 2.5 grams fat with 25 c.c. semi-normal potash in a closed flask, and after evaporating off the alcohol on a steam bath, dissolves the soap in water, adds excess of dilute sulphuric acid, and makes up to 75 c.c., distilling over 50 c.c. He finds a minimum of 12.5 c.c.'s deci-normal alkali required to neutralize this distillate.

A paper read by R. W. Moore, A.B., M.S., before the American Chemical Society in September of last year, and published in the "Analyst" for December, shews the very great superiority of Reichert's process for the identification of cocoa-nut oil used as an adulterant of butter-fat, and was the immediate cause of my undertaking the work described in the following pages. My friend, the late lamented H. Sugden Evans, F.C.S., Chief Analyst for the Dominion, requested me to examine the process with a view to ascertaining the limits of accuracy obtainable by it under fixed conditions.

I prepared from a genuine butter, pure, dry fat, by allowing the salt and water to separate by subsidence in a tall beaker on the water bath at about 80° to 90° C., pouring off the supernatant fat, and freeing from suspended caseine, etc., by filtration (using a steam jacket). The fat so obtained had a specific gravity of 0.914 at 100° Fah. (water at 100° Fah. = 1).

The liquid fat was weighed by difference from a light glass tube, having a lip, directly into the flasks used in saponification.

The difficulty of weighing exactly 2.5 grams of fat suggested the use of an approximation to that quantity, and the subsequent calculation into *volatile acidity* per gramme of fat used.

I employed an approximately normal solution of alcoholic potash for saponification, the alcohol having a specific gravity of 0.823 (equivalent to 90 per cent. anhydrous alcohol). The saponification was effected in stoppered flasks of strong glass (the stoppers being tied down), on the water bath at 100° C.; and 10 c.c. alcoholic potash was used for each gram of fat taken. One hour was allowed for the completion of this process.

The melted soap was decanted into a flask of about 250 c.c. capacity, about 2-3 c.c. of dilute alcohol used to rinse, and 20 c.c. of approximately normal sulphuric acid (accurately 0.98 N.) added for each gram of fat used. During the subsequent distillation the flask was placed on a sand bath, and a pretty strong heat supplied by a Berzelius's alcohol lamp.

A tube leading to the bottom of the flask permitted a current of air to be aspirated through the whole apparatus. A 24-inch Liebig was used and kept well cooled. The distillate was collected in a graduate which was connected with a Richard's filter pump, by

means of which a current of air was drawn through at the rate of about 4 to 6 bubbles per second.

The distillate, before titration, was thoroughly cooled (to about 55° Fah.) and filtered through wet paper. Phenol-phthalein was used as the indicator.

## SERIES I.

These experiments were intended to illustrate the effect of using air *not* freed from carbon dioxide. The tube of the condenser did not dip into liquid in the receiver.

Number of Experiment.	Fat used.	Potash used.	Sulphuric Acid.	Distillate collected.	Total Acidity in c.c. on Soda.	Acidity per gram fat.
1	5.167	51.7 c.c.	103.3 c.c.	103.3 c.c.	21.0 c.c.	4.06 c.c.
2	2.975	29.7 "	59.5 "	59.5 "	10.2 "	3.43 "
3	3.809	38.1 "	76.0 "	76.0 "	17.1 "	4.50 "

The acidity found bears no constant relation to the quantity of fat used; nor is any average increase shown for increasing quantities of fat used.

The arbitrary volume of distillate collected (equal to the quantity of sulphuric acid used, or to *two-thirds* of the total quantity of the liquid in the distillation-flask) is more than that collected in Series II., and less than that collected in Series III.

## SERIES II.

In this series of experiments the air drawn through the apparatus was freed from carbon-dioxide by being washed through strong solution of caustic potash.

Number of Experiment.	Fat used.	Potash used.	Sulphuric Acid.	Distillate collected.	Total Acidity.	Acidity per gram fat.
4	3.669	36.7 c.c.	73.4	55 c.c.	9.6 c.c.	2.6 c.c.
5	3.089	30.1 "	60.2	46.3 "	8.7 "	2.8 "
6	3.376	33.8 "	67.4	50.5 "	9.3 "	2.75 "
7	1.638	16.4 "	32.8	24.8 "	4.7 "	2.86 "

From this series it appears that, while there is a fair approach to constancy in the quantity of volatile acid distilled over, there is a relative increase for lessening amounts of fat used. To find whether this was still observable with a larger (proportional) distillate, the next series of experiments was undertaken. In these the distillate collected was three-fourths as great as the total quantity of liquid in the distillation-flask.

## SERIES III.

Number of Experiment.	Fat used.	Potash.	Acid.	Distillate.	Total Acidity.	Acidity per gram fat.
8	3.777	37.8 c.c.	75.6 c.c.	85.0 c.c.	15.6 c.c.	4.1 c.c.
9	2.967	29.7 "	59.4 "	67.0 "	12.2 "	4.1 "
? 10	2.487	24.9 "	49.8 "	56.0 "	11.9 "	4.8 "
11	2.054	20.5 "	41.0 "	46.1 "	8.45 "	4.1 "

A remarkable constancy in the acidity of the distillate, calculated on the fat used, is observable in this series, and seems to indicate that under the given conditions, the percentage of acid distilled over is constant. Experiment 10 is not to be counted, except as an illustration of the amount of error that may occur through not properly cooling the distillate before filtering. This filtrate became distinctly turbid on cooling (a circumstance noted at the time), although the results were allowed to stand.

In all the preceding experiments the delivery tube of the condenser merely entered the receiving graduate, not reaching to the bottom of it. In the following experiments the tube reached to the bottom of the graduate, and dipped into 20 c.c. of distilled water at the beginning of the experiments, and the aspirated air bubbled through the distillate during the whole of the operation.

## SERIES IV.

Number of Experiment.	Fat used.	Potash.	Acid.	Distillate.	Total Acidity.	Acidity per gram fat.
12	3.188	31.9 c.c.	63.8 c.c.	71.8 + 20	13.9 c.c.	4.36 c.c.
13	3.475	34.7 "	69.4 "	78.1 + 20	15.85 "	4.56 "
14	1.563	15.6 "	31.2 "	35.1 + 20	7.4 "	4.74 "
15	3.847	38.5 "	77.0 "	86.6 + 20	16.6 "	4.31 "
16	2.693	26.9 "	53.8 "	60.5 + 20	11.6 "	4.31 "
17	2.257	22.6 "	45.2 "	50.8 + 20	9.6 "	4.24 "



Experiment No. 14 taken in connection with No. 7 would seem to indicate that with very small amounts of fat—say less than 2 grams—the volatile acidity found is higher than the average. The whole series shews that, as might be expected, a slightly higher volatile acidity is obtained when the first portions of the distillate are received into water already placed in the receiver than with the arrangement used in Series I., II. and III.

In the following table my average results, expressed in cubic centimetres of deci-normal alkali required to neutralize the acidity of the distillate found, for each gramme of fat taken, are compared with the results—similarly expressed—obtained by various chemists who have examined the process. The numbers have been calculated by me from a table of results given by Allen in the *Analyst* for June, 1885 (Vol. X., p. 105).

CHEMIST.	ACIDITY PER GRAM FAT.
Reichert .....	5.6 c.c. d.n.
Ambuhl .....	5.9 c.c. "
Caldwell .....	5.9 c.c. "
Schmitt .....	5.4 c.c. "
Moore .....	5.3 c.c. "
Allen .....	5.4 c.c. "
McGill .....	4.4 + c.c. " ..... From Series IV.
McGill .....	4.1 c.c. " ..... From Series III.

It will be seen that the average acidity obtained by me is much lower than by the other chemists named. This may be due either to the different conditions under which the work was done, or to the different character of the butter fat submitted to examination. I can vouch for the absolutely accurate strength of the standard alkali employed in titration of the distillate; and I also took care to ascertain that no traces of sulphuric acid were present in the distillate. The process is, of course, not intended to estimate the *total volatile acid* in a butter fat, but only that which is volatile under

*exactly* defined conditions ; and the examination which I have made justifies me in saying that with the same fat, under constant conditions, the quantity of volatile acid distilling over is constant within 3 to 4 tenths of 1 c.c. deci-normal for each gram of fat used, provided that not less than 2 or more than 4 grams be taken.

I may add that the work described was done in January of this year (1886) ; since which time I have had an opportunity of examining several commercial butters by the process, carried out as in Series IV. ; and I have found no sample examined to give more than 4.5 c.c. deci-normal per gram.

Dr. Ellis read a paper on "Determination of Tannin in Spices, particularly Cloves and Allspice." For this paper see page 214, vol. IV., *ante*.

---

#### FIFTH MEETING.

Fifth Meeting, 4th December, 1886, the President in the Chair.

Exchanges since last meeting, 33.

D. A. O'Sullivan, D.C.L., read the following paper on "The Jurisprudence of Insanity."

To the law of the land is entrusted the protection of the lives and property of all entitled to seek that protection. It professes to be no respecter of persons, but it is obliged, nevertheless, to take notice of certain states and conditions which may be regarded as exceptions to the general rule. The first and second childishness, the reason impaired by abuse or defective from natural causes, and the various forms of mental unsoundness, exact a share of the law's protection under the exceptional class of cases referred to. When we consider that one person in every three or four hundred is unfit to take care of himself or his property, it becomes evident that the law frequently finds itself confronted by a very large class of cases requiring a display of the nicest discrimination, while each case unfortunately is almost always useless as a guide for the next instance that may present itself. When in every day life, as we are assured, very many

doctors, lawyers, clergymen, merchants, as well as ordinary day labourers, go on each with his proper work while yet a victim of delusional insanity, it is evident that at any moment, and from any quarter, a specimen case may present itself for the consideration of the Courts.

The class of cases which I propose to discuss in this paper is comprised very generally under the head of the ordinary term "insanity," though the legal term is "unsoundness of mind," and the questions which Jurisprudence has in view are :—

1. When is any given person to be considered as insane.
2. What degree of responsibility or capacity is he fixed or gifted with.

The law sets out with the assumption that all men are sane, but nevertheless it recognizes the fact that some are insane ; just as the law recognizes the existence of crime, although acting ordinarily on the presumption that every person accused is innocent. The law assumes the more noble, more perfect state of humanity.

The gradation from sanity to insanity, as from health to disease, or light to darkness, may be slow or instantaneous, as those versed in such matters may speculate. The law when called upon has to say which of the two states exists. The twilight stage—part sane and part insane, weak-minded, balancing between capacity and incapacity—is a condition that calls for the greatest vigilance at its hands, especially as regards property and contracts generally.

"Sanity," says a great English lawyer, "exists when the brain and the nervous system are in such condition that the mental functions of feeling and knowing, emotion and willing, can be performed in their regular and usual manner."

"Insanity," says the same authority, "means that state in which one or more of the above-mentioned mental functions is performed in an abnormal manner, or not performed at all, by reason of some disease of the brain or nervous system."

The result of this is stated by the same author to be knowledge that an act is wrong and the power to abstain from doing it. This is the test in criminal matters. A similar rule applies in civil cases.

How is it to be determined that any given person has knowledge of right and wrong, and a will to do the one and shun the other ?

It is difficult for medical men to listen to lawyers discoursing on diseases of the brain and of the nervous system; and on the other hand the lawyers and judges thought and think that they know as much of the functions of feeling and knowing of emotion and willing as is permitted to the medical gentlemen.

The jurisprudence of insanity is in consequence a subject claimed by doctors and by lawyers. It is one of those debatable territories on the border lands of two sciences that needs the assistance of the best minds in both; but it so happens that these are not always in harmony, indeed sometimes in apparent or real contradiction. Each one claims to be the real judge or the sole judge, and each disputes the right of the other to decide what may be common issues.

The medical men assert that common sense and science are with them, and it may be so; but the fact is that the legal luminaries have not only the law, but what is more important the verdict on their side. The conflict continues apace. The Courts and the lawyers have retained for a long time their view of the matter, and are unmoved by any advancements in the medical world. The medical writers adhere to their own views, and are not sparing in their ridicule of unskilled persons meddling with things of which they know nothing.

"The ground which medical men should firmly and consistently take in regard to insanity," says Henry Maudsley, "is that it is a physical disease; that they alone are competent to decide upon its presence or absence; and that it is quite as absurd for lawyers or the general public to give their opinion in a doubtful case, as it would be for them to do so in a case of fever."

Mr. Balfour Brown replies to this as follows:—"No lawyer wants, so far as we know, to give his opinion either as to insanity or as to fever. He does not profess to be able to do so, but he does assert that he and the public are in a position to judge of conduct, that the proof of the existence of such insanity as incapacitates for civil acts or renders an individual irresponsible in case of the commission of a criminal outrage lies in conduct, and that the fact that in the case of the insane the act is the result of certain changes which medical men have chosen to call disease, and that in the other it is due to certain changes which medical men have with as much arbitrariness chosen to call health, has nothing whatever to do with the subject."

To obtain the result of a perfectly legal and otherwise irreproachable lunatic or person of unsound mind, the assistance of two sciences is requisite; so law and medicine combine for that purpose, then after each particular sentence is pronounced relapse into their accustomed and time honoured antagonism. The offspring is begotten of this wrangling parentage, though the peace of the family be endangered thereat and thereafter.

It is natural and proper that each scientific person considering any subject in his particular line, as it is said, should view it with reference to his own special training and profession. The metaphysician and the physiologist meet on the one ground and each claims it as his own, one surveying it from a mental the other from a material point of view. In the same way a medical man and a lawyer brought face to face with a madman in the dock or in the witness-box come to regard his capacity or responsibility as subjects for detection in their own particular way. Theoretically medical skill must pronounce as upon any disease looking out for symptoms and making a diagnosis. Practically it keeps its eyes and ears open and observes what are less ordinarily the *indicia* of disease—of the absence of health. Legal skill, on the other hand, is thrown entirely, or almost entirely, on observations upon the conduct of the person in question, on astuteness under examination, propriety of an action under certain conditions, and on the thousand and one circumstances that separate common from extraordinary conduct. The judges and the Courts say---the law in fact lays it down---that what justice or equity demands is, not whether the particular individual is diseased mentally, but whether his conduct is the result of a sound mental guidance. If it is, then he is to be treated as other persons, and the law cares no more for the disease than the jury cares for the name of it. This disregard of medical science and of complicated classification is not relished by doctors, but they console themselves by the reflection that they instructed the Court, and possibly confounded all others by the intensely scientific character of their answers.

The law then is primarily concerned with the condition of the mind, the disease is of secondary importance. Medical skill aims to detect the disease, and if possible to remedy it; for this the law cares nothing ordinarily, its object is to discover capacity and responsibility. On this subject, as on all others within the province of

evidence, the purpose of the law is to obtain information just as it would endeavour to discover foreign law, or ecclesiastical law, or facts concerning engineering, mechanics, or any of the arts and sciences. What medical experts and writers complain of is that judges and lawyers can and do know nothing of disease of insanity, while the legal gentlemen say it is too much and intolerable that the witness should usurp the functions of judge and jury, and claim the right of deciding the whole question.

The common ground upon which these conflicting scientists fight this battle is evidently the mind—an unsound mind law says, a diseased mind medicine says. The chief difficulty is, therefore, not which science should claim the exclusive right of appropriating the mind, but what the mind in itself is. When the mind is diseased, one party says every act is that of a diseased mind, and is, therefore, to be regarded as an insane act. The mind is a totality says Lord Brougham; and this has been quoted approvingly by Dr. Willard Parker, by Dr. Gilman, and others of eminence.

The Courts of law, however, have not acted upon this doctrine, and they repeatedly and every day act upon the assumption that a man may be sane upon one subject and insane upon all others, or that being insane upon one, or a monomaniac, he may be sane upon all others. He may be subject to delusions, but otherwise sensible. And so a man who is unquestionably insane upon one or on a variety of subjects, may yet have his will upheld, or his contract enforced against him. If he understands fully what is necessary to dispose of property by will or by agreement, he may be so far as the law cares hopelessly and incurably insane upon all others. Does he understand the nature and value of his property, his relations and their claims upon him? Then his will stands, though it were drawn (as wills have been drawn) in the rooms of an asylum. If he understands the value of property and conducts himself so that the other party had no suspicion of his insanity, then his contract can be enforced against him, though his object were to use that property to erect another tower of Babel.

These conclusions of the Court leave no doubt as to its view on the totality of the mind and on the effect of a diseased mind, though it is not disputed that many able lawyers side with the medical view. It is evident if unsoundness as here been stated is due to diseased

organisms, the doctors ought to be the proper, and indeed the sole judges; but if there be such a thing as mental unsoundness with physical integrity, then the lawyers have good foundation for their reasoning.

There is a form, perhaps many forms of physical disease, which result inevitably in mental weakness, and so given certain symptoms the result is predicated to a certainty almost mathematical.

There is a disease which I take as an example, because it is probably as good for a popular example of medico-legal strife as any other: a disease called *Locomotor Ataxia*. The name primarily suggests a want of order in physical movements; as for example when the patient in attempting to drink would bring the glass to his ear, or would walk to the window in the endeavour to go out the door.

To be exact I append the examination of Dr. Seguin, Specialist Professor of Diseases of the Mind and Nervous System in the University of the City of New York, in reply to questions I put to him in a contested Will case a few years ago. The doctor, after referring to the different stages of the disease, replied as follows:—

Q. Please define briefly the first and second stages of this disease, [*Locomotor Ataxia*.]—A. The first stage is characterized by the recurrence of peculiar neuralgic pains in the legs, by absence of reflex movements at the knee, and by double vision in some cases. The second stage consists in the above symptoms, with the addition of a staggering, jerky, or ataxic walk, and in some cases ataxic movements.

Q. Are the symptoms of this disease solely physical, or are they both physical and psychical?—A. Purely physical.

Q. Has *Locomotor Ataxia* any effect upon the mind?—A. Not except through the occurrence of a rare complication.

Q. Will you state shortly what complications in this disease give rise to mental impairments?—A. In a few cases, from one to two in a hundred, in my experience, the symptoms of the disease known as *General Paresis*, or *Dementia Paralytica*, make their appearance after the development of the *Ataxia*.

Q. Will you state briefly the physical symptoms of a person affected with *Dementia Paralytica*?—A. These are: first, a condition of tremor of the muscles of the face, tongue, and hands, clearly visible to the eye, and sensible to the touch; second, a vibratory tremulous articulation—words are often clipped or shortened; third, a tremulous, jerky handwriting; fourth, unnatural smallness of and inequality of the pupils.

Q. Will you state briefly the psychical symptoms of a person affected with *Dementia Paralytica*?—A. They are: first, progressive impairment of memory

and judgment; in other words, dementia. Second, variable mental state; which may be hypochondriacal, or melancholic, or maniacal. Usually, the patient is active and exacted; entertains delusions of great strength, of vast wealth. He has extravagant plans and boasts. These exalted notions are very numerous, and constantly changing in a given case. They are not fixed ideas.

Q. What is the chance of recovery in the case of a person afflicted with Dementia Paralytica?—A. There is no chance of recovery.

Q. To which of the two classes of symptoms, physical or psychical, do you attach the most importance in Paresis?—A. The physical symptoms are more constant, and appear earlier, in my opinion. In some cases of Dementia Paralytica, the physical symptoms, together with failure of memory, are the only symptoms to the end of life.

Q. What is the mode of attack in Dementia Paralytica?—A. Usually by the gradual development of the physical symptoms I have named and diminution of memory, and by faults in judgment.

Q. In your experience, have you known a case of sudden attack in Dementia Paralytica?—A. I have not.

Q. Are the exalted notions to which you have referred confined to Dementia Paralytica, or are they found in other forms of insanity?—A. When varied and numerous, exalted delusions are highly characteristic of Dementia Paralytica, but not pathognomonic. When the exalted notions are few and fixed, they are indications of a condition of mania subacute or chronic.

Q. Can there be said to be anything hereditary in the disease, Dementia Paralytica?—A. The hereditary tendency in this disease is not strong, and is usually indirect.

Q. Generally speaking, have persons afflicted with Dementia Paralytica testamentary capacity; and, if so, what?—A. In some cases with uninterrupted progressive development of the disease, there is usually no such capacity; in other cases characterized by alternations of excitement or mania and remarkable remissions, the patient may, in my opinion, be capable during such remissions of correctly expressing his testamentary wishes.

Q. Generally speaking, is testamentary capacity affected in Locomotor Ataxia?—A. Not at all, in my opinion.

Q. Is there any defined limit to the advancement of the disease, Locomotor Ataxia?—A. There is none. It may terminate fatally in a few months, or there may be no advance in the symptoms for many years.

Q. Is there any defined limit to General Paresis of the insane?—A. There is no defined limit, but I have stated it as my opinion that no case has extended over six years which has not terminated by death. I have known no case which has recovered, and it is my opinion that it is always fatal.

On this point also I had the opportunity of examining Dr. Wm. A. Hammond, one of the best known scientific experts in America, or perhaps now living. In this examination, of course, I pursued only the facts of the particular case. I incline to the view (though



I don't know) that such cases are comparatively rare ; when they do occur, it is manifest that if that be the weight of medical evidence no judge would feel disposed to set it aside in favour of a finding of mental unsoundness by reason of rational conduct in the person so affected. Conduct is deceptive and can be simulated when the *indicia* of disease cannot be concealed. The important part of Dr. Hammond's evidence is the following :—

Q. What has been your experience in cases of this character ending in mental disorder ?—A. I have known several cases where that has occurred, one especially, that of a distinguished actor, under my charge for several years with Locomotor Ataxia, and not shewing any mental aberration until towards the last of his life, when there was decided mental disorder.

Q. Does the mental aberration you refer to point toward any particular form of mental disorder ?—A. I should say distinctly, no, it does not, but there is a disease of the brain that occasionally resembles in its ataxic symptoms Locomotor Ataxia. There is a cerebral form of Locomotor Ataxia, which is not common, and a spinal form of general paralysis of the insane. In the one case, the mental symptoms are superadded to the spinal ; in the other, the spinal are superadded to the mental.

Q. Is it the exception or the rule that in disease of Locomotor Ataxia the brain becomes affected through the medulla oblongata ?—A. The brain may be affected in two days in Locomotor Ataxia, either by extension through the medulla oblongata or indirectly through the sympathetic nerve.

Q. In case the brain is affected by the former, what symptoms are present ?—A. Irregular action of the heart ; nausea and vomiting ; difficulty of swallowing, and irregular respiration. Locomotor Ataxia sometimes ends life suddenly, before the morbid symptoms reaches the brain.

Q. Does any implication of the medulla oblongata necessarily suppose mental disease ?—A. It does not.

Q. What percentage of cases of Locomotor Ataxia coming under your observation resulted in mental disease ?—A. I should say not one per cent. In the sixth edition of my book on nervous diseases, I did not call attention to insanity as a symptom of the disease, Locomotor Ataxia. This may be because my attention was not specially directed to it, and since such sixth edition, I have seen seven or eight cases. My sixth edition was written four years ago, and my new book, soon to appear, will express my views upon this point. The recognition that there are sometimes symptoms of insanity accompanying Locomotor Ataxia, is a fact comparatively recent.

Q. What would you regard as the best indication that a patient affected with Locomotor Ataxia was progressing towards insanity ?—A. The recurrence of delusions.

Q. Are there any other psychological symptoms ?—A. A change in the emotional characteristics of the patient. He laughs and cries without sufficient cause, and becomes suspicious of those about him. These are the most prominent.

Q. Will you state the physical symptoms?—A. Probably the first would be some disturbance of the vision, and motion of the eyeball. Speech may be affected, and convulsions may occur. The hearing may be impaired. The patient may die in convulsions; but all these symptoms of brain lesion may exist without insanity, and such is generally the case. There is a distinction between the cerebral symptoms accompanying Locomotor Ataxia and the mental symptoms of insanity.

Q. How do these symptoms make their appearance—slowly or suddenly?—A. Either they may be developed slowly or suddenly, according to the means by which they are produced. The sudden appearance of the disease is by the sympathetic nerve, whereas the gradual development is through the medulla elongata.

Q. What value do you place upon the test of handwriting?—A. The handwriting would not be affected unless the disease had advanced high enough to affect the arms; and when it did so rise, the arms would not be co-ordinate, the same symptoms would appear in the arms as in the legs.

Q. What conclusion would you draw from the fact that the patient wrote a firm hand?—A. I should say that the disease had not reached the upper portions of the spinal cord.

Q. In Locomotor Ataxia, does the disease necessarily affect the mental power?—A. No.

Q. In General Paresis of the insane, would you say that the person had testamentary capacity?—A. There are stages. When the disease is well established, I should say the patient was entirely deficient in such capacity. There are remissions in the disease in which the patient is apparently lucid, but he is not to be depended upon even in these conditions.

Q. What is the duration of this disease, usually?—A. On the average, three to five years.

The law having with the combined assistance of the technical evidence of medical experts and the common sense of a jury, became apprised of the fact that the person under consideration is insane, the judge or Court is left to its self to decide what follows. If in a civil case under a contract or a will, the Court must say whether or not there was sufficient capacity to perform the act in question; if in a criminal matter to decide how far the accused is responsible and so punishable.

The law of England and of this country, so far as I can make out, is that the same rule in effect is applicable to both class of cases. As may have been expected few cases are to be found on what is for the most part a question of speculative law; but Chief Justice Tyndal and Sir James Hannen have both expressed themselves to the effect that the same formula holds good in both cases. The learned Chief Justice in dealing with a case of irresponsibility by reason of a

“defect of reason from diseases of the mind as not to know the nature and quality of the act he was doing, or if he did not know it. that he did not know he was doing what was wrong,” goes on to say that this illustrates a civil case of a will fully under the same principle. In a case of murder, for example, you have, say a knife in the hand of the accused. Does the latter know the consequences of putting the knife in the heart of the living man, and does he know it is wrong? In the other case of a disputed will, put his possessions, his money before the testator. Does he know the effect of signing with a pen in his hand a sheet of paper that will operate as his will? Does he know his property, his relatives, and their claims on him, and so on?

One American case has not followed these views of the English jurists, and of the general conclusion of American judges, but held that a less degree of imbecility is necessary to invalidate a will than would be found for acquittal from a criminal charge. As Mr. Balfour Brown has expressed it, “The question in connection with crime is: Does the accused know what he is about, and can he refrain; has he capacity to choose one course rather than another? That in connection with testamentary dispositions is: Did the testator know what he was about, and had he power to will this disposition?” And so if he knows that death ensues to a living man by means of wound with a knife, and that he knows he is raising his arm and has the strength necessary, there is knowledge sufficient to criminate; otherwise the knife was, as Mr. Brown puts it, a mere instrument in the hands of disease. The knowledge in the civil case is of a like character; a man must know whether he had \$100 or \$10,000 worth of property; he must know that a will is an instrument by which his wishes are given effect to after his death; he must know whether or not he has relatives, who are his relatives, and what claims they have on him and his bounty. If he knows nothing of these things, he knows not what he is doing. In the same way the law holds that if he knows these and is insane upon every other point, his will is valid as if he were sane in every particular. This may be taken as an exact enough summing on this prolific source of litigation; and the civil side may be disposed of with the remark that as to contracts generally it requires much more capacity than to make a will, though even this is now questioned.

On the criminal side the law is not easily stated, nor is it so satisfactory. The foundation of irresponsibility is the inability to distinguish right from wrong; but if a man has this power of distinguishing, and is yet impelled by mental disease to raise his hand and slay some one, he may not be punished. An act is not a crime, unless the person committing it knows not only that it is wrong, but knows the nature and quality of act, and is free to do it or leave it alone. These elements combine a number of things about which people are not always agreed; people who are perfectly sane, and who can give a good account of their belief. What is highly reprehensible to one, may be less so to another, or to a third more so; and so in an ascending or descending scale from the average mind. Yet this part of the verdict is the least difficult, because the results are as evident as if the element of insanity did not exist. A man killed or injured by a lunatic is as palpable a result as if killed by a sane man. But to discern whether or not the accused was impelled irresistibly to kill him, or if the doing of it was believed by the accused to be a wrong forbidden by law, are things generally much more difficult to determine.

If a man has an insane delusion that by shooting his neighbour he will benefit the whole community, he may work himself up to the degree of committing the deed. He knows that death will ensue; he expects it, his delusion would not be satisfied without it; he knows too that it is forbidden by law, but he is impelled by his delusion to go on consistently in his insane project. For such an act, under the law as it stands, this man would hang, unless he was insane in other respects. But this rule of the judges, and a hard rule it is, really applies only to one class of the insane—to monomaniacs. To one man who wants to steal everything, and to another who desires to set fire to his neighbours houses, or to kill people, the plea of insanity is unavailing until the mind is shown to be gone in other respects.

The fourth answer given by the English judges to the House of Lords raises a cognate question to this. If a man labouring under an insane delusion believes that his neighbour is attempting to take his life, and if he kills him in self defence he is free, though his neighbour may have only the kindest feelings towards him. But if he killed him because he fancied his neighbour did him a wrong, he

would hang for it, because revenge and not self defence would be at the foundation of his act.

The only other point in which the judges make answer was that already referred to. In their view of the law to establish a defence of insanity it must be clearly proved that at the time of committing the act the accused was labouring under such a defect of reason from disease of the mind as not to know the nature and quality of the act he was doing, or if he did know it, that he did not know he was doing what was wrong.

It would be impossible towards the end of this paper to refer to the criticism that has been bestowed by medical writers on these extra-judicial opinions of the judges of England. To hang or imprison as a felon an insane man seems a shocking proceeding. Not that insane people are to be let at large, or that sane people are not to be protected. A man nurses delusion until it masters him, is controls his acts, it forces him to do extraordinary things. The kings and queens in our asylums would consistently put to death the subjects unreasonable enough not to pay court to them, and outside the asylum they would possibly hang for such an act. If the mind has its separate compartments for an individual craze leaving the others as in sane people, there may be reason for the law, but it is hard to suppose a case where there is deeply seated delusion so clearly cut from all other notions as not to influence them in some degree. I think that Mr. Stephen, following the idea in Lord Brougham's totality of the mind, was well justified in recommending a verdict of guilty, but his power of control was weakened by insanity. To punish for the same offence an insane man in the same way as you punish a man in his full senses appears an unequal dispensing of justice, and so far as the ends of punishment are concerned must fail to a great degree in the case of the insane man.

Dr. Cassidy referred to the difference between the legal and medical views of insanity. The lawyer naturally directed his attention to the conduct of the individual, and endeavoured to form an estimate of it. The physician, who studied the nature of the disease, its origin, symptoms and character, would be better qualified than the ordinary observer to pronounce on the insanity of an individual. In many cases where there was a degree of unsoundness of mind, it was

difficult to decide whether it amounted to insanity. In these doubtful cases the experience and scientific skill of the physician would render him better qualified to give an opinion than the lawyer.

Dr. Oldright, referring to the instances of abnormal conditions of uncertainty mentioned by Dr. Cassidy, said that such questions had occurred to himself, though he did not let them go to the stage of worrying himself as many had done. He knew cases where persons had injured themselves in morbid conditions of uncertainty. He agreed with the last speaker that a medical man was better qualified to judge of cases of insanity than a lawyer. He sees more cases, and sees them at an earlier stage. The lawyer seldom sees the early stages of the symptoms.

Dr. Ellis, in referring to *Locomotor Ataxia*, said that in many cases the mind was not diseased.

Dr. O'Sullivan said that in working up a case, he made enquiries in New York of eminent authorities whether *Locomotor Ataxia* necessarily resulted in insanity. The answers were not very decided either way. The opinion seemed to be that in the milder stages it did not.

Mr. H. R. Wood, B.A., read a paper, entitled "Contributions to Blowpipe Analysis."

## SIXTH MEETING.

Sixth Meeting, 11th December, 1886, the President in the Chair.

Certain amendments to the Constitution and Regulations were adopted.

Exchanges since last meeting, 216.

F. N. Kemlin, B.A., Ernest C. Mackenzie and John H. Horsey, were elected members.

Mr. A. F. Chamberlain, B.A., read the following paper on "The Relationship of the American Languages."

I shall devote this paper to an inquiry into the arguments which have been advanced in favour of the north-eastern Asiatic or Peninsular origin of the American Indians, and an endeavour to assign to them an origin in other directions. That the question of American Origins is still an open one is apparent. Thus, Prof. Flowers, an eminent ethnologist, says: "It is quite as likely that the people of Asia may have been derived from America, as the reverse," (*Pop. Science Monthly*, Jan., 1886); and, speaking for a sister-department of the science of man, Horatio Hale, the distinguished American philologist, declares that "Philologists are well aware that there is nothing in the language of the American Indians to favour the conjecture (for it is nothing else) which derives the race from Eastern Asia," (*Indian Migrations as Evidenced by Language*, 1883, p. 25).

The Eskimo, the most northern of our American aborigines, have in particular been claimed as being certainly northern Asiatic in their origin. They seem, however, to possess in the most marked degree, the characteristics of a very primitive people. With regard to their origin, their scanty mythology and their legendary lore furnish us with no clue; their religion is silent; and no evidence of recent Asiatic origin can be gleaned from an inquiry into their language. I insert here a short comparative vocabulary of those Eskimo dialects which it seems certain have sprung from a common stock. Though in many instances the affinities may not be striking, they are still sufficient to bear out the idea of a common origin.

## COMPARATIVE ESKIMO VOCABULARY.

ENGLISH.	KUTZ. SOUND.	TCHUKTCHU.	KADJAC.	UNALASKA.	ALEUTAN.	GREENLAND.	HUDSON'S BAY.
hear	tsnakk	knigga	auk	tanihak	tanagak	panik	nennook
black	kavngnoak	auku	halayuk	kaitcheizeok	kokksukhali	uilit	kerniak
blood	nook	kajak	aganok	anneliak	anunilik	suit	noonak
canoe	kalyak	paanien	tsbjian	aykok	tukuk	nuna	keyak
daughter		aghyuak	tsbjian	toolonsuk	totusak	errega	panneya
day	keuma	kymyk	inlak	chekeke	tshekak	frsk	keimeg
dog	tscheutik	tschintak	adaga	thak	attak	attalak	hecutinga
ear		lik	igugu	atnak	atlan	ittik-rik	erega
earth	oerruka	atla	knok	keatok	kifa	tsiket	ittik-rik
eye	idigny	iqok		athoonen	atchon	tirketik	ikkonma
father	tsamridteh	aunak		keyhuak	kignak	ugnek	ekkaloo
fingers	ipantek	ssalik			tanagellik	nyak	angernooke
fire	khallio	kaaguk		imleen	enley	arkseit	myakka
grass	nuchel	niyok			tsna	makuk	ad-eyutka
hair	argo-gei	maskok				igloo	neakoke
hand	neakon	wanga			keep	vauga	ooanga
house		tuak			toioch	imnek	imnek
I		tankuk			tooguhak	anungat	anungat
man	wouga	shuk			anunak	kannek	kanuera
moon	tuak	anaba			aghuiga	kingak	ooaseak
mother	tadkuk	kanok			anghoosin		kingura
month	kanneceak	kinga			tscholakat		ooapatook
mouth	kingar	kannyehly			atudnak		ky
nose		kuuk			inlak		keilik
night		knuk			kanek		kanpetuk-poke (t. suowa)
rain		knukak			sthak		oermina
red		knulak			akathak		oojorak
river		annin			aghaluk		ooyarra
sky		tinaka			tanngak		keateeka
snow		agach			konaktak		imnek
son		shbeknak			at takon		kovdook
star		kanak			atluok		arnua
stone		ganyak			atloken		at'amek
straw		knok			kanoon		arlek
sun		knok			shushin		pingahke
tongue		knok			tsahung		sissamat
tooth		knok			atlook		tedlema
water		knok			atlook		arlonok
white		knok			atlook		argwenrak
woman		knok			atlook		argwenrak
one		knok			atlook		kittukleemoot
two		knok			atlook		at'amek
three		knok			atlook		at'amek
four		knok			atlook		arlek
five		knok			atlook		pingahke
six		knok			atlook		sissamat
seven		knok			atlook		tedlema
eight		knok			atlook		arlonok
nine		knok			atlook		argwenrak
ten		knok			atlook		argwenrak
eleven		knok			atlook		argwenrak
twelve		knok			atlook		argwenrak
thirteen		knok			atlook		argwenrak
fourteen		knok			atlook		argwenrak
fifteen		knok			atlook		argwenrak
sixteen		knok			atlook		argwenrak
seventeen		knok			atlook		argwenrak
eighteen		knok			atlook		argwenrak
nineteen		knok			atlook		argwenrak
twenty		knok			atlook		argwenrak
twenty-one		knok			atlook		argwenrak
twenty-two		knok			atlook		argwenrak
twenty-three		knok			atlook		argwenrak
twenty-four		knok			atlook		argwenrak
twenty-five		knok			atlook		argwenrak
twenty-six		knok			atlook		argwenrak
twenty-seven		knok			atlook		argwenrak
twenty-eight		knok			atlook		argwenrak
twenty-nine		knok			atlook		argwenrak
thirty		knok			atlook		argwenrak
thirty-one		knok			atlook		argwenrak
thirty-two		knok			atlook		argwenrak
thirty-three		knok			atlook		argwenrak
thirty-four		knok			atlook		argwenrak
thirty-five		knok			atlook		argwenrak
thirty-six		knok			atlook		argwenrak
thirty-seven		knok			atlook		argwenrak
thirty-eight		knok			atlook		argwenrak
thirty-nine		knok			atlook		argwenrak
forty		knok			atlook		argwenrak
forty-one		knok			atlook		argwenrak
forty-two		knok			atlook		argwenrak
forty-three		knok			atlook		argwenrak
forty-four		knok			atlook		argwenrak
forty-five		knok			atlook		argwenrak
forty-six		knok			atlook		argwenrak
forty-seven		knok			atlook		argwenrak
forty-eight		knok			atlook		argwenrak
forty-nine		knok			atlook		argwenrak
fifty		knok			atlook		argwenrak
fifty-one		knok			atlook		argwenrak
fifty-two		knok			atlook		argwenrak
fifty-three		knok			atlook		argwenrak
fifty-four		knok			atlook		argwenrak
fifty-five		knok			atlook		argwenrak
fifty-six		knok			atlook		argwenrak
fifty-seven		knok			atlook		argwenrak
fifty-eight		knok			atlook		argwenrak
fifty-nine		knok			atlook		argwenrak
sixty		knok			atlook		argwenrak
sixty-one		knok			atlook		argwenrak
sixty-two		knok			atlook		argwenrak
sixty-three		knok			atlook		argwenrak
sixty-four		knok			atlook		argwenrak
sixty-five		knok			atlook		argwenrak
sixty-six		knok			atlook		argwenrak
sixty-seven		knok			atlook		argwenrak
sixty-eight		knok			atlook		argwenrak
sixty-nine		knok			atlook		argwenrak
seventy		knok			atlook		argwenrak
seventy-one		knok			atlook		argwenrak
seventy-two		knok			atlook		argwenrak
seventy-three		knok			atlook		argwenrak
seventy-four		knok			atlook		argwenrak
seventy-five		knok			atlook		argwenrak
seventy-six		knok			atlook		argwenrak
seventy-seven		knok			atlook		argwenrak
seventy-eight		knok			atlook		argwenrak
seventy-nine		knok			atlook		argwenrak
eighty		knok			atlook		argwenrak
eighty-one		knok			atlook		argwenrak
eighty-two		knok			atlook		argwenrak
eighty-three		knok			atlook		argwenrak
eighty-four		knok			atlook		argwenrak
eighty-five		knok			atlook		argwenrak
eighty-six		knok			atlook		argwenrak
eighty-seven		knok			atlook		argwenrak
eighty-eight		knok			atlook		argwenrak
eighty-nine		knok			atlook		argwenrak
ninety		knok			atlook		argwenrak
ninety-one		knok			atlook		argwenrak
ninety-two		knok			atlook		argwenrak
ninety-three		knok			atlook		argwenrak
ninety-four		knok			atlook		argwenrak
ninety-five		knok			atlook		argwenrak
ninety-six		knok			atlook		argwenrak
ninety-seven		knok			atlook		argwenrak
ninety-eight		knok			atlook		argwenrak
ninety-nine		knok			atlook		argwenrak
one hundred		knok			atlook		argwenrak
one hundred and one		knok			atlook		argwenrak
one hundred and two		knok			atlook		argwenrak
one hundred and three		knok			atlook		argwenrak
one hundred and four		knok			atlook		argwenrak
one hundred and five		knok			atlook		argwenrak
one hundred and six		knok			atlook		argwenrak
one hundred and seven		knok			atlook		argwenrak
one hundred and eight		knok			atlook		argwenrak
one hundred and nine		knok			atlook		argwenrak
one hundred and ten		knok			atlook		argwenrak
one hundred and eleven		knok			atlook		argwenrak
one hundred and twelve		knok			atlook		argwenrak
one hundred and thirteen		knok			atlook		argwenrak
one hundred and fourteen		knok			atlook		argwenrak
one hundred and fifteen		knok			atlook		argwenrak
one hundred and sixteen		knok			atlook		argwenrak
one hundred and seventeen		knok			atlook		argwenrak
one hundred and eighteen		knok			atlook		argwenrak
one hundred and nineteen		knok			atlook		argwenrak
one hundred and twenty		knok			atlook		argwenrak
one hundred and twenty-one		knok			atlook		argwenrak
one hundred and twenty-two		knok			atlook		argwenrak
one hundred and twenty-three		knok			atlook		argwenrak
one hundred and twenty-four		knok			atlook		argwenrak
one hundred and twenty-five		knok			atlook		argwenrak
one hundred and twenty-six		knok			atlook		argwenrak
one hundred and twenty-seven		knok			atlook		argwenrak
one hundred and twenty-eight		knok			atlook		argwenrak
one hundred and twenty-nine		knok			atlook		argwenrak
one hundred and thirty		knok			atlook		argwenrak
one hundred and thirty-one		knok			atlook		argwenrak
one hundred and thirty-two		knok			atlook		argwenrak
one hundred and thirty-three		knok			atlook		argwenrak
one hundred and thirty-four		knok			atlook		argwenrak
one hundred and thirty-five		knok			atlook		argwenrak
one hundred and thirty-six		knok			atlook		argwenrak
one hundred and thirty-seven		knok			atlook		argwenrak
one hundred and thirty-eight		knok			atlook		argwenrak
one hundred and thirty-nine		knok			atlook		argwenrak
one hundred and forty		knok			atlook		argwenrak
one hundred and forty-one		knok			atlook		argwenrak
one hundred and forty-two		knok			atlook		argwenrak
one hundred and forty-three		knok			atlook		argwenrak
one hundred and forty-four		knok			atlook		argwenrak
one hundred and forty-five		knok			atlook		argwenrak
one hundred and forty-six		knok			atlook		argwenrak
one hundred and forty-seven		knok			atlook		argwenrak
one hundred and forty-eight		knok			atlook		argwenrak
one hundred and forty-nine		knok			atlook		argwenrak
one hundred and fifty		knok			atlook		argwenrak
one hundred and fifty-one		knok			atlook		argwenrak
one hundred and fifty-two		knok			atlook		argwenrak
one hundred and fifty-three		knok			atlook		argwenrak
one hundred and fifty-four							



From this we see that the Greenland *attatak* (father) becomes in Kadiac *adaga*, in Tchuktchi *atta*, and in Aleutan *attan*, in Unalaska *attak*; *annanak* (mother) becomes in Unalaska *annak*, in Kadiac *anaka*, i. e. Aleutan *anwan*; *arkseit* (hand) becomes in Kadiac *eshet*, in Aleutan *tshu*; *ingnek* (fire) becomes in Kadiac *knok*, in Tchuktchi *annak*; *immek* (water) becomes in Tchuktchi *mok*, in Kadiac *mooe*; *ujarak* (stone) becomes in Tchuktchi *aigach*; *oonooak* (night) becomes in Tchuktchi *unjak*; *keuteetka* (tooth) becomes in Tchuktchi *gutyk*, in Kadiac *chudyt*; *attowseak* (one) becomes in Kadiac *attauden*, in Unalaskan *atoken*, in Aleutan *attakon*; *ardlek* (two) becomes in Aleutan *alluk*, in Unalaskan *arlok*; *pingahuke* (three) becomes in Tchuktchi *pinajut*; *sittamat* (four) becomes in Tchuktchi *istamat*, in Kadiac *stamik*; *kollit* (ten) becomes in Kadiac *kulen*, in Tchuktchi *kulle*; *ekkaloo* (fish) becomes in Tchuktchi *ssaljuk*. From this examination of the Greenland and Hudson's Bay Eskimo, the Eskimo of Kotzebue's Sound, the Tchuktchi, Kadiac, Unalaskan and Aleutan, we see that they have all sprung from one common stock; that the language of Greenland and Hudson's Bay approaches the nearest to what must have been the common tongue of the primitive stem from which they have all separated. And moreover I believe that the separation of these tongues from the parent stock took place in America, not in Asia. A comparison with the Tungusian, the Koriak, and other languages of north-eastern Asia, reveals many affinities which tend to show that these also are derivative languages, but have suffered much more change than the other members of this primitive family. The Kamtschatka tongue bears upon its face the evidence of great corruption and loss of words, and replenishing from other and less cognate dialects, but there is still proof enough to connect it with the great northern American family.

I believe also that the Lapps, Samoiedes, and the whole so-called "Mongolian" peoples are related to the peoples of northern America; that their languages have had a common origin, and that the seat of the primitive stock was in America. The long period which must have elapsed since their separation must necessarily have worked great changes among the numerous languages of this family, but there yet exist many distinct evidences of their common linguistic origin.

In proposing the origin of the Mongolian Peninsular Asiatic and languages of Asia from America, I believe I am offering a fair

explanation of the fact noted by Dr. Latham, "that the Peninsular languages agree in the general fact of being more closely akin to those of America than any other." Before passing on to consider another family of speech, I will cite the opinions of two eminent writers, Dr. Robt. Brown (*Races of Mankind*, Vol. I.) and Dr. Rink, who have held that the Eskimo are not recent immigrants from Asia, but are an "Hyperborean American race" forced by circumstances and the inroads of other peoples into the position they now occupy. Dr. Rink says, "The Eskimo people evidently representing the north-polar coast people of America, the first question which arises seems to be, whether their development can be conjectured with any probability to have taken place in that part of the world. Other geographical conditions appear greatly to favour such a proposition" (*Eskimo Tales and Traditions*, 1874, p. 70), and again: "There is very little probability that a people can have moved from interior Asia to settle on the polar sea-shore, at the same time turning Eskimo, and afterwards almost wholly migrating to America" (*Ib.*, p. 73). Dr. Rink also concludes that in the religion and mythology of the Eskimo there is nothing that can prove the recent Asiatic origin of that people. The great Athapascan stock of languages shows some traces of affinity with the Eskimo family; but the great diversity and corruption of the vocabulary show that a considerable period has elapsed since they separated from the parent stock. Members of this family are found as far south as New Mexico; and Prof. Buschmann (*Ueber die Spuren der aztekischen Sprache im nördlichen Mexico und höheren ameriknischen Norden*, Berlin, 1854, p. 648) has shown that the languages of the Comanche, Wihinast, Utah, &c., have numerous marked affinities with the Aztec.

We now come to the great Algonkin group, which in particular has been claimed as of recent Asiatic origin. Whatever linguistic affinities can be shown to exist between this or any other group and the Peninsular languages of northern Asia, do not, as I have shown, prove satisfactorily an Asiatic origin. A great deal of argument has been based upon the idea that the legends, traditions, and mythology of the Indians prove for them an origin from north-eastern Asia; and those of the Algonkin tribes have been most frequently cited to that effect.

Horatio Hale (Indian Migrations as evidenced by Language) discusses this question with regard to the Dakotan, Wyandot, Iroquois and Choctaw-Muskogee families, and comes to the conclusion that, instead of pointing towards Asia, the traditions of these peoples point to the north-east as the land of their forefathers and their earliest abode. He says: "The striking fact has become evident that the course of migration of the Huron-Cherokee family has been from the *north-east* to the *south-west*, i.e. from eastern Canada on the lower St. Lawrence to the mountains of northern Alabama" (p. 11). Mr. Hale and others have shown the connection which exists between the Algonkin stock and the Cherokee and cognate tongues, and in investigating the Tutelo language, he discovered that it was the oldest form of speech in the Dakotan family. As the original habitat of the Tuteloes was in Carolina, it follows that the whole Dakotan stock came from the *east* of the Mississippi. This opinion has lately been strikingly confirmed by the investigations of the Rev. I. Owen Dorsey amongst the tribes of the Siouan family. He observes: "Some authors speak of a series of migrations of these Siouan tribes from the west towards the east, but the author has been unable to learn upon what authority such statements have been made, nor has he ever found any tradition of such eastern migration among the tribes which he has visited." . . . . .

Ages ago the ancestors of the Omahas, Ponkas, Osages, Kansas, Kwapas, Winnebagoes, Pawnee-Loups, and Rees, dwelt *east* of the Mississippi. They were not all in one region, but they were all allies, and *their general course was westward*" (Migrations of Siouan Tribes, Amer. Naturalist, March, 1886). Thus from the Mississippi to the Atlantic, and from Labrador to Florida, careful study has shown a general affiliation of speech to exist (the relation in many cases it not easy to discern, but enough has been shown to prove that it does exist). It is probable that a like application in other regions will produce a like result. Neither from the languages nor from the traditions of the Indians of this vast region does the theory of Peninsular Asiatic origin gain support, and the same may be said of their mythology.

In dealing with questions of mythology, some writers have gone to the extreme of deriving all known phenomena of this kind from one source. . But too much attention cannot, I think, be paid to

those phenomena which are manifestly the product of the "working of like minds in a like state of culture." The disregard of this has led to many curious, and sometimes most absurd, views as to the origin of some of the peculiar features of the customs and mythology of our American Indians. Here let me cite a case in point. Among certain tribes of northern Asia the "hare" appears frequently in their mythology and folk-lore. In the great Algonkin family we find the myth of the "*Great White Hare*." In this apparent coincidence the advocates of an eastern Asiatic origin would find a striking proof of the truth of their theory. But when we examine into the matter we find that it is a "myth of the dawn," as Max Müller would term it; and from this as a basis the myth of the "*Great White Hare*" has grown in the following manner:—The words for "hare" and "white" in the Algonkin dialects are in many cases evidently the same at bottom, *e.g.*:—

Chippewa—*wabos*, hare; *waubishkaw*, white.

Menomonee—*wawpos*, hare; *waubish keewah*, white.

Miami—*wapawsuoh*, hare; *wapekinggek*, white.

The words for "*white*" in old Algonkin, Micmac, Penobscot, Etchemin, Abenaki, Bethuk, Cree, Massachusetts, Mohican, Nanticoke, Narragansett, Montaug, Pampticoe, Saukie, Sheshatapoosh, Squallymish, &c., are all from this same root. Thus, instead of an imported myth from Asia, we have a "language myth" grown up amid the Algonkin family. The transition from the *white of the dawn* to the *white hare* is easily understood, and the result is the myth of the "*Great White Hare*," Michabo. And I have no doubt but that in our study of American mythology we shall meet with many of these language-myths for which no other satisfactory explanation can be given.

Mr. Horatio Hale suggests that the foreign element of the Cherokee language may have been derived from the speech of the ancient "Mound-builders." He bases this view upon the fact that the Choctaw and Cherokee, "though differing in the more common words of vocabulary, agree in quite a number of terms which seem likely to have been borrowed." Dr. Brinton suggested that "the Mound-builders were in part the progenitors of the Chahta tribes." Robertson, the historian, considered the Otomis to be their present representatives. Frost (*North-Americans of Antiquity*, 1882,) sums

up the evidence in favour of their identity with the Nahuas ; others have connected them with the Natchez. The best authorities regard their civilization as essentially American.

Prof. Campbell, in several papers read before the Institute in favour of the Peninsular Asiatic origin of American peoples, claims that the "Mound-builders" were "*Hittites*." The weight of his arguments rests upon the facility with which (he says) the "mounds" can be traced from the "Tels" of Syria *via* Behring's Straits to the works of those ancient settlers in the Ohio valley ; upon the alphabet derived from certain inscribed stones alleged to be genuine relics of the Mound-builders of America ; and upon certain topographical and linguistic arguments to which I shall refer later. In a communication to the writer a few weeks ago, Dr. D. G. Brinton says :—"I would suggest that the 'Mound-builders' were probably not one but many nations, and may have belonged to quite different stocks. The time has past when they should be looked upon as a single tribe or nation. As to the origin of any one of the 'Mound-building' nations, I think it is premature to express any opinion ; we have not sufficient data." Respecting the inscribed tablets Dr. Brinton says :—"With regard to the inscribed stones you mention (the Grave Creek, Brush Creek, and Davenport stones), I personally consider them all frauds and utterly unworthy of consideration. I have not been hasty in this conclusion, but have reached it after conscientious examination." Coming from one whose thorough research and calm and unprejudiced spirit of investigation have placed him in the foremost rank of Americanists, this effectually disposes of the first two branches of Prof. Campbell's argument. The last, as will be seen, rests upon evidence still less trustworthy. I prefer, then, to see in this ancient people a nation (or nations), with a culture essentially American, and not a horde of quasi-civilized intruders from Syria. Too much, I am convinced, is being made at present of these "*Hittites* ;" and when we are in possession of all the facts in the case, I think it may possibly turn out that the *Hittites* were not the wonderful and ubiquitous people that some writers would have us believe they were. The question whether the "Mound-builders" came into the Mississippi from the north or the south has not yet been satisfactorily settled. There are evidences which point in both directions ; and may they not both be right in the light Dr. Brinton has suggested ? The existence of mounds in the far North-West has been held to be

an evidence of migration from that direction. The fact that there are mounds in Brazil bearing a remarkable likeness to those of the Ohio valley has lately been pointed out by M. Netto (*Archivo do Museo nacional do Rio de Janeiro*, Vol. VI., 1885), and certain objects held to be of southern origin, or as indicating such origin for those whose handiwork they were, have often been found in the mounds of the Mississippi valley. But such objects may have been obtained by commercial interchange, and the South American mounds may be of independent origin, or perhaps the work of refugees who fled from the north after the defeat of the "Mound-builders" and their dispersion. Perhaps the best view of the matter is that the "Mound-builders" were a vast confederacy, similar perhaps to the great league of the Iroquois, or to the combination which existed between the kings of Mexico, Tezcuco, and Tlacopan, in the time of Montezuma. This league may have consisted of many tribes, and the art of mound-building may have been a foreign graft from more southern peoples; but this is doubtful.

Many writers have professed to see in the Pueblos Indians of New Mexico the modern representatives of the old Mound-builders. If this be true, the Mound-builders must have spoken a dialect akin to some of the numerous Athapascan languages, or these survivors of that ancient people must have adopted such a language instead of their former tongue. For a comparison of the Pueblos dialects (Tesuques, Jemez, Zuni, &c.) with the Navaho, Xecorilla, Apache, and other languages, with Athapascan affinities leads to this conclusion. It may, as Mr. Hale suggests, be philology which will finally settle the much vexed question of the origin of the peoples known as Mound-builders.

Our present knowledge is not sufficient to entitle us to speak with certainty regarding the origin of the numerous tribes who occupied the Pacific coast from California to Alaska; it is very probable that a great mixing has taken place here, and only long and careful study of these languages can aid us in solving the question of their origin.

We now turn to the populations of Mexico and Central America. Since the day when Father Duran in 1585 expressed the opinion that they were the Lost Ten Tribes of Israel, human ingenuity has been almost exhausted in suggesting possible origins for these interesting peoples. It is needless, perhaps, to observe that all theories

which make their civilizations a late importation from the Old World are gradually being abandoned and cast aside. Prof. Campbell, however, comes to the conclusion that the Aztecs were Hittites, and brought their hieroglyphs from Syria. Let us consider the Mexicans first, as the Maya-Quiches are evidently a people of much greater antiquity. A recent writer says:—"The movement by which in a remote antiquity, the peoples of Central America ascended towards the north, carrying with them their relative civilization to Mexico and beyond, was reversed at the epoch of our middle-ages by a migration in the opposite direction, and it is probably to invasions of this description that we must ascribe the fall of the Maya civilization of the isthmus region" (Dr. A. Réville, *Native Religions of Mexico and Peru*, p. 20). The traditions of the Aztecs have been held by many to betoken an Asiatic origin; but they are much corrupted and bear in many cases evidences of Spanish influence. The prevailing view is that the Nahuatl nations came from the north-west, the Huehue Tlapalan being held to be the region round the Rio Colorado. Buschmann, it is true, has pointed out traces of the Aztec in the languages of the Pacific coast, and it seems to me that there are similar traces in the language of Kamtschatka; but all these are best explained (they are but faint) by migrations from the primitive Aztec seat in America, rather than by making the Aztecs a colony from Asia. Some recent writers have held with some show of reason that the Nahuatl tribes came from the east; in fact some of their oldest traditions point to the north-east as the point of origin. With regard to the Aztecs I am inclined to connect them with the northern tribes of America, with whom their language shows them to have been related; and it is rather curious that some of their legends represent their forefathers as coming from a land of sandy wastes strewn with bowlders, which seems to point to a northern region; besides, Aztlan (the white land) may find its explanation here, as may also Huehue Tlapalan (the old red land), though it seem at first contradictory of the former. A linguistic chain of evidence seems to connect the Aztecs with the Athapascan tribes, but their later development seems to have taken place in the valley of the Gila and Colorado.

Much has been written on the relations of the civilizations of Mexico and Central America; the prevailing view being that though the Mayas preceded the Mexicans, the civilization of the latter shows

an independent origin in many respects. The traditions of the Mayas point to the east as the region whence their forefathers came to America; and their antiquity precludes all possibility of a recent origin from Asia. But it is in the philology of Mexico and Central America that we find the strongest evidence against such an origin. The pictorial (or as Zelia Nuttall would have it, the phonetic) writing of the Aztecs, and the phonetic, perhaps even alphabetical, system of the Mayas, bear upon them the proofs of their essentially American origin. Speaking of the phonetic aspect of some of the Mexican writings Tylor says "There is no sufficient reason to doubt that this purely phonetic writing was of native Mexican origin" (*Early History of Mankind* p. 96). And the ablest writers upon the subject agree that the Maya system of writing is of independent growth, and not an importation from the Old World. The length of time requisite for the development of the sixteen languages of the Maya-Quiche family must take us back to a vast antiquity; add to this the period necessary to allow the development through its various stages of the Maya phonetic system, and we reach an age in the primeval past that may vie with the most ancient civilizations of the other hemisphere. When we read that from five cities alone on one occasion the Spanish governor obtained no less than 16,000 volumes or scrolls, it is but reasonable to suppose that America had a literature as well as an alphabet; and we impatiently wait for the appearance of the American Champollion who shall unlock for us the stone records of Palenque and Copan, and read for us the few volumes of ancient American history that priestly intolerance has permitted to escape the flames. That late migrations from Asia have had any appreciable effect (if they ever took place at all) upon American civilizations, I do not for one moment believe.

Dr. E. F. Hamy lately (Nov. 9th, 1886) read a paper before the Anthropological Institute "On an Interpretation of one of the Copan Monuments," in which he claims to have found upon one of the stone figures at Copan, the Chinese sign Tai-Ki; from this he obtains "fresh proofs of the influence of Asiatic upon American civilization." Referring to such views in terms of disapprobation, W. H. Dall says (in *Science* Nov. 5th 1886): "We believe that the very wide hypothesis thus broached (*i. e.* of early Chinese voyages to America) and which in one form or other has had a certain currency for more than a century, rests upon a totally insufficient basis. . . . Mr. Wol-



cott Brooks informed me that he had patiently searched into the matter, and that he had conclusive evidence that the voyage which actually took place was one to the well known and still existing province of Fusang in Corea (see Griffis' work) and had no connection whatever with America." Some have professed to see philological evidence of the Asiatic origin of the Otomi, an alleged monosyllabic language, which Senor Najera (*Disertacion sobre la lengua Otimi* 1835 p. 87) has compared with the Chinese. But Dr. Brinton has pointed out many evidences in this language of the prevailing American polysynthesis; and there is nothing improbable in the fact that a close resemblance to a monosyllabic language should develop itself upon the continent of America, as we find similar approaches to such a state amongst certain languages of Western Africa, where purely monosyllabic tongues are unknown.

With regard to the relations of the multitude of languages in South America, we have not the same light to guide us as in North American philology. Most writers, however, have seen fit to discern at least four different stocks, viz.: the Muysca, Quichua-Aymara, Carib-Tupi, and Arancanian. The two former of these seem to have developed considerable civilization; the Quichuas having attained a degree of culture which in point of antiquity can only be compared to the Maya of Yucatan. Bochica, the culture hero of the Muyscas, is represented as having come from the east; as did also Tupi and Gurani the twin progenitors of the Carib-Guarani tribes. The legends of Peru are said to bring the Incas from over the Pacific; but the best authorities regard their civilization as but a further development of primitive Aymara culture, and not a foreign graft. That these people must have reached Peru at a very early period is evident from the fact that no clear proofs of connection between the civilization of Peru and Central America have ever been made out; a portion of the primitive American stock early reached the Andean region, and there developed their peculiar civilization, without the advent of Zinghis Khan's grandson, or of Buddhist priests from China, or shipwrecked sailors from Japan.

With regard to the Quichua-Aymara language speculation has been rife. Dr. Lopez, of Monte Video, has claimed for it an Aryan origin (*Les Races ariennes du Pérou* par Vicente Fidel Lopez, 1871); and the Rev. Prof. Campbell (*Proc. Canad. Instit.*, 1881, Vol. I., Pt. 2, p. 189), styles it the "pre-Aryan Celtic," whatever that may

mean. Dr. Ellis would derive it "in common with the other American tongues from Central Asia" (Peruvia Seythica, 1875). The last two writers note its resemblance to the Basque.

What the relations of the Araucanian family are has not yet been satisfactorily settled. Prof. Campbell claims the Fuegians (a branch of the Araucanian stock) as members of his "Khitan" family and immigrants into America from Asia. Mr. Hyde Clarke claims to have discovered a relation between the Fuegian and certain languages of South Africa. He says:—"It is sufficient to state that these relations enter into a definite group, No. VIII. of Dr. Koelle's Poly-Metta Africana, and bear a notable resemblance to the Ngoten and Ekamtufulu languages. How such relations can exist between Tierra del Fuego and South and West Africa, others may explain. My own conclusions have often been made public" (Journ. Anthropol. Inst. of Gr. Brit. and Ire., Nov., 1885). The existence of a primitive Negroid people at the southern extremity of South America is not very improbable. If Mr. Hyde Clarke's views be correct, the relation of the Araucanian proper and the Panpean families to the Fuegian will be of great help in solving the problems of South American ethnology.

But it is in Brazil and Guiana that the philologist and the ethnologist alike are puzzled. The multitude of languages in these regions bewilders the investigator, but it is quite likely that proper study and application will prove (as has indeed been tacitly assumed by most writers) that they have all (or nearly all) sprung from the primitive Carib-Guarani stock. Lang (Polynesian Origins and Migrations), comparing certain languages of Polynesia and Guiana, would bring the Polynesians to America, and the contrary theory has been held by not a few.

A recent writer, M. Peixoto (Arquivo do Museo nacional do Rio de Janeiro, Vol. VI., 1885), arrives at the conclusion that "no type yet examined in Brazil presents the essential characteristics of a race; a great mixing has been long going on among South American peoples; the plastic forms of the primordial factors in the mixture have long ago disappeared in the general fusion." The resemblance in manners, customs and mythology of the Botocudos, Suyas, Yaruras and other Brazilian tribes to those of certain African peoples has often been noticed. It is possible that the ancestors of the Mosquito Indians of Central America, of the Caribs of the West Indies and

the coasts of Venezuela and Guiana, and of some of the Brazilian tribes, may have crossed over from Africa at a time when the African Islands in the Atlantic were connected with that continent, and when the West India Islands projected much farther to the eastward than is the case at present. Mr. Horatio Hale suggests that it would have been easy for a people using the immense canoes, from time to time dug up in Britain and Ireland, to cross the Atlantic with favouring winds; and is inclined to find in this the origin of the Iroquois and other North American peoples, as well as the Caribs of the West Indies.

Up to the present no one has been able to show any marked connection between the languages of North and those of South America; and as the time of their separation from a common stock is so remote, we can hardly hope that very many marked resemblances will ever be found, for among the "Turanian" languages the divergence or vocabulary is remarkable when compared with that among the Semitic or the Aryan tongues. Still I believe that careful study will in time reveal those few and important connecting links which one cannot but think exist between many languages of North and South America.

Having thus briefly reviewed our present stock of knowledge, I now return to the general question of the origin of the American peoples and languages, with a view to assigning them a trans-Atlantic origin. Prof. Whitney has said:—"The Basque forms a stepping-stone from which to enter the peculiar linguistic domain of the New World, since there is no other dialect of the Old which so much resembles in structure the American languages" (*Life and Growth of Lang.*, p. 258). And some relation between the two is admitted by most writers on philology.

With regard to archaeology, I quote Prof. Boyd Dawkins:—"We have therefore proof that an Iberian or Basque population spread over the whole of Britain and Ireland in the Neolithic age, inhabiting caves, and burying their dead in caves and chambered tombs, just as in the Iberian Peninsula, also in the Neolithic age" (*Cave Hunting*, p. 24). Now, notwithstanding the wide currency of the Finnic hypothesis as promulgated by Rask, I am inclined to believe that the Basques or the brown race, rather than the Finns or Lapps of the yellow or Mongol race, represent to-day the pre-historic Europeans. Carl Vogt is of opinion that the Basques cannot have

come from Central Asia ; and Dallas proposes Europe as the scene of the origin of the Mongolian tribes, whence, he says, they may have reached Asia by way of America (Dallas on Distrib. of Races, Journ. Anthrop. Inst., Vol. XV., No. 3). There are, however, many objections to Europe having been the primitive home of the so-called Mongol peoples. The Basques are not truly a Mongolian or Turanian people in the accepted sense of these terms. It is in the brown race that created the civilization of the Nile, and whose extraordinary culture meets us on the banks of the Euphrates, that the Basque finds his nearest congeners ; the Finns and Lapps are later and ruder developments from the same stock on another continent, the continent of America.

In the dim past of antiquity, a branch of that same primitive stock, from which the Basques, Egyptians, and earliest settlers of Accad are descended, crossed over from Europe to America, at a time when land connection between north-eastern America and Western Europe *via* Greenland, Iceland, and the Faroes, still existed. Other migrations may have taken place across the ocean, or by the sunken Isle of Atlantis, from Western Europe and Northern Africa.

It is from the race that produced the civilizations of Egypt and Accad, rather than from the wandering Mongols of the Arian steppes, that I would seek to derive that race whose culture we see in the valley of the Ohio, on the shores of lake Tezucuo, at Palenque, Uxmal and Copan, and on the slopes of the Andes in Peru. The "Mongol" race so termed I regard as a subsequent development, starting from American soil, of the same primitive stock ; spreading by Behring's Straits into Asia, and thence into Northern Europe ; having since their departure from America separated into numerous petty tribes and undergone many and extensive changes in their languages.

The following comparative list will I think bear out the reasonableness of the views I have advanced ; as has been often remarked, however, we cannot look for very striking evidences of community of origin amongst the members of a stock which has been so widely dispersed, and that, too, in the remote past. But subsequent study will, I hope, reveal the true state of the case to be much as I have stated it to be.

## COMPARATIVE ES-KIMO-TURANIAN VOCABULARY.

ENGLISH.	ASIATIC (NORTH ASIATIC).	AMERICAN (ESKIMO).
axe	galgate ( <i>Koriak</i> )	algatta, kalkalima ( <i>Tchuktchi</i> )
belly	ksuch ( <i>Kamtschatka</i> )	aksheka ( <i>Tchuktchi</i> )
black	kad, katte ( <i>Samoied</i> )	kakshikluli ( <i>Aleutan</i> )
	kaeth ( <i>Lapp</i> )	kahehezcek ( <i>Unalaskan</i> )
boy	oongua ( <i>Loo Choo</i> )	einyook ( <i>Kotzebue Sound</i> )
brother	aki ( <i>Tungus</i> )	agituda ( <i>Aleutan</i> )
cold	iyich ( <i>Ostiak</i> )	ikkee ( <i>Hudson's Bay</i> )
	kai ( <i>Samoied</i> )	keja ( <i>Greenland</i> )
day	hallug ( <i>Kamtschatka</i> )	ullit ( <i>Greenland</i> )
	halui, halo ( <i>Koriak</i> )	
	tjeld, tell, telga, jalle ( <i>Samoied</i> )	
	yeld, dialle ( <i>Tungus</i> )	
	jalakas ( <i>Lapp</i> ) [light], chald ( <i>Ostiak</i> ) [sun]	
dog	kanak ( <i>Samoied</i> )	keimeg ( <i>Hudson's Bay</i> )
		keuma ( <i>Kotzebue's Sound</i> )
duck	galle ( <i>Koriak</i> )	kymyk ( <i>Tchuktchi</i> )
ear	sehen ( <i>Tungus</i> )	galgagalaehi ( <i>Tchuktchi</i> )
	kus, ku, chau ( <i>Samoied</i> )	schijun ( <i>Kadiak</i> )
		heentinga ( <i>Hudson's Bay</i> )
		suit ( <i>Greenland</i> )
earth	na ( <i>Tungus</i> )	tshintak ( <i>Tchuktchi</i> )
		nuna ( <i>Greenland, Hudson's Bay, Kadiak</i> )
egg	muni ( <i>Samoied</i> )	numna ( <i>Tchuktchi</i> )
	muna ( <i>Finn</i> )	mannig ( <i>Hudson's Bay</i> )
	mumna ( <i>Estonian</i> )	manik ( <i>Mackenzie River</i> )
	muno ( <i>Tcheremiss</i> )	mannik ( <i>Kotzebue's Sound</i> )
	monn, muni ( <i>Wogul</i> )	
eye	cha, esha, ihseh ( <i>Tungus</i> )	cieega ( <i>Hudson's Bay</i> )
	hui ( <i>Samoied</i> )	iik ( <i>Tchuktchi</i> ), iyik ( <i>Mackenzie River</i> )
		irsik ( <i>Greenland</i> )
father	atja ( <i>Samoied</i> )	atta ( <i>Tchuktchi</i> )
	etcea ( <i>Yukagir</i> )	attak ( <i>Unalaskan</i> )
	achai ( <i>Sajal</i> )	athau ( <i>Aleutan</i> )
finger	gyhgek ( <i>Kamtschatka</i> )	tikkiek ( <i>Hudson's Bay</i> )
	tarka ( <i>Samoied</i> )	tegheya ( <i>Kotzebue's Sound</i> )
	tarka ( <i>Finn</i> )	tirkerit ( <i>Greenland</i> )
fish	kalla, kual ( <i>Samoied</i> )	eekaloo ( <i>Hudson's Bay</i> )
	kala ( <i>Finn</i> ), kole ( <i>Tungus</i> )	khalloo ( <i>Kotzebue's Sound</i> )
	kal ( <i>Hungarian</i> )	ssaljuk ( <i>Tchuktchi</i> )
	kalmach ( <i>Suamic</i> )	
	guolle ( <i>Lapp</i> )	
	olia ( <i>Tungus</i> )	
	olloga ( <i>Yukagir</i> )	
	xul ( <i>Ostiak</i> )	
fire	ennen ( <i>Kamtschatka</i> )	annegni ( <i>Tchuktchi</i> )
great	ku ( <i>Yeneseian</i> ), agoime ( <i>Yukut</i> )	ikkooma ( <i>Hudson's Bay</i> )
hair	agga ( <i>Samoied</i> )	kaaguk ( <i>Tchuktchi</i> )
	nyumit, nurikteh ( <i>Tungus</i> )	nyakka ( <i>Hudson's Bay</i> )
	tenge ( <i>Yeneseian</i> )	niyet ( <i>Kadiak</i> )
		najak ( <i>Tchuktchi</i> )
		nuyak ( <i>Greenland</i> )
		nuchet ( <i>Kotzebue Sound</i> )
		tinge ( <i>Greenland</i> )
hand	chkatseli, syttu ( <i>Kamtschatka</i> )	tsax, tsha ( <i>Aleutan</i> )
	kit ( <i>Tcheremiss</i> )	eshet ( <i>Kadiak</i> )
	giette ( <i>Lapp</i> )	arkseit ( <i>Greenland</i> )
	ket ( <i>Ostiak</i> ), kett ( <i>Mordwin</i> )	tathicka ( <i>Tchuktchi</i> )
ice	eigu ( <i>Koriak</i> )	tshikuta ( <i>Tchuktchi</i> ), ticku ( <i>Mack. R.</i> )
	djuko, dschuche ( <i>Tungus</i> )	sikkoo ( <i>Hudson's Bay</i> )
	ser, sok ( <i>Samoied</i> )	sermek ( <i>Greenland</i> )
	seren ( <i>Sajal</i> ) [cold]	
lake	tuse ( <i>Samoied</i> )	tessek ( <i>Greenland</i> )
	ten ( <i>Ostiak</i> )	tateirk ( <i>Mackenzie River</i> )
		twoga ( <i>Tchuktchi</i> )
live, life	inni ( <i>Tungus</i> )	innuowok? ( <i>Hudson's Bay</i> ) [he lives], innuk ( <i>Mackenzie River</i> )
mountain	naju ( <i>Koriak</i> )	naigak ( <i>Tchuktchi</i> )
man	chu ( <i>Loo Choo</i> )	juk ( <i>Tchuktchi</i> )
	chujikutseli ( <i>Koriak</i> )	shuk ( <i>Kadiak</i> )

ENGLISH.	ASIATIC (NORTH ASIATIC).	AMERICAN (ESKIMO).
man	khuyukutsch ( <i>Koriak</i> ) emete ( <i>Samoied</i> ) innimene ( <i>Fethonian</i> )	chojatschin ( <i>Tchuktchi</i> ) innuk ( <i>Greenland</i> ) innueet ( <i>Hudson's Bay</i> )
moon	jaillgat, gailygen ( <i>Koriak</i> )	yaalock ( <i>Kadiak</i> )
mother	anguan, aingga ( <i>Kaantschatka</i> ) angnan ( <i>Koriak</i> ) amma ( <i>Samoied</i> ) ama ( <i>Yenesian</i> ) anga ( <i>Ostiak</i> ) enie, ani ( <i>Tungus</i> )	anaan ( <i>Aleuton</i> ) anaha ( <i>Kadiak</i> ) anama ( <i>Greenland and Mackenzie River</i> ) annak ( <i>Unalaska</i> ) anana ( <i>Mackenzie River</i> )
mouth	zehylda ( <i>Kaantschatka</i> ) khan ( <i>Yenesian</i> ) angya ( <i>Yukagir</i> )	aghilga ( <i>Aleuton</i> ) aveelrek ( <i>Unalaska</i> ) kannek ( <i>Greenland</i> ), kanok ( <i>Kadiak</i> ) shetooe ( <i>Kotzebue Sound</i> ) settunka ( <i>Tchuktchi</i> )
nails (finger)	chada ( <i>Samoied</i> ) kad ( <i>Ostiak</i> ) kaeth ( <i>Lapp</i> )	kukek ( <i>Mackenz e River</i> ) mmuk ( <i>Mackenzie River</i> )
night	nygyok ( <i>Koriak</i> ) kyunnuk ( <i>Kaantschatka</i> )	unjak ( <i>Kadiak</i> ), unjuk ( <i>Tchuktchi</i> ) oomook ( <i>Hudson's Bay</i> )
nose	kannkang ( <i>Kaantschatka</i> ) hang ( <i>Yenesian</i> ) joomul ( <i>Yukagir</i> ) enku ( <i>Koriak</i> )	kinaga ( <i>Kadiak</i> ), kin k ( <i>Greenland</i> ) kingara ( <i>Huds. Bay</i> ), kingar ( <i>Kotz. Sd.</i> ) chinga ( <i>Tchuktchi</i> ), krenyark ( <i>Mack. R.</i> ) ankozin ( <i>Unalaska</i> ), anghosin ( <i>Aleuton</i> )
ram	tshukutsh ( <i>Kaantschatka</i> )	tshutakat ( <i>Aleuton</i> ) chehtak ( <i>Unalaska</i> ) kawychly ( <i>Kadiak</i> ), kakluk ( <i>Tchuktchi</i> ) koo ( <i>Hudson's Bay</i> ), koonk ( <i>Kotz. Sd.</i> ) kuik ( <i>Greenland</i> ), kuuk ( <i>Mackenzie R.</i> ) kuik ( <i>Kadiak</i> ) knak ( <i>Tchuktchi</i> ) sermek ( <i>Greenland</i> )
red	cholahin ( <i>Tungus</i> )	annu ( <i>Tchuktchi</i> ), amju ( <i>Kadiak</i> ) kannek ( <i>Hudson's Bay</i> ), amiuo ( <i>Mackenzie River</i> ), kannek ( <i>Aleuton</i> )
river	gozem ( <i>Koriak</i> ) gyhi ( <i>Kaantschatka</i> ) kila ( <i>Kaantschatka</i> ) kochall ( <i>Kaantschatka</i> )	ujarak ( <i>Greenland and Mackenzie River</i> ) ooyarra ( <i>Hudson's Bay</i> ) yamak ( <i>Kadiak</i> ) koooonak ( <i>Unalaska</i> )
sky	char ( <i>Sjef</i> ), char ( <i>Yakut</i> ), qar ( <i>Turk</i> )	annu ( <i>Tchuktchi</i> ), amju ( <i>Kadiak</i> ) kannek ( <i>Hudson's Bay</i> ), amiuo ( <i>Mackenzie River</i> ), kannek ( <i>Aleuton</i> )
snow	anghu ( <i>Koriak</i> )	ujarak ( <i>Greenland and Mackenzie River</i> ) ooyarra ( <i>Hudson's Bay</i> ) yamak ( <i>Kadiak</i> ) koooonak ( <i>Unalaska</i> )
stone	wrhauyon ( <i>Koriak</i> ) guzwen, gugun ( <i>Koriak</i> ) hyna ( <i>Tungus</i> ) kiwwi ( <i>Finn</i> ), kaw ( <i>Mordwin</i> ) kow ( <i>Bergsl.</i> ), korb, kug ( <i>Ostiak</i> )	sikkonuk ( <i>Hudson's Bay</i> ) shekenak ( <i>Tchuktchi</i> ) ajut ( <i>Greenland</i> ), agalak ( <i>Kadiak</i> ) tehkreynek ( <i>Mackenzie River</i> ) tekkinek ( <i>Labrador</i> ) tirkiti ( <i>Tchuktchi</i> ) ahnak ( <i>Unalaska</i> ), aghnak ( <i>Aleuton</i> ) agzonok ( <i>Kadiak</i> ), ukrark ( <i>Mackenzie R.</i> ) kiutit ( <i>Greenland</i> ), kenteel ( <i>Hudson's Bay</i> ) kootay ( <i>Kotzebue's Sound</i> ) gutyk ( <i>Tchuktchi</i> ), chudyt ( <i>Kadiak</i> ) kigut ( <i>Mackenzie River</i> ) moov ( <i>Kadiak</i> ) aganak ( <i>Kadiak</i> ), aganach ( <i>Tchuktchi</i> ) anahenak ( <i>Unalaska</i> ), arenak ( <i>Mack. R.</i> ) atausek ( <i>Greenland</i> ) adatsuk ( <i>Kotzebue Sound</i> ) atoken ( <i>Unalaska</i> ) attakon ( <i>Aleuton</i> ) illaak ( <i>Mackenzie River</i> ) teita-mat ( <i>Mackenzie River</i> ) tsetumet ( <i>Kotzebue Sound</i> )
sun	schigun ( <i>Tungus</i> ) zigini ( <i>Tungus</i> ) hajur, chaja ( <i>Samoied</i> ) xat ( <i>Ostiak</i> ) tykete ( <i>Koriak</i> ) tirgam ( <i>Tungus</i> ) [day]	ahnak ( <i>Unalaska</i> ), aghnak ( <i>Aleuton</i> ) agzonok ( <i>Kadiak</i> ), ukrark ( <i>Mackenzie R.</i> ) kiutit ( <i>Greenland</i> ), kenteel ( <i>Hudson's Bay</i> ) kootay ( <i>Kotzebue's Sound</i> ) gutyk ( <i>Tchuktchi</i> ), chudyt ( <i>Kadiak</i> ) kigut ( <i>Mackenzie River</i> ) moov ( <i>Kadiak</i> ) aganak ( <i>Kadiak</i> ), aganach ( <i>Tchuktchi</i> ) anahenak ( <i>Unalaska</i> ), arenak ( <i>Mack. R.</i> ) atausek ( <i>Greenland</i> ) adatsuk ( <i>Kotzebue Sound</i> ) atoken ( <i>Unalaska</i> ) attakon ( <i>Aleuton</i> ) illaak ( <i>Mackenzie River</i> ) teita-mat ( <i>Mackenzie River</i> ) tsetumet ( <i>Kotzebue Sound</i> )
tongue	omnor ( <i>Yukagir</i> ) nukotem ( <i>Lapp</i> )	ahnak ( <i>Unalaska</i> ), aghnak ( <i>Aleuton</i> ) agzonok ( <i>Kadiak</i> ), ukrark ( <i>Mackenzie R.</i> ) kiutit ( <i>Greenland</i> ), kenteel ( <i>Hudson's Bay</i> ) kootay ( <i>Kotzebue's Sound</i> ) gutyk ( <i>Tchuktchi</i> ), chudyt ( <i>Kadiak</i> ) kigut ( <i>Mackenzie River</i> ) moov ( <i>Kadiak</i> ) aganak ( <i>Kadiak</i> ), aganach ( <i>Tchuktchi</i> ) anahenak ( <i>Unalaska</i> ), arenak ( <i>Mack. R.</i> ) atausek ( <i>Greenland</i> ) adatsuk ( <i>Kotzebue Sound</i> ) atoken ( <i>Unalaska</i> ) attakon ( <i>Aleuton</i> ) illaak ( <i>Mackenzie River</i> ) teita-mat ( <i>Mackenzie River</i> ) tsetumet ( <i>Kotzebue Sound</i> )
tooth	kuppel ( <i>Kaantschatka</i> ) tody ( <i>Yukagir</i> ) tjiw ( <i>Jural</i> ), tji ( <i>Jenesian</i> ) ikta ( <i>Tungus</i> ) nu ( <i>Tungus</i> )	ahnak ( <i>Unalaska</i> ), aghnak ( <i>Aleuton</i> ) agzonok ( <i>Kadiak</i> ), ukrark ( <i>Mackenzie R.</i> ) kiutit ( <i>Greenland</i> ), kenteel ( <i>Hudson's Bay</i> ) kootay ( <i>Kotzebue's Sound</i> ) gutyk ( <i>Tchuktchi</i> ), chudyt ( <i>Kadiak</i> ) kigut ( <i>Mackenzie River</i> ) moov ( <i>Kadiak</i> ) aganak ( <i>Kadiak</i> ), aganach ( <i>Tchuktchi</i> ) anahenak ( <i>Unalaska</i> ), arenak ( <i>Mack. R.</i> ) atausek ( <i>Greenland</i> ) adatsuk ( <i>Kotzebue Sound</i> ) atoken ( <i>Unalaska</i> ) attakon ( <i>Aleuton</i> ) illaak ( <i>Mackenzie River</i> ) teita-mat ( <i>Mackenzie River</i> ) tsetumet ( <i>Kotzebue Sound</i> )
water	heghe ( <i>Tungus</i> ) inrago ( <i>Loo Choo</i> )	ahnak ( <i>Unalaska</i> ), aghnak ( <i>Aleuton</i> ) agzonok ( <i>Kadiak</i> ), ukrark ( <i>Mackenzie R.</i> ) kiutit ( <i>Greenland</i> ), kenteel ( <i>Hudson's Bay</i> ) kootay ( <i>Kotzebue's Sound</i> ) gutyk ( <i>Tchuktchi</i> ), chudyt ( <i>Kadiak</i> ) kigut ( <i>Mackenzie River</i> ) moov ( <i>Kadiak</i> ) aganak ( <i>Kadiak</i> ), aganach ( <i>Tchuktchi</i> ) anahenak ( <i>Unalaska</i> ), arenak ( <i>Mack. R.</i> ) atausek ( <i>Greenland</i> ) adatsuk ( <i>Kotzebue Sound</i> ) atoken ( <i>Unalaska</i> ) attakon ( <i>Aleuton</i> ) illaak ( <i>Mackenzie River</i> ) teita-mat ( <i>Mackenzie River</i> ) tsetumet ( <i>Kotzebue Sound</i> )
woman	heghe ( <i>Tungus</i> ) inrago ( <i>Loo Choo</i> )	ahnak ( <i>Unalaska</i> ), aghnak ( <i>Aleuton</i> ) agzonok ( <i>Kadiak</i> ), ukrark ( <i>Mackenzie R.</i> ) kiutit ( <i>Greenland</i> ), kenteel ( <i>Hudson's Bay</i> ) kootay ( <i>Kotzebue's Sound</i> ) gutyk ( <i>Tchuktchi</i> ), chudyt ( <i>Kadiak</i> ) kigut ( <i>Mackenzie River</i> ) moov ( <i>Kadiak</i> ) aganak ( <i>Kadiak</i> ), aganach ( <i>Tchuktchi</i> ) anahenak ( <i>Unalaska</i> ), arenak ( <i>Mack. R.</i> ) atausek ( <i>Greenland</i> ) adatsuk ( <i>Kotzebue Sound</i> ) atoken ( <i>Unalaska</i> ) attakon ( <i>Aleuton</i> ) illaak ( <i>Mackenzie River</i> ) teita-mat ( <i>Mackenzie River</i> ) tsetumet ( <i>Kotzebue Sound</i> )
one	dyslak ( <i>Kaantschatka</i> ) dizi ( <i>Loo Choo</i> ) akte ( <i>Lapp</i> ), yk-si ( <i>Finn</i> ) otik ( <i>Samoied</i> ), ista ( <i>Fetherm</i> ) ilan ( <i>Mandan and Tungus</i> )	ahnak ( <i>Unalaska</i> ), aghnak ( <i>Aleuton</i> ) agzonok ( <i>Kadiak</i> ), ukrark ( <i>Mackenzie R.</i> ) kiutit ( <i>Greenland</i> ), kenteel ( <i>Hudson's Bay</i> ) kootay ( <i>Kotzebue's Sound</i> ) gutyk ( <i>Tchuktchi</i> ), chudyt ( <i>Kadiak</i> ) kigut ( <i>Mackenzie River</i> ) moov ( <i>Kadiak</i> ) aganak ( <i>Kadiak</i> ), aganach ( <i>Tchuktchi</i> ) anahenak ( <i>Unalaska</i> ), arenak ( <i>Mack. R.</i> ) atausek ( <i>Greenland</i> ) adatsuk ( <i>Kotzebue Sound</i> ) atoken ( <i>Unalaska</i> ) attakon ( <i>Aleuton</i> ) illaak ( <i>Mackenzie River</i> ) teita-mat ( <i>Mackenzie River</i> ) tsetumet ( <i>Kotzebue Sound</i> )
three	tjue ( <i>Yukag. and Ostiak</i> )	ahnak ( <i>Unalaska</i> ), aghnak ( <i>Aleuton</i> ) agzonok ( <i>Kadiak</i> ), ukrark ( <i>Mackenzie R.</i> ) kiutit ( <i>Greenland</i> ), kenteel ( <i>Hudson's Bay</i> ) kootay ( <i>Kotzebue's Sound</i> ) gutyk ( <i>Tchuktchi</i> ), chudyt ( <i>Kadiak</i> ) kigut ( <i>Mackenzie River</i> ) moov ( <i>Kadiak</i> ) aganak ( <i>Kadiak</i> ), aganach ( <i>Tchuktchi</i> ) anahenak ( <i>Unalaska</i> ), arenak ( <i>Mack. R.</i> ) atausek ( <i>Greenland</i> ) adatsuk ( <i>Kotzebue Sound</i> ) atoken ( <i>Unalaska</i> ) attakon ( <i>Aleuton</i> ) illaak ( <i>Mackenzie River</i> ) teita-mat ( <i>Mackenzie River</i> ) tsetumet ( <i>Kotzebue Sound</i> )
four	tjata ( <i>Tungus</i> ), teto ( <i>Jenes.</i> ), thode	ahnak ( <i>Unalaska</i> ), aghnak ( <i>Aleuton</i> ) agzonok ( <i>Kadiak</i> ), ukrark ( <i>Mackenzie R.</i> ) kiutit ( <i>Greenland</i> ), kenteel ( <i>Hudson's Bay</i> ) kootay ( <i>Kotzebue's Sound</i> ) gutyk ( <i>Tchuktchi</i> ), chudyt ( <i>Kadiak</i> ) kigut ( <i>Mackenzie River</i> ) moov ( <i>Kadiak</i> ) aganak ( <i>Kadiak</i> ), aganach ( <i>Tchuktchi</i> ) anahenak ( <i>Unalaska</i> ), arenak ( <i>Mack. R.</i> ) atausek ( <i>Greenland</i> ) adatsuk ( <i>Kotzebue Sound</i> ) atoken ( <i>Unalaska</i> ) attakon ( <i>Aleuton</i> ) illaak ( <i>Mackenzie River</i> ) teita-mat ( <i>Mackenzie River</i> ) tsetumet ( <i>Kotzebue Sound</i> )

As regards the grammar of many of the Turanian languages, many resemblances in structure to the Northern American languages have been pointed out, and it is not necessary at present to elaborate this feature of the case.

I do not, however, propose to derive the American languages from the Basque, believing that they are but sister branches of the same

parent stock. To the Basque are intimately related the brown races of Africa (the Berbers, Foulah, Houssa), the old Egyptians and the pre-semitic Accadians. The migrations of these primitive Eur-African races into America must have taken place at a very remote period; it may be however that several distinct migrations have in course of time taken place. The routes by which they reached America were by land from Western Europe to Labrador and across the Atlantic (or over the isle of Atlantis) to Florida, the West Indies and South America. The earliest to migrate were probably the ancient Peruvians, (who may have reached South America while land connection between it and North America by the isthmus of Panama did not yet exist) the Maya-Quiches, and the ancestors of the Eskimos. Certain South American tribes probably migrated from Africa at a time much more recent.

At a very early period migrations to Asia must have taken place, the result being to develop the various Mongol tribes of Northern Asia and the Finns, Lapps and Esthonians of Europe. It may seem strange to attempt to derive the Japanese and Chinese from America. The philological relations of the Basque and Japanese, and the relations which the Japanese seems to bear to the Dakota and Cherokee-Muskhooee families can best be explained in this way. And a few coincidences can be noted between the Eskimo and the languages mentioned. A recent writer (Our Arctic Province Alaska, H. W. Elliott) would see in the Aleuts a connecting link between the Eskimo and the Japanese, and, though favoring an Asiatic origin for the Eskimo, he refers the migration to a very remote period. An American origin for the Japanese is just as reasonable. The Chinese have ever been a puzzle to the ethnologist; all we know of them is that they seem to have appeared first in the north; and to derive them also from America is as satisfactory as the solutions of the problem which have hitherto been proposed. It may be objected, that to derive the American aborigines from Africa or Europe would not give sufficient time for their early spread into Asia and the development of their civilizations in America and Asia. But the existence of an Iberian race in Europe in the Neolithic age is conceded; and the brown race [one of whose representatives the Foulahs, are described by Mollien (*Voyage en Afrique* 1818 vol. I p. 275) as "redskins and nomads" (*hommes de couleur rouge et des nomades*)] have dwelt in Northern Africa from time immemorial.

Barth says that the relations of the Peulhs (Foulahs) carry us back to an antiquity prodigiously anterior to the domination of the Pharaohs (see Crozal *Les Peulhs*, p. 268), and the date of the disturbance of the primitive negro people of Africa by the ancestors of the Peulhs etc., is fixed by F. Mueller at about 6000 B. C. It is to a people boasting an antiquity like this that I would seek to attach the ancestors of the aborigines of America. Prof. Anders Retzius, from a comparative study of crania of the ancient Caribs of the West Indies and of the Guanches of the Canaries, unhesitatingly came to conclusion that these two peoples were closely related; and the Guanches belong to the great brown race of Northern Africa and it is probable that many South American tribes came the same way as the Caribs did from Africa to the northern coast of that continent.

It has been attempted to derive some of the American peoples from Asia by reason of an apparent similarity in tribal names and names of rivers, mountains etc. This is a very dangerous ground to tread upon; and random comparison is worse than useless. For example "Koriak" and "Cherokee" have been thus co-related. But "Koriak" is from a word "Kora" (cp. Tchuktshi "Korang") meaning "rein-deer," and can have no possible connection with "Tshelaki" the name of the Indians here mentioned. The names "Yuma" and Yemez have been connected with "Yamato," "Himalaya," "Haemus" and "Hamath." "Yum-a" according to H. L. Pinart (*Zeitschrift für Ethnol*, 1886, Heft III.) is a borrowed word, being applied to the Yuma Indians by the Pima tribe, and its signification is probably the same as we find in other cases of tribal nomenclature where the name is of foreign origin. "Himalaya," according to the best authorities, means "abode of snow" in Sanscrit, and the related word "Haemus" (and "Himalaya" as well) is clearly explained by Pliny, (*Imaus incolarum in lingua nivosum significante*). In tracing the alleged migrations of the Hittites or Khitai into America much use has been made of topographical resemblances. The river-name *Songala* has been connected with *Saghalien* (island) and *Sungar* (sts). Now the meaning of *Saghalien* is easily seen; the native name is "*Saghalin anga hada*" "isle of the black mouth" i. e., the island at the mouth of the "black river," the Amur, the native name of which is "*saghalinula*" (black river). The same word is seen in the Tungus "sachalin," black. Now it is altogether unlikely that *Songala* means the "black river" or *Sun.*



gar the 'black strait.' The primitive meaning of *Hamath* is probably the very opposite of *Haemus* and *Himalaya* (snowy, white,) being most likely the same as *Ham*, *Khem*, "the dark one, the black one" (see I Chron. ii., 55).

Bunbury (Hist. Anc. Georg., 1879, Vol. I., p. 505, note) states that the resemblance of the name of the "*Cathai*" of the Punjab to the name "*Cathay*" is purely fortuitous. With regard to the "*Kitai*," Dr. Gustav Oppert says:—"The home of the Kitai is to be found in those mountainous regions in the north of Corea, whence all the rulers of China descended to the plains, as in later times did the Niutche and the Mandju" ("The Kitai and Kara-Kitai," Journ. Anthrop. Inst., 1869-70, Vol. II.). So if the *Khitai* and the *Hittites* are one and the same people, they, along with the rest of the Mongols, may have come over from America. Prof. Campbell, in his papers on "*Asiatic Tribes in America*," has endeavoured to connect the Ainos and certain American tribes in respect to their languages, and the inference to be drawn from his remarks is that the Ainos are Mongols. But Scheube (*Die Ainos*, p. 3) says:—"I cannot discover the Mongol type in the Ainos;" and D. P. Penhallow (*Canad. Record of Science*, 1886, Vol. III., No. 2, p. 128,) concludes an article upon these interesting people with the remark that "the prevailing view is that they are distinctly Aryan." Dallas (*Journ. Anthrop. Inst.*, Nov., 1885,) says:—"There seems to be now no doubt that the language of the Ainos has not the slightest affinity with the languages of the neighbouring Mongolian races." It may be that they are an Aryan tribe that has adopted a non-Aryan language; their connection with the American Indian has not, I think, been proved.

The topographical evidence by which Prof. Campbell would connect the Hittites with America does not, after careful examination, bear the construction which he puts upon it, and the philological evidence which he adduces seems to be singularly unfortunate. In his paper "*On Some Phonetic Laws in the Khitan Languages*," he claims to have discovered a sort of Grimm's law amongst the so-called "*Khitan*" tongues. It cannot be admitted that he has proved the existence of such a law. *A more complete knowledge of the various American languages in themselves is necessary before such extensive phonological rules can be laid down.* The Basque *hilargia* (moon) is

compared with the Iroquois *kilanquaw* (sun, moon). Now the derivation of *hilarity* is *il-argi* (light of the dead), not a strange appellation for the earth's silent and lifeless satellite [cp. the Algonkin *nipa* (moon), *nip* (I die), *ipua* (dead)]; but *kilanquaw*, bei-, applied to both sun and moon, can never have meant "light of the dead." The Basque *bilao* (Lat. *pilus*), *ezurra* (Latin *os* with a Basque termination), and *kharrika*, are of Latin or Romance origin, and cannot possibly be related to any American words. *Curcira* (thunder) is probably onomatopoeic, as we find in Basque another word *ortzanz* (cloud-noise). Comparisons based upon these words must therefore fall to the ground. The Aino *kunozu* (moon) is in no way related to the Basque *hilarity*, being probably a corruption of *kaw-nozu* (night-star). The case for the eastern Asiatic origin of the American peoples rests too much upon apparent phonetic resemblances, such as those I have just pointed out. Before any law like that of Grimm can be discovered and demonstrated between the American and related linguistic families, a thorough understanding of the relations which exist between the individual members of each branch of the American stock is requisite and of paramount importance.

The President read the following paper by Rev. Dr. McNish, of Cornwall, on "The Language and Literature of Brittany."

These remarks regarding Brittany occur in the last edition of the *Encyclopædia Britannica*: "Brittany, Brittany, or Britany, in French Bretagne, an ancient province and duchy of France, consists of the great north-western peninsula of the country, and corresponds very nearly to the present departments of Finisterre, Cotes-du-Nord, Morbihan, Ile et Vilaine, and Lower Loire. It is popularly divided into Upper or Western and Lower or Eastern Brittany. . . . The Celtic language is still generally spoken, especially in Lower Brittany, and a considerable body of traditional story and song is current among the people." It is obvious that Brittany is identical with Britain, and that the etymology of the two words must be the same. The Bretons or inhabitants of Brittany give to their own country the designation *Breiz*—a word which corresponds with *brat*. Professor Rhys, of Oxford, in a somewhat elaborate discussion maintains that we are to discover in *Brit*—the first syllable in Britannia—*breth* or *brath*, and that in Irish *bratt* or

*brat* means a cloth, a cloak, or a sail, and *brattan* a little cloak. "It would then appear that the word Brython and its congeners meant a clothed or cloth-clad people." "Who then," he asks, "were the people whom the Brythons did not consider cloth-clad, or properly clad? They could hardly have been Celts of any kind, as the art of making cloth of some sort was known even to the earliest of them that ever landed here. They were probably some of the aboriginal tribes whose country they, *i.e.* the Brythons, invaded on the continent."\* The Bretons give to themselves the appellation *Breiziaded*, and to their language the appellation *Brézonek*. England has among them the name *Bro-Zaos*, *the Saxon land*; and France bears the name *Bro-Chals*, *the land of Gaul*. The word *bro* which is thus employed is the Gaelic *bree*, and is to be found in *bruthaich*, a hill. *Breiz veur* is the name which the Bretons apply to Great Britain. Their own province bears the name *Breiz vihan*. Upper Brittany is known among them by the designation *Breiz uchel*, or *Gorre vreiz*; and Lower Brittany by the designation *Breiz isel*, *Gmelled vreiz*.

The Welsh, the Cornish and the Breton form the Cymric family of the Celtic languages. *Armorica*, which is another name for Brittany, reveals its etymology at a glance, signifying as it does *a country that borders on the sea*, and exhibiting an unmistakable resemblance to the Gaelic words *air muir*, or *air a' mhuir*, *on the sea*. In Welsh, Brittany bears the name *Llydaw*; the people of Brittany are known as *Llydawiad*, and the language of Brittany is known by the designation *Llydawaeg*.

The Bretons and their language date from a very remote antiquity. Niebuhr thus writes:—"The Venetians were a Belgic tribe, and so, without doubt, were all the inhabitants of Lower Brittany, whose Cimbric character seemed so evident in the time of the Romans, when all the country round about was peopled by Gaels, that a late immigration from Britain was invented to explain it. The Celts occupied the extent of country from Lusitania in Spain to the country about the Tanais in the East. . . . At an earlier period the Cymri inhabited a much greater part of Gaul. In Lower Brittany alone they maintained themselves against the invading Celts, while Normandy and the other countries were conquered by the Gael."†

\* Celtic Britain, pp. 207-210.

† History of Rome, Vol. 2, p. 522. Ethnography and Geography, Vol. 2, p. 304.

In his preface to his *Dictionnaire de la Langue Bretonne*, Le Pelletier, who expended twenty-five years on the study of that language, remarks "that it is perhaps the most ancient language among those that are spoken to day in the world." With the patriotic enthusiasm for which he was remarkable, Le Gonidec, who may appropriately be designated the Eugene O'Curry of Breton Literature, avers "that the greatest proof of the antiquity of the Breton language is that up to the present time no learned man has been able to make us re-ascend to its origin, and to show us its first steps and progressive march. It appears incontestable that the Breton language has had Asia for its cradle, and that from Asia it spread into Europe with the nations which have peopled this part of the world." It is stated on the authority of Heraclides that the person who carried intelligence to Athens of the destruction of Rome by the Gauls, related that Rome had been taken by a great host of Hyperboreans—a people who came over the icy mountains from the unknown regions of the north. Whether the Bretons belonged to those Hyperboreans or not, there can be no question that they and their language have the hoar and the honour of a remote antiquity on their side.

The physical configuration and the comparative remoteness of Brittany from the thoroughfare of human connections and migrations lead us to expect that the Celts of Brittany have been allowed to occupy their homes without much molestation. As it is *prima facie* probable, if not altogether likely, that the first Celtic occupants of Great Britain must have crossed at the Straits of Dover, and as there is abundant evidence that Celts at one time possessed the whole of France as well as the south-west of Europe, there is nothing unreasonable in the conjecture that the Bretons of to-day are the descendants of the earliest Celts that had their home in the western part of Europe.

In his tour through Brittany the famous Welsh scholar, *Carmhu-anau*: the Rev. Thomas Price, thus writes: "If I were asked what language I was chiefly reminded of, by hearing the Breton spoken by the natives in conversation, I should say certainly not so much the Welsh as the Gaelic; and this from the frequent occurrence in the Breton, of a certain nasal pronunciation very much resembling that so frequently heard in the Highlands of Scotland."

Mr. Price remarks that Druidical remains can be found in greater profusion in Brittany, than perhaps in any other country whatever.

There is still existing in Morbihan a greater variety of those curious remains, than in all the British islands put together. This corner of Europe was the favourite resort of the Druids. Then this attaches to Brittany an unusual interest, owing to the numerous evidences which it presents of the manners and industry and peculiarities of the Druids; and it is also conceded that Brittany was the cradle of chivalry and romance, and that there some of the most essential materials of romantic fiction had their home. Owing to the political upheavals which obtained over several centuries in Great Britain, it might be expected that frequent interchanges took place between the Celts of England and their brethren in Brittany, and that communications of an intimate character must often have passed between them. Stephens, than whom there can be no more reliable authority, thus writes in his *Literature of the Kymry* (p. 402): "We must therefore seek the first traces of the Arthur of romance among Kymry of Armorica, and the people of Armorica, and of ancient Gaul generally, are supposed to have been the same people as the colonists of Britain, and this would seem to be the reason why, during times of distress, the Britons fled there for refuge, and the oppressions of the Picts led many more to leave the island; and after the Anglo-Saxons had entered A. D. 513, fresh bodies flew to Armorica, and settled in the Country of Vannes and Quimper, then called Lectavia, Littan and Ilydew, and the conclusion is both legitimate and irresistible that the romantic Arthur is a creation of the Armorican Kymry." "The primitive people of the British isles," writes Le Gonidec, "who did not wish to submit to the yoke of the Saxons, fled into the mountains of the country of the Gauls . . . . Another party of the insular Britons went to find an asylum in Armorica, because they knew well that they would find a friendly people and one that spoke the same language. Saint Mayloire followed the emigrants to the Armoricans; how could the Saint have been able to make the Armoricans understand him, if he had not spoken the same language that was in use in Armorica?"

The Celts of Brittany have accordingly many features of interest and of historical importance. The inhabitants of that portion of France exceeded two millions and a half in 1876. Le Gonidec stated in 1838 that no less than two million Bretons spoke the Celtic language of their native province. It must afford immense satisfaction to Celts, whose sympathies are either directly or indirectly con-

nected with Great Britain and Ireland, that a dialect of their common language is spoken by a very large population on the continent of Europe. It is much to be regretted that the literature of a people so ancient and so remarkable is not very extensive, and that but few fragments have come down to our times from a date that can be regarded as in any sense early or remote. In the article on Celtic literature in the last edition of the *Encyclopædia Britannica*, it is stated that Armoric like Welsh is a living language, but that no monument of the old form of the language exists. The relics of middle-Breton literature consist of two miracle plays, a prayer-book or "Hours," a dictionary and the chartularies of two monasteries. Of this small list only one of the plays and the dictionary are known to exist in early manuscript originals or copies. One of the plays bears the title *Buhez Santez Nonn*, or the life of St. Nonna. The other play is entitled *Bursud braz Jezus*, or the great mystery or miracle of Jesus, and consists of two parts, the "Passover and the Resurrection."

In his famous "*Archæologia Britannica*," which was published in 1707, Lhuyd inserted an *Armorican Grammar and Vocabulary*. In the preface to his laborious work Lhuyd states "that the *Armorican Grammar and Vocabulary* which have been mentioned, were written in French by Julian Manoir, Jesuit, about the middle of the seventeenth century, and published by order of the Bishop of Quimper. The author was one of the masters at the Jesuits' school in that town, and afterwards a famous missionary in *Buss Britany*. His vocabulary, though not very considerable, was yet, so far as I could learn, the most copious extant; and so scarce that 'twas my fortune to meet but with only two copies, and those in convents." There was published at Paris in 1752, an excellent dictionary of the Breton language by Dom Louis Le Pelletier, a Benedictine Monk. It is said that he expended fifty years in the preparation of his dictionary. Great ability and industry are perceptible in the work which cost so much indefatigable pains, and which must continue to be of very great service to the student of Armorican. Other works of more or less value in connection with the literature and language of Brittany might be enumerated.

Le Gonidec may fitly be regarded as the Eugene O'Curry of Armorican literature. In a notice of the enthusiastic Breton scholar, which is prefixed to a second edition of his *Celto-Breton Grammar*

by Brizeux, the latter mentions that Jean-François-Marie-Maurice-Agathe Le Gonidec was born at Cinquet, a small harbour situated at the western extremity of Brittany, on the fourth September, 1775. He was not a stranger to the troubles which convulsed France towards the end of the last century. He rose to a position of eminence as chief of the foresters on the Rhine under Napoleon I. The overthrow of that Emperor's army at Moscow led to the loss of the lucrative situation which Le Gonidec held. He was compelled in his declining years to toil assiduously for his support. It has to be said to his credit that he continued faithful in his devotion to the language and literature of his native province. Brizeux justly observes that Le Gonidec can be called the restorer of the language and literature of the Celto-Bretons: Grammar, dictionaries and texts of language—his work embraces all, and his books, if dear to his country, are not the less recommended by their pure criticism to the learned of all Europe. Eleven years of wakeful hours, that were obtained after the daily and necessary labours for the support of his family were over, were given to the dictionaries, two years were devoted to the grammar, and ten to his admirable version of the Holy Scriptures. Three Armorican grammars were in existence before his Celto-Breton Grammar appeared in 1807. The grammars in question were La Grammaire Bretonne-Galloise, by Jean Daires, which appeared in 1621, the Grammaire Bretonne of P. Mannoir, which appeared about the same time, and the Grammar of P. Grégoire de Rostrenen, which was published towards the end of the seventeenth century. Le Gonidec's Breton-French Dictionary appeared in 1821. His French-Breton Dictionary must have been published about 1838. His translation of the New Testament, which Brezeux pronounces to be the most beautiful book of their language, appeared in 1827. Among minor translations which Le Gonidec made into Breton, is to be mentioned Thomas A. Kempis' Imitation of Christ.

So far as the value of the argument which can be drawn from the topography of any country is concerned, as to what language was spoken by its earliest inhabitants of any strength or permanence, there is much in the topography of Brittany to sustain the theory that Gaels who spoke the same language which is now spoken in the Highlands of Scotland, gave the names that the rivers and headlands and islands of Brittany still bear.

In the topography of Bretagne, accordingly, Gaelic roots are unmistakably present. The names of the rivers of Brittany disclose their Gaelic origin very readily, *e. g.* :

*Loire, luath*, fast, and *shruth, sruth*, a stream.

Loire corresponds with *Lora*, a name which frequently occurs in the poems of Ossian.

*Sevre* appears to be compounded of *seamh*, gentle, and *shruth, sruth*, a stream.

*Vilaine* seems to be the Gaelic *aluinn*, excellent.

*Oust* is the Gaelic *useje*, water.

*Don* is domhainn, deep, a *dubh black*, and *amhainn*, a river: *the black river*. The word *Don* occurs in the topography of the Highlands of Scotland.

*Seiche* appears to be related to *seacach*, fading.

*Blauet, Blath*, the Gaelic word for *warm*, forms the first syllable of *Blauet*. *Et* is *aite*, a place.

*Daorelas* is compounded of *dubh*, black, and *glas*, grey; *Douglas*, a name which occurs in the topography of Scotland and of the Isle of Man.

*Aff* is *abh*, water.

The names of the rivers in Brittany which have been cited are Gaelic, and, therefore, are closely allied to the names of rivers in Scotland and elsewhere, where the Gael has had his home from a remote past.

*Ros, a cape or promontory*, is of common occurrence in the topography of Scotland and Ireland. It is to be found also in the topography of Brittany, *e. g.* : *Rosporder, ros* and *portair*, the ferryman's promontory.

*Rostrenen, ros trian*, a third part.

*Roscoff, ros* and *cobh*, a victory.

*Rohan* seems to be derived from *sruthan*, a streamlet.

*Quimper* is the Gaelic *cuimir*, elegant.

*Penmarch* is compounded of *pen ceann*, a head, and *mara, muir, mara*, the sea.

*Quintin* is closely allied to the Gaelic *cinntinn*, growing.

*Arree Mount*. In Arree *airidh*, a shealing seems to be present.

*Auray* is allied to *ora*, golden.

*Antram* is the Antrim of Ireland, *an druim*, the ridge.



*Baird* is the Gaelic *ban*, white.

*Concarneau* is a compound of *cu coin dag* or *cuan*, ocean, and *carn*, a heap.

*Craon* is the Gaelic *craobhan*, trees.

*Douarnenez* comes from *dubh*, black, *airne*, a sloe, and *eas*, a cataract.

*Dol* is akin to *dail*, the Gaelic word for meadow.

*Dinan* is the Gaelic *dunan*, a hillock.

*Frehel*, Gaelic *fritheil*,

*Faon*, Gaelic *faobh*, spoil.

*Glenan*, *gleannan*, a little glen.

*Gourin* may be *guerean*, a pimple, or *gobhan*, a goat, as in Gourrock.

*Guer* is the Gaelic *gaoir*, a noise.

*Lanmon*. *Lan full* is the first syllable of this word.

In *Liosneven*, *lios*, a garden or fort is present. *Lios* enters largely into the topography of Ireland and Scotland.

*Landernean* seems to be a compound of *lan*, and *tighearna*, a lord.

*Locmine* is compounded of *loch*, a small lake, and *min*, soft or calm.

*Londeac* appears to be *lointean*, marshes, from *lon*, a marsh.

*Mur* signifies a wall or fortified place.

*Muzillac* is *muisealach*, *muiseal*, a muzzle.

*Morlaix* may be either *morhuach* or *murlach*.

*Angouleme* is a compound of *ancon*. *Armorican* for dead, and *leum*, Gaelic, leap.

*Ploermel* is resolvable into *plorie* (arm), Gaelic *blar*, and *mel*, Gaelic *maol*, bare.

*Redon* is from *reidh*, smooth, and *dun*, a hillock.

In *Rennes*, the well-known Gaelic word *raon* is present.

*Vannes* is akin to *ban bhan*, white.

*Ushant* seems to pertain to the same root as *fhoiseneach*, *fois*, quiet, rest.

*Morbihan* is not unlike *Morbheinn*, the Mower of the poems of Ossian.

*Morbihan* may also be a compound of *mur*, a wall, and *beag*, small.

*Cerfili* is *cathair*, a seat, and *fidh*, a poet.

The topographical names which have been adduced are sufficient to indicate that Gaelic is the substratum of the topography of

Brittany, and that, accordingly, Celts, whose language was Gaelic, were the earliest occupants of any permanence in that portion of Europe.

In the extensive region of the Alps, in the South of France, and in Spain and Portugal, there survives in the names of streams, and headlands, and mountains, and passes, imperishable evidence that in the far off past, Celts who spoke Gaelic occupied that portion of Europe in sufficient strength and over a sufficiently long period to enable them to give those topographical names, which defy the change and commotions of nations and centuries. The argument which can be drawn from the topography of Brittany tends to corroborate the theory that so far, at least, as the Celts are concerned, Gaels or Celts who spoke Gaelic preceded the other members of the Celtic family in their occupation of Europe and Great Britain and Ireland.

---

### SEVENTH MEETING.

Seventh Meeting, 18th December, 1886, the President in the Chair.

Exchanges since last meeting, 26.

A. Hamilton, M.D., and Rev. G. M. Wrong, M.A., were elected members.

Rev. Prof. Ferguson, of Queen's College, Kingston, read a paper on

### THE ETRUSCAN QUESTION.

In January last, Professor Campbell, of the Presbyterian College, Montreal, read a paper before this Institute, in which he seeks to prove the affinity of the Etruscan with the Basque, and claims to have found the clue by which he is enabled to read the Etruscan inscriptions. It is an accepted principle that our only hope of deciphering and translating the inscriptions on the monuments of a nation that has passed away is by means of a bilingual inscription. It was in this way that the hieroglyphics of Egypt, and the cuneiform inscriptions have been read. Any other way than this must be hypothetical, and therefore unreliable, for, however ingeniously the researches may be conducted, we cannot accept the results with any

confidence. Proceeding on this hypothetical principle it is quite possible, by a mere resemblance in the words, to show with great plausibility the affinity of a language, and consequently of a nation, with any other language or nation. We have not hitherto attached any importance to Professor Campbell's researches. Any attention we may have given to comparative philology has been because of its historical importance, and, if Professor Campbell derived any satisfaction from his Hittite or Aztec researches, we were not disposed to detract from that pleasure, for neither the Hittites nor the Aztecs have contributed much to the general development of civilization, and historically considered are unimportant nations. The Hittites had relations with Egypt during the Hyksos period, and during the reign of Rameses II., but they did not affect to any extent the progress of civilization. But Professor Campbell was treading very different ground when he entered the field of Etruscan research. The Etruscans were a very important people. They at one time occupied the greater part of the Italian peninsula, and largely influenced Roman civilization. They had extensive commercial relations with the inland countries of Europe, and with the Baltic. They have been regarded as foreigners on Italian soil, and there has been a very strong desire to read their numerous inscriptions, and to trace their affinity with other nations. It is more than half a century since Niebuhr said that he would willingly give half of what he possessed, if he could possibly obtain a clue to the deciphering of the Etruscan language, but he had come to look on this as utterly hopeless. Undoubtedly since Niebuhr's day some advance has been made in our knowledge of the Etruscan language. In 1828 appeared the first edition of Otfried Müller's "Die Etrusker," and in the second volume of this very learned work the author established the value and power of both the Etruscan and the Umbrian letters. Five years after, in 1833, appeared Lepsius' work, "De Tabulis Eugubinis," in which he substantiated the results arrived at by Müller. The subsequent researches of Aufrecht and Kirchhoff, of Grotefend and Lassen, of Mommsen and Deecke, of Corssen and Pauli, of Curtius and Bugge, with those of English, French, Italian, and Swedish scholars, have all tended to support the results arrived at by Müller and Lepsius, till in the last edition of Müller's work, edited by Deecke, we have a very valuable supplement, in which there is very clearly and satisfactorily represented, not only the value of the Etrus-

can letters, but the changes of which they are susceptible, their possible combinations, the laws of syncope, of inlaut and auslaut, of anlaut and ablaut, in fact a thorough treatise on the subject.

Prof. Campbell ignores the results arrived at by these scholars, whose names are a sufficient guarantee of the conscientiousness of their labours, of their industry and judgment, their extensive learning, and their sincere love of the truth. Lepsius was perhaps better versed than any other in Egyptian writing, and his researches are marked by striking calmness and judgment. Grotefend and Lassen devoted themselves with equal success to the study of the cuneiform inscriptions. Kirchoff and Aufrecht have thrown a flood of light on the old Italian dialects. Mommsen is our greatest authority on Roman history and Roman epigraphy. Why has Prof. Campbell ignored the works of all these eminent scholars? He once quotes from Deecke, but it is from that rather meagre article which Deecke contributed to the *Encyclopedia Britannica*—an article scarcely in keeping with Deecke's erudition. These earnest students were obliged to confess their inability to translate the Etruscan inscriptions, or to establish the affinity of the Etruscan language. But where these men, who spent their lives in such studies, failed, Prof. Campbell claims a complete victory. He enters the field, and waves his magic wand, and all is done; the old Etruscan starts again into life, and gives up its long impenetrable secrets. "Etruria capta est," and he declares: "I have the honour to report to this Institute, as one of the most important results of my studies in Hittite Palæography, the solution of the Etruscan problem." Perhaps we are unfitted for criticising this last wonderful achievement, as we had attached no importance to the results which Prof. Campbell imagined he had reached in regard to other languages, but we were long at a loss to understand, even from his own point of view, what possible connection there could be between Hittite Palæography and this Etruscan problem. But this present contribution is only a part of a great "Etruria Capta." He promises a fuller work in which he will offer a translation of the Etruscan Tables. We quote his words: "Of these Tables, seven only and a part of the eighth are in the Etruscan character, the rest are written in the Roman alphabet, and are in Umbrian. These Umbrian Tables are being translated and will be shortly presented to the world as the oldest Celtic documents." Umbrian Celtic? As well tell us that English is Japanese or Choctaw.

But in this promised translation of the Eugubine Tables, will Prof. Campbell kindly begin with the eighth. We have to inform him that there are not more than seven of these Eugubine Tables, and they are all in Umbrian, though five are in the Etruscan characters, and two in the Latin. The Etruscan Tables are much older than the Latin, and they prove the early extended influence of the Etruscans, and the prevalence of their alphabet. But when in 307 the Umbrians became subject to the Romans, they adopted the Roman customs and the Roman alphabet, and so the acts and the ritual of the College of Priests, which had been previously in the Etruscan alphabet, were transliterated into Latin.

Prof. Campbell has imagined that Etruscan may be Basque, and he resolves to prove it Basque. He is not the first who has imagined this. Some fifty years ago, Sir Wm. Bethran wrote some articles in "*Les Annales de Philosophie Chrétienne*," having for their object to prove the identity of the Basque and Etruscan. Scholars did not even condescend to review his absurd hypothesis. The only notice we believe the work ever received was in this form, "*Cette assertion gratuite ne mérite pas de réfutation*." Mr. Ellis, in one of his posthumous works, proposes the same.

Prof. Campbell, however, approaches the subject from a different point of view—from the supposed syllabic character of the Etruscan. But he never attempts to prove this syllabic character, he merely supposes it to be syllabic, and proceeds to prove its affinity with the Basque. Now there is a very great number of Etruscan inscriptions found, from Capua in the South up in to the Alps in the North. They are for the most part monumental inscriptions, and are therefore short. Many of them are bilingual—Latin and Etruscan, and it is reasonable to suppose, judging from other bilinguals, that the one will be a literal translation or reproduction of the other. Unfortunately these monumental inscriptions consist largely of proper names, and can aid us little in gaining a knowledge of the language; but there is this advantage which proper names present, and that is, that they will enable us to determine the character and value of the letters, and some of the grammatical forms, and it is just this advantage which has enabled Lepsius and Deecke to determine so exactly the value and power of the letters and to study the laws, which apparently govern their relations, without however gaining any fuller knowledge of the language. But besides these bilingual inscriptions

there are in the writings of Greek and Roman authors some forty or fifty Etruscan words, transliterated into Latin characters. So far as these words go, they are important, and yet they do not throw much light on the construction of the language, and they form a very meagre vocabulary; but this one thing they do, they confirm the bilingual inscriptions in establishing the character of the letters. As this is the point which Prof. Campbell pooh-poohs, it will be necessary to consider it for a little, and we shall take one or two examples of bilingual inscriptions:

V · LECNE V · PAPIRINAL  
VEL · LICINIUS VEL · PAPIRI NATUS.

Now are we wrong in supposing that V of the first line corresponds with V of the second line, and the L of the first with the L of the second, and the whole of the word Papiri of the first with the word Papiri of the second? But before *n* in Etruscan the preceding vowel is always syncopeated—the Latin Capena is the Etruscan Capna, the Latin Marcanius the Etruscan Marcna, and so Menelaus = Menle, Herakles = Herkle, and here the Latin Licinius is the Etruscan Lecne; the *i* and *e* being often interchanged. The suffix AL is a masculine genitive termination, and is of constant occurrence in the monumental inscriptions, as Arnthal of Arnth, Larthal of Larth, or son of Larth; just as in Latin we say Marcus Tullii, Marcus the son of Tullius, and the Papirinal of the above inscription is rendered in Latin Papiri natus, and the whole inscription reads, Velleius Licinius, the son of Velleius Papirus. While *al* is the masculine suffix, the corresponding feminine suffix is *-alisa*, and we have this inscription, where both the father's and mother's names are given:

LARIS FRAUCNE VELUSA LATINIALISA.  
LARIS FRAUCNE the son of VELUSE and LATINIA.

Similar inscriptions are very common, and a number may be found in Prof. Campbell's *Etruria Capta*. But the Eugubine Tables, being principally in the form of rituals, present several formulæ which occur in the Tables of the Etruscan, and also of the Latin or Umbrian character. Compare the following formulæ as they occur in the Etruscan characters of the first Table, and in the Latin characters of the sixth Table:

ETR.—Vukukum : iuviu : pune : uvef : furfath : tref : vitluf : turuf : marte :  
hurce :

LAT.—Vocucum · ioviu · ponne · ovi · furfant · vitlu · toru · trif · fetu · marte ·  
 horse ·  
 fetu : pupluper : tutas : iuvinas : tutaper : ikuvina : vatuva : ferine :  
 fetu :  
 fetu · popluper · totar · iiovinar · totaper · iiovina · vatua · ferine · fetu ·  
 puni : fetu : arvia :  
 puni · fetu · arvia ·

And again a little below in the same Tables :

ETR.—Vukukum : kureties : tref : vitlup : turup : hunte : feitu : pupluper :  
 tutas :  
 LAT.—Vocucum · corecier · vitlu · toru · trif · fetu · honde · fetu · popluper ·  
 totar · ·  
 iuvinas : tutaper : iuvinas : vatuva : ferine : fetu : arvia :  
 iiovinar · totaper · iiovinar · vatve · ferine · fetu · arvio ·

It would seem impossible to doubt that in these instances we have a simple transliteration, and that the formulæ written in the Etruscan characters are literally reproduced in the Latin characters; and if so, then they establish the value of the Etruscan letters. This would seem almost self-evident, and no one has for one moment doubted it, till Prof. Campbell propounds his hypotheses. Believing that he has solved all other linguistic problems, of the Horites and Hittites, of the Japanese and Aztecs, of the Cypriotes and Choctaws, he believes it his duty also to untie the Etruscan knot. He ridicules all these bilingual similarities, and marks out a certainly original mode of dealing with the subject. He has resolved that Etruscan is Basque, and Basque he intends to prove it, and all difficulties must give way before this hypothesis. But in choosing the Basques with which he is to prove the affinity of the Etruscans, we think Prof. Campbell has been very unfortunate. The Basques are a small body of people living on the Spanish and French slopes of the Pyrenees. They number about 700,000, and are the descendants of the old Vascons. They have never played an important part in history, and have contributed nothing to the general development of civilization. They show some affinity with some of the native tribes of North Africa, but perhaps more with the inhabitants of the American continent. We know that at one time Africa was joined to Europe at the Straits of Gibraltar, and there is every probability that in the Miocene period Europe was connected with America, and the people of America may have crossed over by a great Atlantic bridge, having left however a small remnant in Spain. But, whatever the affinity

of the Basques, they have, from a very early period, been largely affected by foreign influences. No part of Europe has so changed masters as Spain. Phœnicians, Celts, Greeks, Carthaginians, Romans, Visigoths, Alans, Moors, and the Romance nations have at one time or other held Spain, and have influenced the Basques, and these at the present day present physiological characteristics so diversified as to baffle all attempts at ethnological classification; and the Basque language is perhaps the most corrupt of all languages. The writer of the article on the Basques, in the *Encyclopædia Britannica*, a work Prof. Campbell is fond of consulting, says: "Foreign words are easily assimilated, but with modifications to suit the Basque ear." If Prof. Campbell was resolved on proving the affinity of the Etruscans with the Basques, he ought to have positively assured himself, that in using individual words, it was really in each case a Basque word of which he had got hold; for to prove the affinity of the Basque and Etruscan by means of Greek or Latin, Gothic or Romance words, however perfectly incorporated into the Basque, would be an absurdity; and we shall presently show that this is one of the absurdities in which Prof. Campbell has rather freely indulged.

But there is another difficulty. The Etruscan inscriptions are perhaps none of them later than the second century B.C., but the earliest examples of Basque literature are of the fifteenth century, except a short charter granted to the commune of Daviles in 1150, 3 *Tomos chant des Cantabra*. Now under any circumstances there must be great difficulty in proving the affinity of languages whose literatures are separated by not less than seventeen centuries, but the difficulty becomes insuperable when it is remembered that one of the languages has been subjected to very great foreign influences. We quote from M. Blabé, the greatest authority on the Basque:— "L'idiome Basque s'est tellement modifié depuis le XV<sup>ième</sup> siècle, qu'il est toujours très difficile, quand il n'est pas ab olument impossible, d'expliquer les premières textes connus qui remontent à cette époque." If the changes have been so great within three centuries, during which time the language has acquired, we should suppose, some degree of fixity through a printed literature, and when it has been comparatively free from foreign influence, what changes must have taken place in the seven en centuries when the country was constantly changing masters, and there was no literature to fix the language. M. Blabé points out that it is impossible, just on account



of the mixed character of the language and of the people, to determine the affinity of the Basques or of their language. After a lengthened review of all the sources of information, he says:—"La toponymie ancienne de l'Espagne, la numismatique dite ibérienne, le droit coutumier, et les prétendus chants héroïques, ne jettent donc, jusqu' au présent, aucune lumière sur l'origine des Basques. Les moyens d'information sont limités à l'histoire positive, à l'anthropologie, et à la philologie comparée. Ces trois sciences constatent unanimement que les Basques sont un peuple fort mélangé." M. Blabé plainly points out the great difficulty in determining the affinity of the Basques themselves. The undecided relations of the Basques and of their language has hitherto deterred Etruscologists, and would naturally deter any ordinary scholar; but Prof. Campbell's ingenuity can adapt itself to the most adverse circumstances, and perhaps we should be more correct in saying that he is quite unconscious of these difficulties. But he has not only determined that Etruscan is Basque, but also that it is syllabic, and therefore he has found it necessary to reject all the bilinguals. "The bilingual inscriptions," he says, "present many difficulties. In some cases I doubt their being bilinguals at all, as the Etruscans used characters hardly differing from the Latin." Prof. Campbell is evidently ignorant of the relation between the Etruscan and Latin alphabets. We shall presently tell him something about this relation, but in the meantime does he not see that the existence of even only one bilingual inscription is sufficient to give us the characters of the letters? How many Rosetta stones, or how many Behistun inscriptions, would Prof. Campbell wish? The very scant inscription on the boss of Tarkondemos, consisting of only seven words, in the bilingual of Hittite and Persian cuneiform, has afforded Prof. Sayce a key by which he has been able not only to determine the value of the letters, but even to read some of the Hittite inscriptions. Prof. Campbell, if consistent, must reject all the bilingual inscriptions. But these Etruscan bilinguals present many difficulties to Prof. Campbell, simply because they will not fall in with his hypothesis. He believes that Basque is Turanian, and as he has determined that Etruscan is Basque, it must therefore be Turanian also. But he imagines also that the Turanian languages are syllabic, and he concludes that as Etruscan is Turanian, it must also be syllabic, and now we begin to catch some idea of his meaning when he says:—"I have the honour to report

to this Institute, as one of the most important results of my studies in Hittite Palæography, the solution of the Etruscan problem." The Hittite is Turanian and syllabic; the Etruscan he has determined is also Turanian, and therefore syllabic. There can then be no doubt as to the light which his studies in Hittite Palæography throw on the Etruscan problem. Let us satisfy ourselves of Prof. Campbell's reasoning: Etruscan is Basque, Basque is Turanian, Turanian languages are syllabic, therefore Etruscan is syllabic also. We are not responsible for Prof. Campbell's logic, we have only tried to reduce it to the simplest terms; but to himself nothing can be clearer, and all that is necessary is to illustrate it by examples, and applying this key, he imagines that he can unlock all the treasures of the Etruscan language. All those bilingual inscriptions are of no value, nay they are deceptive, no doubt intentionally so, possibly to perplex such men as Müller and Lepsius, Mommsen and Deecke. If we are not to accept these bilingual inscriptions as virtually duplicates, then we cannot divine their meaning. In every other case bilingual inscriptions have been of the utmost value, have been indispensable, and we cannot understand why they should be worthless here. Prof. Campbell has however decided that they are worthless, and that the door will only open to his key. Now the whole value of Prof. Campbell's researches rests on the syllabic character of the Etruscan language; but we beg to differ from him, and we maintain that Etruscan is not syllabic. But admitting with Prof. Campbell that these bilinguals are worthless, yet apart from these, apart also from the fact that we know the history of the Etruscan alphabet better perhaps than we know the history of any other alphabet, we maintain that every circumstance is against the possibility of the Etruscan being syllabic. Prof. Campbell seems ignorant of the life and growth of languages, or at least of linguistic symbols. Languages pass through separate and distinct stages in regard to the character and value of the signs or symbols of thought. The first of these stages is the Ideographic, or, as it is generally called, the Hieroglyphic. A man in his barbarous state wishes to express his idea of a horse, and he draws the picture of a horse; of a man, and he draws the picture of a man. This is the earliest form in which man has expressed his ideas, whether for the purpose of communicating those ideas to others, or of preserving them, and assisting his own memory. This figurative writing is presented in the inscriptions of Egypt and of Mexico.

But this is an exceedingly cumbersome mode of expressing ideas. An almost unlimited number of separate signs would be required. This would be most burdensome to the memory, and be unable to express grammatical relations. With the growth of ideas one sign came to express several ideas by means of determinates, or small distinguishing marks added to the sign itself somewhat similar to the vowel signs in Hebrew; but there was a tendency in these original types of figurative writing to become conventional, as in the case of Chinese and the language of the cuneiform inscriptions. Here the signs do not at once suggest what they are intended to represent. They have undoubtedly grown out of iconographic prototypes, but they have lost their resemblance. They are called semeiographs, or better ideograms. Now these ideograms mark a progress from purely figurative writing to phonetics. Thought and feeling naturally express themselves in voice, and a phonetic value came to be attached to the ideogram, and the sign suggested at once an object and a phonetic value. But the representative value of these signs became less and less prominent, and in time they were used only to express a sound or combinations of sounds. The name of the object represented a certain sound, at first no doubt the whole name, and then only a part of the name. And in this way arose syllabic writing, which was generally acrological, that is, the initial letter or letters came to express the sound which was itself expressive of an idea. In the case of the Chinese the ideogram has continued to express only one sound, and not a combination of sounds, and so the language has remained monosyllabic. The sacred books of the Chinese were however accepted by the Japanese, who adopted the characters in which the sacred books were written, but they ascribed to these characters a different phonetic value, while they combined them according to the exigencies of their own national idiom, and to permit of certain flexions. But this change, as exemplified in the Japanese or similar instances, marks a change from the ideogrammatic to the syllabic form. But the combination of signs permitted by the syllable allowed a great diminution in the number of the signs. In place of the innumerable signs of the Chinese, the Japanese expressed their vocalization by forty-seven characters wholly borrowed from the Chinese, but having different determinate values. This change of the value of the Chinese characters to the Japanese took place probably in the third century, but some five hundred years

after the connection of Japan with India led to the formation of a new syllabary, based on the other, but presenting a more cursive form, and reducing the number of syllabic signs. This syllabic state of a language marks a distinct stage in the growth of language, or rather of linguistic symbols. But there is still another stage in which individual signs are used to represent individual sounds, as they are uttered by the organs of speech; and now there is possible a classification of sounds, and consequently of letters into vowels and consonants, or into dentals, labials, gutturals, and nasals, and an alphabet is formed. Now this throughout is a gradual development. The figurative writing of the Egyptians was developed into the alphabet of the Phœnicians. The conventional figurative writing of the Chinese was developed into the syllabic of the Japanese, and from that into the alphabet of the Coreans. The writing of the Accadians was developed into the cuneiform character of the Assyrians and the Babylonians, and from this passed, on the one hand into the syllabic cuneiform of the Persians, and of the Cypriots on the other. What we wish especially to point out is, that these changes mark distinct stages in linguistic development, and consequently in the development of civilization, for the two are inseparably connected. But Prof. Campbell imagines that the syllabic form is peculiar to the Turanian languages. That we may not misrepresent him we shall quote his own words. He says:—"The problem therefore is to find the powers of the Turanian alphabet or *syllabary*, Besides the Cypriote, the Corean of far Eastern Asia has furnished me with phonetic values of forms belonging to the Etruscan and other old *Turanian syllabaries*." Again:—"As the syllabic values of the Aztec characters are well known, I gained in them the actual key to the old *Turanian syllabaries*." With only a passing allusion to the absurdity of connecting the Aztec characters with the Cypriote, we wish to lay especial stress on Prof. Campbell's association of syllabism with the Turanian languages. On the other hand we would express our entire divergence from him, and we maintain that syllabism is a stage of linguistic development common to the Semitic and the Aryan with the Turanian languages. Take Persian as a type of the Aryan; Egyptian, or Assyrian, or Babylonian of the Semitic, as well as Japanese of the Turanian. It is quite true that very many of the Turanian languages at the present day are syllabic. The Japanese have only now reached that stage of development in

which they find the syllabary inadequate to their growing requirements, and are adopting the alphabet of the European nations. But we repeat that syllabism is not peculiar to any one class of languages ; it marks a stage in linguistic development. However, Prof. Campbell has determined that Etruscan is Turanian, and therefore syllabic. This is the result of his researches in Hittite Palæography, and cannot be doubted, and he sets about forming an Etruscan syllabary. But here a new difficulty meets him in the small number of the Etruscan signs. Simple letters may enter into an almost unlimited number of combinations, but syllables are not so flexible, will not so easily combine, and we require a very much larger number of syllabic signs. Thus the Amharic has thirty-three consonantal signs, each of which may combine with seven vowel signs, and a separate sign is used to denote each of these combinations, so that in the full Amharic syllabarium there are two hundred and thirty-one different signs. The Persian, though approaching very closely the alphabetic form, has thirty-six distinct characters. But Etruscan has only twenty signs. Here too Prof. Campbell's ingenuity does not fail him, and he makes his syllabic signs mean anything, thus :—

I = ha he hi ho hu au ou eu oi o u hau.

π = ta te ti da de di at et it ad ed id.

K = os ots oz otz u o uts ots uz utz hotz hetz hy hots hits.

L = so sa za zo zu us oz, sometimes es ez, also it may denote cho chu cha, and ja jo ju.

In other words, the Etruscan syllabic signs represent in each case nearly all the vowel sounds in combination with a large number of consonants, so that we may make anything we please of these syllabic signs. Prof. Campbell acknowledges this, for he says :— “The poverty of the Etruscan syllabary multiplies the equivocal to such an extent that the context, or even a knowledge of the nature of the document in which the words occur, must decide their value.”

The signs of this syllabary may mean anything we may choose to make them mean, only we must know beforehand what we expect them to say before we can make them say it. This is certainly very accommodating, but has it not struck Prof. Campbell that it is an insuperable difficulty in the way of receiving his hypothesis? But his syllabary of such a low order is inconsistent, not only with the evident laws of linguistic growth, but with the known facts of

Etruscan civilization. The Etruscans had reached a high degree of civilization. At an early period, long before the date of the earliest of these inscriptions, the Etruscans were in close relations, commercial and otherwise, with two of the most civilized nations of the ancient world, the Greeks and the Carthaginians, and among whom the Alphabet had reached the fullest development. It is inconceivable,—it is wholly inconsistent with what we know of linguistic development, that the Etruscans should, alone of these nations, have remained in the syllabic stage, that while in every other respect they should have been noted for their civilization,—a civilization to which every museum in Europe bears evidence, that yet in their language they should have belonged to a past epoch. In a work of William Humboldt, “Über die Verschiedenheit des Menschlichen Sprachbaues, und ihren Einfluss auf die geistige Entwicklung des Menschengeschlechtes,” there are such expressions as this: “There is a mutual action of language on the mind and intelligence of a people, and of the mind and intelligence on the language. This is a capital fact. The mind of a nation, and the character of its language are so intimately bound up together, that, if the one is given, the other may be exactly deduced from it.” We hold it impossible that a nation which was in a degree of equality with the Greeks,—a nation from which the Romans borrowed some of the most prominent features of their civilization, should have made no advance in their language beyond the syllabic state. But suppose we admit Prof. Campbell’s assertion, let us see what he makes of it. We have already stated that there are some forty or fifty words occurring in Greek and Latin authors, and written in Greek and Latin characters. These words, however, he treats as literal or alphabetic; but it happens that some of these words occur in the inscriptions, and here he treats them as syllabic. But so elastic in his mode of procedure that both alike are made to serve his purpose. He says: “Of the Etruscan words furnished by classical authors, many at once reveal their Basque origin. Lar or Lars, as Lars Porsena is the Basque *larri*—Great.” This titular prenomens appears to have been one of the most common among the Etruscans, as: Lars Porsena, Lars Tolumnius, Lars Herminius. Now when it is found in Greek or Latin writers it is allowed to retain its literal form, but when it occurs in the inscriptions it is syllabic, and is read *Saratuka*, and means “engraved.” It occurs in an abbreviated form at page 34 of “*Etruria Capta*,” and again at page 29, in

the feminine. But is difficult to imagine how the same word can be at one time alphabetic and at another syllabic. This Lars as it occurs as a titular prenomens means *great*, no doubt in the sense of famous; just as we say Charles the Great, or Peter the Great, or Frederick the Great. Unfortunately we can find no such meaning given to *larri* in our Basque Dictionary. Here it is defined as “un peu gros,”—somewhat gross, or rather perhaps fat. Not as if it were Charles the Great but Charles the Fat, Charles le Gros,—whom the Germans called “Karl der Dicke.” It is great in the Falstaffian sense. We doubt whether Prof. Campbell will be willing to accept this rendering. But in our Dictionary *larri* stands in a very suspicious connection, and has a very Romance look. It occurs as follows:—Largo, élargir; Laranzo, largesse; Largo, large; Larri, un peu gros. It is evidently a Romance word accepted by the Basque, and therefore cannot be used in tracing the affinity of the Etruscan with the Basque. Let us take another example of Prof. Campbell’s translations:

Etr.—F. LEONE, F. OA/IPNAL.

Lat.—C. Licinii. C. F. Nigri.

Translit.—*Age* Sanesikane *age* morabautukarasa.

Basque, <sup>a</sup>—*Age* Zunt-gikin *age* Maira Baitu sortze.

We shall not occupy time with minor criticisms, but “*age*” does not mean “to behold”; the proper word for behold is “*icust*.” But Prof. Campbell says, “The Latin Licinii is a derivative from *licium*, a leash, a tag, a thread. It corresponds exactly with the Basque *zunft*, a needleful. The final *kane* represents *egin*, to do; Zuntze<sup>gin</sup> may be an old name for tailor or weaver. The other proper name translated Nigri is Maira, a Moor or person of dark complexion. The Etruscan adds Baitu, the spotted, from *bai*, a spot, as the mother of Maira. In Latin her name would probably be read as *Varia*.” This is a very partial instance of the playfulness of Prof. Campbell’s fancy. What possible connection can there be between *Licium* and Licinii? Licinius was one of the most common of the Roman Gentile cognomens. It especially occurs in the Gens of the Fabii, who had other connections with Etruria than the disaster at Veii. But the Licinian Gens, though of plebeian origin, was very influential. It is generally regarded as having come from Etruria, and when C. Licinius Calvus was consul in 364, mindful of his Etruscan origin, he secured the admission of Etruscan youths to the Roman games. The name

occurs very often in Etruria, but also in Latium; at Tusculum we have the Porcii Licinii, and at Lanuvium the Murenæ Licinii. The form Lecne, and also the feminine Lecnesa, are very often met with on the Etruscan monuments. Licinius is simply the latinizing of Lecne, and has nothing whatever to do with *licium*, and still less with the Basque *Zunft*. But in this inscription occurs the word, or rather terminal, *nal*. No form occurs so frequently in these inscriptions as this. In the bilingual it is invariably rendered by the Latin *natus* or *filius*. Now, the uniformity of this rendering evidently occasioned some difficulty to Prof. Campbell, and his object is to work in some word which will preserve this signification; according to his syllabarium, "*nal*" reads "*karasa*," and he says this represents the Basque "*sortze*". Now, as Prof. Campbell evidently attributes much importance to these words, and seems to regard "*karasa*" and "*sortze*" as test words, going far to show the connection between Etruscan and Basque, and as his reasoning here presents a very good example of his reasoning in general, at the risk of being a little tedious, we shall examine it, and shall give his own words. He says, "The Rev. Isaac Taylor and other Etruscologists, while failing to translate these inscriptions, have made some good guesses. Such are their suppositions that the characters they have read *isa* denote a wife, those read *sec* a daughter, those read *al* a child. The first is read *nare* or *anre*, a wife; the second, *nechi* or *nesca*; and the third, *karasa*; in modern Basque, *sortze*, *natus*." Surely Prof. Campbell must be aware that modern Basque can have no bearing on the present question; he might as well try to prove the affinity of the Japanese with the old Gauls by means of the present French. However, he proceeds at some length to justify the relation of these two words *karasa* and *sortze*. He says, "It has been objected that *karasa* and *sortze* are difficult to reconcile; that *nal karasa* means *natus*, several bilinguals attest." Prof. Campbell's consistency is very wonderful. "The Basque '*natus*' is *sortze*. The only difficulty in the words is the replacement of *ka* by *so*, after an interval of over one thousand years in the history of the language." We must plead inability to understand Prof. Campbell, but so far as we can make out, he means that one thousand years ago the *so* of *sortze* was *ka*; and that within the last thousand years it has undergone a change, and *karitze* has become *sortze*. What proof can Prof. Campbell adduce of this? How does he know that a thousand years ago



*sortze* was *kartzē*, when he has no document with which to compare it older than four hundred years ago? He refers to Van Eys's "Tableau des permutations des consonnes dans les mots Basques des différents dialectes." We fail to see what this reference has to do with the question. Van Eye is alluding to the large number of the Basque dialects, and he tabulates these dialects as they at present exist, but this has nothing to do with the historical changes which have taken place in the language, or with its analogies with other languages any more than a comparison of the dialect of Yorkshire with that of Lancashire, or with the London cockney has to do with the old Celtic of the earlier Britons. But Prof. Campbell regards the words *karasa* and *sortze* as so important that he illustrates their relation to one another by their supposed common affinity to the Japanese. He says the Japanese equivalent of the Basque *sortze* is *harama*. This is very learned, and we feel our inability to follow Prof. Campbell; fortunately, it is not necessary. We suppose he will not require to be told that the nearest neighbours of the Basques on the north are the Provençal, a people speaking a Romance dialect. But if Prof. Campbell will turn to a Romance Dictionary he will find this word *sortze* not even changed, as the writer in the Encyclopædia says, "to suit the Basque ear"; or, better still, if he will turn to Diez's Dictionary of the Romance languages, he will find there *sortze* with all its Romance affinities; it is a derivative from the Latin *surgere*. This word is not Basque; it is a Romance word so lately introduced into the Basque, that it is as yet unchanged, and the very learned disquisition about its being *kartzē* a thousand years ago, and about its affinity with the Japanese *harama* is all thrown away upon us, and we still doubt the Etruscan being syllabic or that it has any connection with the Basque.

But further, on page 27 of "Etruria Capta" occur these words *Rakora* translated "offering," and in each of the next three inscriptions occurs the word *Rako*; so that on the same page *Rakora* occurs once, and *Rako* three times, and on all these occasions it is a noun and means an offering. These words occur very frequently in "Etruria Capta." So also do *Ra* and *Rano*, and at page 69 occurs *Rapi*, a verb, "to receive," and at page 98 we read "*Rako atso Rakone*," translated "towards age acknowledging,"—and regarding *Rakone* Prof. Campbell says: "The final *ne* seems to change the post-position *rako* into a verb,"—rather a unique grammatical change, we

think unparalleled in the history of language, and surely he forgets that he has all along translated *Rako* as a noun and not as a post-position. He continues: "Here *Rakone* seems to signify "acknowledging," "p ying respect to." We very much wonder, that with Prof. Campbell's profound knowledge of Basque, he has not discovered that in Basque no word begins with R. When we began to read "Etruria Capta" we were rather surprised at frequently meeting with words beginning with R, and to find even allusions to them in the notes without any apparent consciousness of their irregularity; we turned over page after page of Basque to find a word beginning with R, but without success. We again consulted our Dictionary, and under the heading R we found the following: "Cette lettre R n'est en usage, au commencement des mots Basques, que pour les noms propres tels que Rome, Rambouillet, et encore dans' le langage familier, les Basques diront Erroma, et non Roma. Il est à croire que la suppression de la consonne R comme initiale des mots a pour cause certaines difficultés que son articulation semble offrir d'abord." Humboldt says: "No word in Basque commences with R. The Basques always place an *e* before foreign words of this category, and then double the R. And in certain cases, as in the words *edastea* and *erastea*, there is a dialectic change of *d* and *r*. But they always say *erregue*—roi" M. Blabé, the most competent authority, says: "Je conviens que le Basque n'a point en propre de mots commençants par *r* et que lorsqu'il donne l'hospitalité dans son glossaire a des mots ou *r* est en tête, il a soin de les faire précéder d'une voyelle. Sur le versant Nord des Pyrénées occidentales cette voyelle est un *a*—*araya* la race," *arrichina* resine. De l'autre côté des Pyrénées les Basques disent aussi *arrocher*—rocher. Cependant ils préfixent plus volontiers l'*e*—*errisina*, resine, *errabia*, rage. Peut-être en bien cherchant trouvera-t-on quelques mots où ces préfixes *a* et *e* seraient remplacés par *i*. Aussi selon les pays, viz.: se dit *arrosa* ou *irrisa*." We do not see how we can reconcile Prof. Campbell's constant use of the *R* with the plain testimony of these eminent Basque scholars.

From the first page to the last of "Etruria Capta" any affinity between languages is based on mere similarity of sound. Prof. Campbell never once points to any similarity in grammatical forms; yet it is on this alone that any such affinity can be proved. Nay, he even makes a virtue of his rejection of grammatical forms, and he says: "I have set forth the fact that, various as are the grammatical

forms of Basque, Caucasian, Yeniseian, Japanese, Corean, Iroquois, Chocktaw, and Aztec, they are one in vocabulary, and constitute with many other members a linguistic family of no small importance. The parent speech belongs to Syria. West of Syria, in Asia Minor, Italy, Spain, and Britain, the inscriptions yield Basque." We think we have shown how far Prof. Campbell is competent to speak of this. He continues: "East of Syria, in India, Siberia and on this continent, the Japanese at first, and afterwards the Aztec, are the languages set forth." And again: "The threefold Tyrseni, Tuscer, Naharcer, Japuscer, carry us back to Mesopotamia, the land of Nairi or Nahirina, and to the region of Khupuscai, as well as forward to Navarre and Guipuscoa. The former even takes us to this continent, where the Aztecs or Citin also called themselves Nahuatl or Navetl. Who the Tuscer were it is harder to say, for the final *er* is a termination; otherwise the great Basque name *Euskara* would at once suggest itself in such a form as the Dioscurias of Colchis, now Iskurieh, near which Chapsoukes or modern Khupuscians and eastern Guipuscoans dwell." It is hard to characterize this. It is simply philology run mad. Euskara and Dioscurias connected! Prof. Campbell knows Greek, and should know that the cities which bore the name of Dioscurias, and of which there were several, received that name because they honoured as their tutelary Deities, the twin sons of Leda, Castor and Pollux, the Dioskouroi.

Perhaps the leading error into which Prof. Campbell falls is the constant application of the laws which govern the Aryan languages to the Turanian also. Grimm's laws, of the variations of consonants in the Aryan languages, do not hold good in the Turanian. But even in Aryan languages, it is always dangerous to conclude that words which assimilate in sound, or that have the same class of consonants, are connected, and much less may such assimilation be trusted in the Turanian languages. Rask, Schott, Cap'trén, Rémusat, and Boetlingk,—in fact all who have written on the Turanian languages, are very particular in guarding us against depending on the similarity in sound. But they also tell us that it is absurd to expect the existence of the same words running through the Turanian languages as they do in the Aryan. The Turanian languages have not been thoroughly classified, and the difficulty lies not only in the variation of grammatical forms, but quite as much in the vocabulary. Speaking generally, the Turanian nations have had no literature to fix

words, and the consequence is that they differ from one another to a degree of which the Aryan scholar has no idea, and which makes it impossible to compare them in the very loose way Prof. Campbell has attempted. The basis of the classification of the Turanian languages has hitherto been according to the employment of pronominal affixes, but this is an unsatisfactory and very meagre mode of arriving at a classification. Max Müller says: "To maintain a word and not to allow it to be replaced by a new expression was possible in the Aryan, that is in a social state of the language, not among nomad tribes, who, living only for the present, were little concerned about the past or future, without history, without ambition; and thus we find that the number of common words is very small." Schott says: "We ought not to despair about the affinity of these languages, the Turanian, although the words for the most necessary ideas in them are so essentially different. To Prof. Campbell, however, the Turanian languages present no difficulty whatever, and he proves their affinity with one another by long lists of words, which he says are identical in Basque and Etruscan, in Japanese and Circassian, in Hittite and Chocktaw, in Iroquois and Aztec. We trust Prof. Campbell will pardon us if we prefer the judgment of Müller and Schott, and of a score of other Turanian scholars to his judgment, and if we express a very strong doubt as to the value of his researches and his very remarkable conclusions.

And now a few words regarding the Etruscan alphabet, its origin, some of its peculiarities, and the extent of country over which it prevailed, and a short statement of what is generally received concerning the origin of the Etruscans. The town of Chalcis in Eubœa was one of the oldest of the Phœnician colonies, and received from Phœnicia the alphabet, which it adopted with very little change. When Chalcis became an Ionic possession it still retained its alphabet, which is more closely connected with the old Phœnician than any other of the Greek alphabets. Shortly after Chalcis became Ionic it entered into rivalry with Miletus for commercial and colonial supremacy. Miletus acquired a supremacy in Eastern Europe, in the Ægean, and the Euxine; while Chalcis turned to Italy and the West. Cumæ was founded by a colony from Chalcis, and became a centre from which Greek learning, Greek culture, and the Greek Chalcidian alphabet were communicated to the rest of Italy. Etruria early received its alphabet from this source and an examination of the Etruscan letters

will at once show their similarity with that earliest Greek alphabet. The Etruscan, the Umbrian and the Oscan of the Italian dialects approach most nearly in their alphabets to the Chalcidian, and the Latin is the farthest removed. The Etruscan rejects the soft mutes B, G, D, and retains the aspirates *th*, *ph*, *ch*. The Latin on the other hand retains the soft mutes and rejects the aspirates. The Etruscan and the Umbrian alike retain the Sam and the Sigma, the Zain and Samekh of the Phoenicians. At that early period we perhaps cannot expect exact fixity in the alphabet, and while all the Etruscan inscriptions are of the same type, there are yet some minor differences, as we may see by comparing the pure Etruscan alphabet with the Etruscan alphabet of Campania. This last lying close to the Oscan, seems to have been affected by it. The influence of the Etruscans was very great in the South, but especially so in the north of Italy, and even in the districts still further north. They carried on commerce with central Europe, and apparently with the countries around the Baltic. Northern wares are frequently found in the tombs, and were also exported from Tarquinii, a seaport which rivalled Massilia in the amount of its exports. The result was that the Etruscan alphabet extended far into Europe, and from the *Romana Provincia* on the west to the Tyrol and Carinthia on the east. Throughout this extended district the Etruscan alphabet prevailed. But in the north-eastern corner of Italy another element was introduced and another Greek alphabet. That movement which drove the Dorians out of Thessaly to the south seems to have compelled the migration of another tribe into north Italy, and this tribe settled about the mouths of the Po and the Adige. Whether these were Veneti or the Euganei, we are not prepared to say. The inscriptions in this alphabet are found principally at Este. With which of the Greek alphabets we are to connect it is still uncertain. Berndorf believes it to be Ionic; Kirchoff regards it as Locrian; while the Bronze of Tegea would seem to connect it with the Arcadian or the Elean.

And now, before we close, a few words regarding the origin of the Etruscans. Herodotus tells us that the Lydian nation having, from internal difficulties, become divided, one portion emigrated from Lydia under Tyrrhenus, or, as he is some times called, Tarchon, and that after a time these emigrants settled in Umbria, and by Umbria Herodotus means North Italy. Whatever importance we may attach to this story it must be admitted that there are some

facts which seem to lend it plausibility. The sea which washes the west coast of Etruria has, from an early period, been called the Tyrrhenian Sea, and the city of Tarquinii is regarded as having derived its name from Tarchon. That a band of pirates called Tyrrhenians did long infest the Ægean Sea is well attested, and it seems equally certain that a portion of them settled in Italy. Thucydides speaks of Tyrrhenian-Pelasgians who had originally dwelt in the peninsula of Athos, but were driven from there to Athens or Attica, and finally took refuge in Lemnos. Herodotus adds that these Tyrrhenians drove out the Minyae and held the island for some time but were overpowered by Otanes, a general of Darius Hystaspes. After the close of the Persian wars, the Athenians took possession of the island. Both ancient and modern writers identify these Tyrrhenians with the Tyrrhenian invaders of Italy. Niebuhr was the first to point out that the Etruscan was a mixed language, and Lapsius believes that with a strong Pelasgic element there is combined an Umbrian and possibly a Greek. Without entering into any discussion of these opinions we notice that the identification of the Tyrrhenians of Lemnos with the Tyrrhenians or Etruscans of Italy has been confirmed by the recent discovery on the island of Lemnos of two inscriptions in unmistakable Etruscan. These inscriptions, which seem of different dates, are engraved on two sides of a large block of stone, which evidently formed part of an altar. As read, the altar is called the Altar of the Hephæstii, and is dedicated to Zerona, worshipped in Myrina. Hephæstias and Myrina were the two principal towns on the Island. This deity, Zerona of the Tyrrhenians of Lemnos, suggests a connection with the Zirne of the Etruscans, and the Macedonian Zeirene, and, perhaps, with the Thracian Zarunthos, -thos being a masculine termination. These similarities would seem to identify the Tyrrhenian-Pelasgians of Etruria with the Pelasgians of Greece. But there is satisfactory evidence connecting this stone with the place where it was found. It bears the names of the two towns of the island, and is dedicated to the tutelary Deity of one of these towns, and it must be remembered that the dedication is in the Etruscan language. This new discovery certainly corroborates the information given by Herodotus, by Thucydides, Hellanicus, Plutarch and Strabe. But perhaps this new discovery does not determine very much, for the question will be asked: Who were these Tyrrhenian-Pelasgians? But this discovery will

have the effect of pointing out more definitely in what direction researches ought to be pushed, while it renders more probable the finding of some bilingual which may furnish the key to unlock the Etruscan mystery. It does not as yet permit any new solution of the Etruscan problem, it only gives hope of some further light on the subject.

The President said that it was hardly fair to consider that Prof. Campbell had overlooked the fact that a syllabic language was a stage of development from picture-writing. He considered that Prof. Ferguson had taken quite as much liberty with the principles of philology as Prof. Campbell. In regard, however, to inscriptions that he had shown Prof. Campbell, the latter acknowledged that if a satisfactory explanation could not be given, his whole theory must fall to the ground.

The President read a paper on "Eskimo Numerals."

---

#### EIGHTH MEETING.

Eighth Meeting, 8th January, 1887, the President in the Chair.

Exchanges since last meeting, 136.

The following were elected members:—Thomas M. Scott, G. S. C. Bethune, A. Gaunt, S. Jardine, John L. Kerr, W. E. H. Massey, R. Pitman, C. F. Wagner, Henry Winnett, H. S. Alexander, F. D. Manchee.

Mr. Arthur Görgenyi, on invitation of the President, read a paper on "The Corea."

On motion by Dr. Meredith, seconded by Mr. J. C. Dunlop, the thanks of the Institute were tendered to Mr. Görgenyi for his interesting and valuable paper.

On motion by Dr. Kennedy, seconded by Mr. Boyle, the privileges of membership of the Institute were tendered to Mr. Görgenyi during his stay in Toronto.

Dr. Rosebrugh read the following paper on "Duplex Telephony."

In this paper I desire to call the attention of the members of the Institute to some recent advances that have been made in the direction of duplexing telephone lines. It is now ten years since the telephone was introduced but it is only quite recently that attention has been directed to duplex telephony. Duplex telephony seems to be adapted to long distance telephony only. In long distance telephony the best results are obtained when two wires are used, one wire being used as a return wire;—the two wires forming what is called a metallic circuit. The wires used for this purpose require to be first-class conductors. They are now made of copper. This necessarily very much increases the cost of long distance telephone lines, firstly because copper wire is expensive and secondly because two wires instead of one are used.

Hence any means or device that will increase the working capacity of telephone-trunk-lines will proportionately decrease the cost of long distance communication by telephone.

When I took up this question a little over two years ago my object was to use the metallic circuit or double wire trunk line system connecting two telephone exchanges so that either two telephone subscribers or a telephone subscriber and a central office operator at each end of the metallic circuit could communicate simultaneously without interference. In order to accomplish this I found that there were two problems to solve, firstly, how to render the central office receiving telephones neutral to the subscribers' transmitters, and secondly, how to render the subscribers' receivers neutral or insensitive to the central office transmitters.

The solution of the first problem was not attended with any great difficulty. The plan adopted was as follows, namely:—At each central office and at each end of the metallic circuit a subscriber's line was attached. Instead of using the ordinary telephone receiver with a single coil, a telephone with a double coil was used and instead of inserting said coil in a single branch of the metallic circuit, one coil was inserted in one branch and the other coil in the other branch of the metallic circuit and the connections were made so that electrical currents traversing one coil, would be neutralised by the electrical currents traversing the other coil. Speaking technically, the coils were connected differentially. The electrical currents generated by the subscribers' transmitters passed through the two coils in opposite



directions and consequently neutralized each other. Hence while two subscribers, one at each end of the metallic circuit, were using the line, nothing would be heard in the central office telephones.

The first problem having been solved, I was encouraged to attempt the solution of the second, namely, how to render the subscribers' telephones neutral to the central office transmitters. This was found to be a difficult problem. It was obvious that if the transmitters were placed in either branch of the metallic circuit, the electrical currents generated by said transmitters would divide at the junction of the subscribers' lines and a portion of said currents would escape to ground through the subscribers' telephones. Without stopping to enumerate the different expedients resorted to, I finally saw that the only solution to the problem was to arrange the central office transmitters so that both branches of the metallic circuit would be charged equally, simultaneously, and in opposite directions. By charging one wire positively and the other negatively at the same time, I saw that the electrical equilibrium between the two wires could be disturbed without affecting the equilibrium of the subscribers' lines. Fortunately after many and various experiments the means for accomplishing this were discovered and the problem was finally solved.

I also discovered that this can be accomplished in several ways. I will call your attention to but two of these. The first of these methods is to use a transmitter with two induction coils, the primary coils being connected either in series or in multiple arc, and the

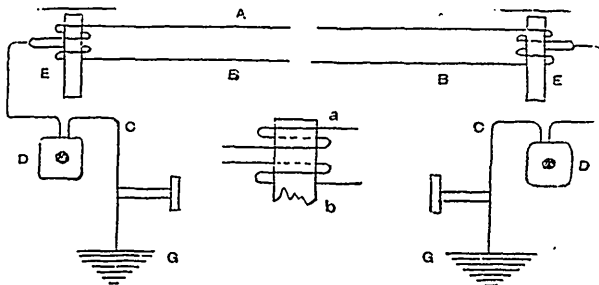


FIG. 1.

In Fig. 1 *A.A.* and *B.B.* are two branches of a metallic circuit, and *C.C.* are two subscribers' lines attached thereto. *D.* and *D'*, subscribers' transmitters, and *E.E.* are receiving telephones at two central offices at each end of the metallic circuit respectively. The telephones *E.E.* have two coils, *a* and *b*, the former connected with wire *A.* and the latter with wire *B.* These coils are connected differentially, and the telephones are neutral to the subscribers' transmitters.

secondary coils being connected in circuit, the one in one branch of the metallic circuit and the other in the other branch of the metallic circuit. In the second method, repeating coils are used with one coil in each branch of the metallic circuit, said coils being connected with each other and also with an independent telephone circuit.

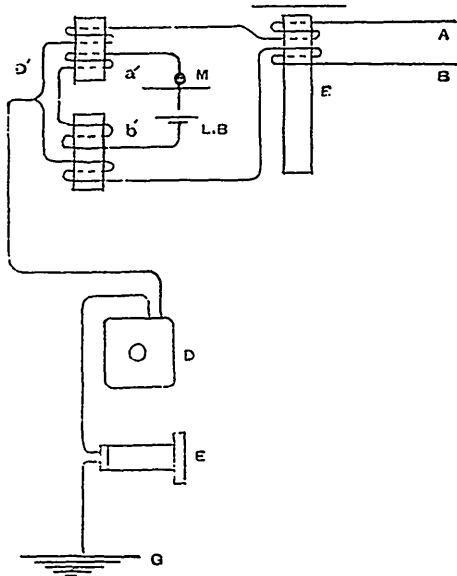


FIG. 2.

In Fig. 2 *A.* and *B.* are the two branches of a metallic circuit at one end of a telephone trunk line. *C.* is a subscriber's line, and *E.* a receiving telephone in said subscriber's line. *D.* is a transmitter with two induction coils at the central office. The secondary coil of coil *a'* is in circuit with wire *A.*, and the secondary coil of coil *b'* is in circuit with wire *B.* *M.* is a microphone, and *L.B.* the local battery connected with the primary coils of *a'* and *b'*. *E.* is the differentially wound receiving telephone at the central office.

In the first method the operation is as follows: The voice impulse vibrates the diaphragm of the transmitter, this varies the strength of the local battery circuit traversing the primary coils of the two induction coils, this generates secondary currents in the two secondary coils and this in turn generates electrical currents in the two branches of the metallic circuit, and if the two coils are properly balanced, electrical impulses are generated in each branch of the metallic circuit equally and simultaneously, and if the connections are properly made, these electrical impulses traverse the metallic circuit in opposite directions, the currents generated in one coil being reinforced by the currents

generated in the other coil.\* I might mention here in passing that the converse is also true, namely, if the connection of one of the coils be reversed, the currents generated by one coil will be opposed by those of the other and no current will traverse the metallic circuit, the currents will meet, however, at the subscribers' lines, and, being reinforced, will proceed to "ground" through the subscribers' telephones. Advantage may be taken of this fact and two sets of transmitters may be used at the central office or at any point in the metallic circuit, and they may be connected in such a manner that the subscribers' telephones will be responsive to one and neutral to the other.

Preferably, however, I would give the subscriber both a return wire and a ground wire, and, preferably, two installations of telephonic apparatus; one a single installation for ordinary use, and the other an installation of duplex apparatus for long-distance telephoning on the metallic circuit.

When repeating coils are used for charging the two branches of the metallic circuit, said branches are charged indirectly through said repeaters. I am aware that there is nothing new in using repeating coils in telephone circuits, but, so far as I am aware, they have never been used as here described nor with the same object in view, namely, to actuate and to be actuated by both branches of a metallic circuit simultaneously. The advantage of using repeaters, as here indicated, is to enable two subscribers at each end of the metallic circuit to communicate simultaneously without interference, one subscriber using a line connecting directly with the metallic circuit and the other subscriber using a line connecting indirectly by means of the two repeating coils. Hence by a combination of these two methods it will be seen that either two subscribers or one subscriber and a central office operator at each end of a metallic circuit may communicate simultaneously without interference.

One important advantage resulting from this arrangement remains to be named, namely, the subscribers have the advantage of two conductors instead of one. This reduces the resistance of the line one-half, and must necessarily very much improve the working of long-distance telephone lines. This idea may be extended as follows: Two metallic circuits may be connected at each end so as to form a

---

\* Adjustable cores are used in connection with the two induction coils for the purpose of balancing, in case the two branches of the metallic circuit are not perfectly balanced.

third metallic circuit. This third metallic circuit may contain duplex central office telephonic apparatus and form a connection with a subscriber's line as well. This would give the subscriber the benefit of four conductors. The four trunk lines would be formed into three metallic circuits, and three repeating circuits could be used. In other words, the four wires would admit of four subscribers at each end of the line using the same wires simultaneously.

In August, 1885, I communicated my duplex telephone system to Prof. S. P. Thompson, of the Finsbury Technical Institute, London, England, and, through his advice and kind offices, a patent was taken out in Great Britain. An application was also filed at Washington. I submitted my system to the American Bell Telephone Company in May last, but I have not learned whether it has as yet been put in practical operation. In the meantime two claimants have made their appearance, namely, one J. J. Curry and one J. A. Barrett, the former an employee of the New England Telephone Company, and the latter an employee of the New York Telegraph and Telephone Company, both under the control of the Bell Company. One claims the arrangement of the differentially wound apparatus, and the other the arrangement of the repeating coils.

I will conclude this paper by giving two extracts from the New York *Electrical World* bearing upon the subject. The first appeared July 31st, or about two months after my system was submitted to the Bell Telephone Company. It says:—

“The great expense attending the construction of copper lines for long-distance telephony has naturally led those engaged in solving the long-distance problems to seek means for increasing the capacity of the wires. The steps to be taken are analogous to those adopted in the case of the telegraph, where the duplex and quadruplex have greatly increased the value of the lines. It is not hard to believe the report, therefore, that the American Telephone and Telegraph Company, a description of whose lines between New York and Philadelphia we gave lately, is now undertaking experiments with the object of duplexing its wires, and thus practically doubling their capacity and utility. Several methods of duplexing telephone lines have already been proposed and have been the subject of discussion and trial among telephonists, but they have not come into use, in this country at least. The delay has been due probably to a lack of necessary incentive, such as the long-distance service now furnishes. While the difficulties to be overcome in the duplexing of telephone lines are greater than with the telegraph, it is safe to say that satisfactory results will in time be attained. We understand that the work in the present instance is in highly competent hands, and even now gives excellent promise of developments scarcely hoped for.”

The second notice appeared October 23rd last, and reads as follows:—

"The telephone lines connecting New York and Philadelphia, recently erected by the American Telephone and Telegraph Company, of this city, have already been described in our columns. It was evident to all interested that lines running parallel for over one hundred miles would suffer from induction if the ordinary "grounds" were employed: hence complete metallic circuits of hard-drawn copper wire were erected, through which the articulation obtained, as we have ourselves tested, leaves nothing to be desired. It becomes manifest, however, that the erection of a double circuit is accompanied by a considerable increase in the cost of construction. Hence it is but natural for the company to seek in some way to increase the capacity of its lines, but still to retain the advantages of the metallic circuit.

"The duplexing of these telephonic circuits was, therefore, undertaken by Mr. John A. Barrett, of Brooklyn, who has succeeded in devising a system which, broadly stated, consists in bringing the metallic or double-wire instruments at the terminal stations into inductive relation, by means of converging or repeating coils, with both sides of the circuit."

The question of priority of invention will be decided by the United States Patent Office, and I doubt not due justice will be done in the premises.

Mr. R. F. Stupart read a paper on "Barometric Pressures."

The President congratulated the Institute on the three valuable and important papers that had been read that evening, and contrasted the present with the time when it was difficult to procure even one paper, which was read to an audience of from six to a dozen persons.

---

#### NINTH MEETING.

Ninth Meeting, 15th January, 1887, the President in the Chair.

Exchanges since last meeting, 19.

The following were elected members:—J. J. Kelso, William George Mutton, Alfred Henry Mason, F.C.S., M.R.M.S.

Mr. F. F. Payne read the following paper on "The Mammals and Birds of Prince of Wales Sound, Hudson's Strait."

During a stay of thirteen months at Prince of Wales Sound, Hudson's Strait, with the primary object of taking meteorological observations, and having some leisure time I devoted as much of this time as was possible to the study of natural history of this region, making collections of the mammals, birds, fishes, insects, and plants; also making numerous notes from my own observations and from such information as I could gather from the Eskimo, who are most keen observers of nature.

So much has been written descriptive of the habits of the mammals and birds found in these regions, by those who accompanied the expeditions of Drs. Hayes and Kane, and by other able writers, that it would be almost useless to go over the same ground again. I shall now therefore only dwell briefly on such other items of interest as came under my personal observation and knowledge, giving the dates of migrations, etc., of each species in the order in which they stand.

#### MAMMALIA.

POLAR BEAR (*Ursus Maritimus*, Linn), (*Nannook*, Eskimo).

The Polar Bear, though numerous two hundred miles to the westward, is scarce in Prince of Wales Sound, and although a sharp lookout was kept for them only four were seen, one of which was shot.

The Eskimo informed me it was useless to look for them during the winter, as they were never seen until June, when the ice is breaking up. They are then occasionally taken on the ice-floes as they drift to the eastward with a regular current that sets this way, which is of great assistance to the bear in its migrations.

At this season, the seals, on which the bear mainly subsists are very numerous and are captured while they sleep, the bear creeping to within a short distance and then running at full speed upon them.

Though almost a marine animal, the bear occasionally visits the land where it regales itself on the young grasses, the eggs of the gull and duck, and has been seen capturing salmon and trout by driving them into a corner in shallow streams.

On the whole I do not think it is as fierce as it is generally supposed to be, for although many enquiries were made of the Eskimo as to this, they could not recall a single instance of its having attacked any of their people, nevertheless it is feared by the women who were careful not to be alone at the time several were seen and all of them expressed fear of it.

WOLF (*Canis Lupus Occidentalis*), (*Armarho*, Eskimo).

Little can be said of this animal as none were seen during my stay here, and I was informed by the Eskimo they were now seldom taken though at one time were very numerous.

They are very troublesome to the Eskimo, often tearing their seal-skin boats or kyaks in pieces and devouring the skin, which they relish very much.

Their food is very varied and their appetite so great there are few animals they will not attack and devour, even the Eskimo dog is occasionally carried off.

Their fur is very much valued by the Eskimo for clothing, but as a rule goes to the trader for powder, lead and tobacco.

WOLVERINE (*Gulo Luscus*), (*Kubvic*, *Eskimo*).

This is the Eskimo's greatest enemy, and should one appear at any time near their camps they will not rest until it has been killed, and when one is brought in there is great rejoicing. It is the most ingenious thief of all the animals in this region, and is so strong that no Caché, however well built, is safe where it exists. It will turn heavy stones over and once in the Caché it does not stop to untie the well made skin bag but soon tears a hole and, Eskimo fashion, lives on oil and blubber until the bag is emptied, when it turns its attention to the next Caché.

The thieving propensities of this animal are so like that of a dishonest human being that an Eskimo who is known to be a thief is called a "Kubvic" by his people.

Fortunately this animal is not numerous in the Sound, though they are often trapped a few miles to the westward where they, like the wolf, are seen throughout the year.

ARCTIC FOX (*Vulpes lagopus L.*), (*Ter-i-in-i-ak*, *Eskimo*).

There are two varieties of this animal, common in these regions, the blue and the white, the habits of which, with a few exceptions, appear to be so like that of the red, black and silver-grey foxes, all of which were seen, that it will only be necessary to speak of them as a single species.

About the beginning of September the white fox began to appear in large numbers upon the coast, and shortly after those of other colour, which are much rarer, were reported as having been seen.

At this time the fur of all the foxes is very short, and that of the Arctic Fox is, for the most part, of slatish colour, though in some instances, almost white, with a few scattered black tipped hairs.

Spring traps were kept set throughout the winter, and a number of red and white foxes were taken, by which means we were enabled to note the changes in the colour of the fur.

Late in November the fur was still very grey, especially near the roots of the hair, and showed little change a month later. During

January the fur appeared to grow very fast and by the middle of that month was perfectly white, with the exception of small tufts of the old hair, which in a great many instances remained entangled in the new throughout the winter. It was also generally noted that the largest and best conditioned foxes had the best fur.

During the winter the fox depends almost entirely on the Lemming (*Myodes torquatus*) for subsistence, but during the seal breeding season may often be seen roaming over the ice in search of the young seal, and when very hungry will attack the older ones.

On visiting the traps one day it was found that a fox had been caught, but had by some means gone off with the trap. As it was supposed it could not go far it was tracked in the snow, but after walking five miles the attempt to come up with it was given up. Three weeks later this fox was sighted a few hundred yards from the observatory and was given chase by an Eskimo who soon captured it, when it was found the trap was very rusty and deeply imbedded in the leg.

Unlike the red fox the white species when caught will howl most piteously as it is approached by the trapper, and upon going up to it it immediately stands on the defensive and will fight most fiercely for its life.

After February 1st foxes became very scarce and few were taken, the last being seen on May 10th. A few remain on the coast throughout the year, but nearly all migrate to the interior, where they can enjoy the luxuries of young ptarmigan and other birds, besides the pleasure of scratching their backs upon small bushes when undergoing the difficult process of change of clothing.

ESKIMO DOG (*Canis Familiaris*, Linn), (*Kingmik*, Eskimo).

The Eskimo dog so nearly resembles the wolf (*Canis Lupus occidentalis*) it is difficult to describe it as other than that animal, excepting when in harness and under the lash of its master's whip.

When at liberty it may often be seen roaming over the country in search of the Lemming or other food, and appears only to care for its master for the food it may get from him.

There is only one redeeming quality in its habits, and that is its simple appetite; it will live a great length of time without food and is not at all particular what it eats, as the following list of articles which I have seen it devour will show:—An old cloth hat, a boot, part of a flannel shirt, part of a pair of trousers without the buttons,



and a lot of greasy felt gun wads, which were seen the next day carefully placed beside a stone undigested. It may be added, *en passant*, these gun wads were subsequently used by an Eskimo for his gun. As might be supposed the dogs do not grow very fat, nevertheless they are often slaughtered for food during hard times, and their skins are made into clothing.

In harness the Eskimo dog appears as a different animal, it is then fed occasionally upon the skin of the walrus and other refuse, but woe betide the dog that refuses to pay for this food by pulling too lightly upon the load that is given it. Thrashing is then often far too good for it, it must pay with a part of its body, and carelessly going up to it the quiet, though enraged, Eskimo will take his knife and cut a small piece off its tail or ear and will as coolly return to the sleigh with the call "whoots," which means "get on."

Having a large Newfoundland dog with me, which was brought up on the ship from the Labrador coast, it was very interesting to watch its treatment of and by its Eskimo neighbours. From first to last the males were deadly enemies, my Newfoundlander disdaining to have anything to do with them, but with the females he was a particular favourite, thereby causing some most terrible rows in the camp.

REINDEER (*Rangifer Tarandus* (*Limn*, *Baird*), (*Took-too*, *Eskimo*).

The reindeer is only a summer visitor to the coast, arriving in the early part of April and leaving again for the interior in November.

The horns of those taken about April 10th were soft and a great many were covered with velvet. At this time of the year a great stir is noticed among the Eskimo, and in a few days all leave for the hunting-grounds a few miles inland where the deer are most plentiful, returning to the shore again about six weeks later.

The reindeer is undoubtedly the most useful animal to the Eskimo that is found in these regions; its hide is used for clothing and bedding, its horns for spear and arrow heads, and the lining of its belly for sewing thread, while the fat, which is usually melted down, is one of the greatest luxuries the Eskimo possesses.

In June the young are dropped, and during this month and July the deer is not molested as the Eskimo is then too busily engaged in seal hunting. In August the hunt again commences, and at this time the Eskimo secures all the skins he can for winter use; unfor-

tunately, however, owing no doubt to the large number that are killed annually for their tongues which are shipped to the London market, they are not so numerous as formerly and many a poor Eskimo has to make shift with a few thin seal skins for his bed and the same for his clothing throughout the winter.

While exploring one day, a natural deer trap was found in the shape of a wide crevice in the side of a hill that had doubtless been formed by the action of frost. The sides of it were perpendicular and about twelve feet high, and in it were the skeletons of several deer, and one that had recently fallen in.

POLAR HARE (*Lepus Glucialis*, Leach) *Oak-a-luk*, Eskimo.

Like other varieties of the same species, the Polar Hare is a most timid animal, and is so watchful of its enemies that it can seldom be seen to any advantage, and is only shot as it passes, like a ball of snow, in its swift retreat; nevertheless, a few fine specimens were taken and added to my collection.

Although it undoubtedly remains here throughout the year, none were seen until the month of December, and from that time until the end of May in the following year, its well-known tracks could be seen in the snow in every direction. Its food consists of a number of small plants, especially the knotty roots of certain grasses, which it obtains by burrowing in the snow and moss.

HUDSONS BAY LEMMING (*Myodes torquatus* Pallas: = *Mus Hudsonius*, Forster) *Avingnuk*, Esk. :

This is the smallest of the quadrupeds found in these regions, and, apparently, only inhabits the coast where it is so numerous that by turning over a few stones, one or more are sure to be found. On a still winter's night, when everything appears hushed in sleep, this interesting little animal may be heard in every direction boring through the snow, and then stopping as if to take breath, and again returning to its labours. Then is the time its enemy, the fox, stands and listens a minute, and pouncing upon the spot where the boring is heard, cuts off its retreat and with little trouble secures its prey.

The fur of the Lemming is of a greyish colour in the summer time, gradually turning white as the winter approaches, but never becoming perfectly so. In some cases the skin was found perfectly hairless in parts that had been affected by a parasite which infests this animal.

WALRUS (*Trichechus Rosmarus*, Linn) *Iviuk*, *Esk.* :

The Walrus is not numerous at any time in the Sound, and disappears altogether in July, not returning again until about the middle of November ; it is then eagerly looked for by the Eskimo, who may be seen exploring the ice from a neighbouring hill with their telescopes, and occasionally walking out to the open water when one is sighted.

During my stay here very few of these animals were seen, and of those taken, only one was an adult specimen, the others all being very young.

The tusks of the walrus are of great value to the Eskimo for spear heads, and for many other purposes, the ivory often being sawn into lengths and used in shoeing their sleighs.

GREAT SEAL (*Phoca Barbata*, O. Fab) *Oog-jook* *Esk.* :

This is the largest of all the seals found in these waters, and next to the deer it is perhaps the most useful animal to the Eskimo.

It arrives in the Sound soon after the ice has broken up, about the end of June, and although never very numerous they are taken from that time until the Strait again fills with ice towards the end of October.

In common with other seals they are shot or harpooned either while they sleep on the ice or while swimming in the open water. The Eskimo say the Great Seal has never been known to breed here, and all those taken during my stay must have been over five months old.

The skin of this seal is used in making kyaks or boats, and harpoon lines of great length are made from it by cutting the skin in a narrow strip round the body, as you would peel an apple. It is also used for the soles of boots, the hair being first scraped off and the skin then dried in the sun, and afterwards going through a process of chewing by the female Eskimo.

HARP SEAL (*Phoca Grænländica*), (*Kyro-lit*, *Eskimo*).

The Harp Seal, so named from a distinct mark of the harp of Erin upon its back, arrives in the Sound a little later than the Great Seal and is much more numerous, leaving again as soon as the ice approaches in October. It does not often take to the ice, but may be seen swimming a short distance from land and is seldom alone, there almost invariably being several together.

With the exception of one or two, all those taken were adult seals, the youngest being about four months old.

The skin of this seal, which is very large, is used in making wigwams and for the upper part of Eskimo boots.

ROUGH SEAL (*Phoca Fœtida Fab*), (*Natchuk, Eskimo*).

This is the most numerous of all the seals found in these waters, and constitutes the principal part of the Eskimo food.

It remains here throughout the year, but is scarce during the months of February, March and April.

The first young seal taken was on March 5th, and about this time several more were found. They are born on the ice where the snow is deep, the parent seal making a most comfortable house under the snow. These houses are not easily found and are only detected by a small mound slightly above the level of the snow.

It is often wondered how the seal may be seen to appear on the ice where only a short time before not a hole could be seen, and some writers on the subject have declared the seal makes a hole from the underside of the ice, by keeping its warm nose pressed against it. This appears so absurd that during my stay here a careful examination was made of all the seal holes that were seen, and in every instance they were found along the line of wide cracks that are constantly being formed by the ever changing tides. As will be readily understood the water between these cracks soon freezes and becomes covered with snow, and the seal keeps a hole open by constantly diving and returning again to breathe.

Many are the arts the Eskimo resorts to to capture this seal, and perhaps the best is by two hunters, one of whom lies down at the edge of the ice near some open water, while his companion remains about ninety yards further from the edge. Here he scrapes upon the ice with his spear and whistles in a low note, while the charmed seal, if there is one anywhere near, slowly swims towards the object at the edge of the ice, and when near enough is surprised with a charge of shot, a bullet or a spear.

RIGHT WHALE (*Balæna Mysticetus Linn*).

Only two of these whales were seen, and as the Eskimo seldom meddle with them little could be learned of their habits.

They apparently only pass here on their way to or from Hudson's Bay, and will not attempt to make the passage while there is ice in the Strait.

Portions of what undoubtedly were the skeletons of three of these animals were found on the shore, and the Eskimo informed me that at one time, when there were more of their people living here, they would not hesitate to surround one of these huge monsters in their kyaks, and with harpoon and floats would sometimes succeed in killing one.

NARWHAL (*Monodon Monoceros, Linn*), (*Uglung-war Esk*).

Commonly known as the Unicorn, the Narwhal is often met with in the Strait, and is much valued for its large ivory tusk which often measures five feet in length. Only one of these animals was seen late in the summer, and the remains of another were found on the shore, the tusk of which measured four and a half feet.

WHITE WHALE (*Beluga Catodon [L.] Gray*), (*Kelleluak, Esk*).

The white whale, though indigenous to the Strait, does not come near the coast until the ice begins to open, the first seen being on April 26th, when there was some open water about five miles from the shore. From this time they were often seen throughout the summer, sometimes singly, but oftener in small schools following the line of the coast. Then the Eskimo may be seen standing motionless at some prominent point, with gun ready waiting patiently for a shot. To one accustomed to extremely quick shooting, a white whale might seem an easy mark to hit, but with the inexperienced, to make the best of it, the bullet never seems to strike anything else than the place where the whale's head was.

During the summer this animal forms a large part of the Eskimo's food, and is eagerly hunted by them.

#### BIRDS.

STONE CHAT (*Saxicola œnanthe L.*).

This is perhaps the most valuable zoological specimen taken during my stay in the Strait. It was the only one seen, and is described by Mr. Whiteaves, Palæontologist of the Geological and Natural History Survey of Canada, who identified all the birds in my collection, as being an adult male of a European species not previously recorded as occurring in Canada, though found in Greenland.

This active little bird was shot after a long chase on May 19th.

SHORE LARK (*Eremophila Alpestris, Forster*).

Arrived May 17th, mating June 1st, young fledged July 15th, was last seen on August 10th. This bird was very numerous during the summer.

WATER THRUSH (*Siturus naevius*, *Bodd*).

Arrived May 20th, mating June 1st, young fledged July 25th, last seen on October 1st. A great number of these birds were seen.

LAPLAND LONGSPUR: LAPLAND BUNTING (*Plectrophanes Laponicus* L.).

Arrived May 14th. This was the only specimen seen and taken  
SNOW BUNTING (*Plectrophanes nivalis*, L.), (*Capenoir*, *Eskimo*).

The first Snow Bunting seen was on April 1st, and shortly afterwards they were very numerous. They were mating about May 25th, young were fledged about July 16th, and about August 23rd the adult birds appeared to leave, returning again a month later, and by October 21st all had disappeared.

RAVEN (*Corvus Corax* L.), (*Tooolouk*, *Eskimo*).

The Raven is indigenous to the country, and although most of them appear to migrate southwards a few were seen throughout the winter. They were mating about May 25th, and the young were fledged July 15th,

This bird is the Eskimo's companion, following him everywhere in his hunts, and when a seal is shot will perch only a few yards from him and "caw" most vociferously.

They do not seem to understand the mechanism of a fox trap and are often caught in the act of taking the bait.

GYR FALCON (*Falco sacer*, *Forster*).

Arrived September 6th. They were not often seen until about September 15th, when a number were seen apparently flying south. The last seen was on September 20th.

ROUGH-LEGGED BUZZARD (*Archibutes lagopus*, *Brunnck*).

Arrived on May 15th. Were rather numerous throughout the summer. Fledglings seen on August 20th. Last seen on September 30th.

SNOWY OWL (*Myctea Scandiaca*), (*Ook-pi*, *Eskimo*).

Only two of these birds were seen in September, neither of which was taken.

ROCK PTARMIGAN (*Lagopus rupestris* *Gmelin*).

Arrived May 11th. mating June 30th, when they were very numerous, young fledged August 18th, and last seen on October 30th.

RING-NECKED PLOVER (*Oegialites semipalmatus*, Bon. :)

First seen on June 1st. Mating, June 10th. Young fledged, July 12th. Last seen, September 25th.

These birds were very numerous throughout the summer. One was seen to pick up its young and fly some distance with it.

RED PHALAROPE (*Phalaropus fulicarius*, L.)

First seen on May 31st. Several of these birds were brought to me during the month of June; but after July 1st, none were to be seen.

PURPLE SANDPIPER (*Tringa Maritima*, Brunn.)

Only one of these birds was seen and shot on May 27th.

WHITE-RUMPED SANDPIPER : BONAPARTE'S SANDPIPER (*Tringa Bonapartii*, Schlegel.)

None of these birds were found breeding, but a few were seen after July 1st; and about August 10th, very large flocks arrived, remaining until September 20th, when the last of them were seen.

BRANT GOOSE (*Bernicla brenta*, Stephens.)

The Brant Goose does not breed here. A few were seen in company with Hutchins Goose in their flight southward, on September 6th, and one was brought to me by an Eskimo on December 1st.

HUTCHINS GOOSE (*Bernicla Hutchinsi*, Richardson.)

This bird, in company with the Brant and Snowy Goose, arrived in great numbers on September 6th, and remained here five days, all disappearing when the wind shifted to the southward.

SNOWY GOOSE (*Chen hyperboreus*.)

Thousands of these birds, in company with those just named, arrived here during a gale on September 6th, and were so tame that seventy were shot in a few hours with very little trouble. They remained here five days, when a steady breeze springing up from the southward, they all disappeared in a few hours and none were seen after September 12th.

LONG-TAILED DUCK (*Harelda Glacialis*, L.)

The first of these birds seen was on June 1st, and the first fledglings found was on August 31st.

This is one of the most numerous and certainly the most noisy duck that visits these regions; its long-drawn note of ar-ar-ow-oo may be heard in every direction.

Its eggs were found on the margin of ponds, from which small streams ran to the sea, and through these the parent bird was seen to conduct her brood when about ten days old. The last of these birds seen was on November 10th.

HARLEQUIN DUCK (*Histrionicus torquatus*, L.)

The Harlequin Duck was most numerous during the month of June, but after the end of that month, none were to be seen. Apparently this bird does not breed here.

KING EIDER (*Somateria spectabilis*, Leach.)

Large flocks of these birds arrived about May 5th, almost darkening a small piece of water about five miles from the shore. About June 1st, pairs were seen to visit small lakes inland, where, as soon as the ice had melted round their shores, the eggs of this bird were found in nests of down on small, mossy islands.

The King Eider lays from four to six eggs, and in some instances continued to lay in the same nests after they had been robbed of the first two or three eggs.

Two nests with eggs of this bird were found several hundred yards from the water upon a high ledge of rock from which it would be impossible for a young bird to descend without assistance.

The first young seen was on August 25th, and like the Long-tailed Duck the parent bird in a few days conducts her brood to the sea.

The last of these birds seen was on November 30th.

HERRING GULL (*Larus Argentatus*, Brunnich), (*Nowia* Esk).

First seen on April 20th. Was mating June 1st. Young were fledged on August 12th. Last was seen on November 15th.

This bird is very numerous throughout the summer and its nests and eggs were found beside those of the King Eider on small, mossy islands.

COMMON TERN (*Sterna hirundo*, L.), (*Emo-cootatia* Esk).

Eggs and specimens of these birds were brought to me by Estimo on July 20th, from a small island about six miles from the coast. These were the only ones seen during my stay here.

GREAT NORTHERN DIVER: LOON (*Colymbus torquatus*, Brunnich).

The first of these birds seen was on June 1st, and the last seen August 20th. None of the young of this bird were found, and I think that very few breed here.



RED-THROATED DIVER (*Colymbus Septentrionalis*, L.) *Corzow Esk.* :

This bird arrived about June 20th and was often seen during the summer.

One nest only of this bird was seen a little above high-tide mark, and the Eskimo informed me they could seldom be found.

On August 7th, some fledglings were seen, and all had disappeared by September 28th.

BLACK GUILLEMOT (*Uria grylle*, L.)

This interesting little bird is seen here throughout the year, being most numerous during the summer.

During the coldest weather it was often taken on small pieces of water, where the ice had been broken by the ever-changing tides.

Quantities of eggs of this bird were brought to me by Eskimo from an island about four miles from the coast, and fledglings were seen on August 10th.

LITTLE AUK (*Mergulus alle*, L.)

A small number of these birds were seen some distance from the shore during the summer, but nothing could be learned of them. One specimen was taken.

In conclusion it may be well to add that with the exception of the Snowy Owl, specimens were taken of all the birds noted herein, and I regret very much that more time could not be devoted to the study of these interesting branches of the Natural History of Prince of Wales Sound.

Prof. Wright enquired whether Mr. Payne had seen any of those extraordinary migrations which had been observed as in the case of the Lemming.

Mr. Payne had not noticed any such changes in their movements. So far as he was aware none had been observed in North America.

Dr. Ellis read a paper on "The Chemistry of the Natural Waters of Ontario."

## TENTH MEETING.

Tenth Meeting, 22nd January, 1887, the President in the Chair.

Exchanges since last meeting, 28.

The following were elected members :—R. Dawson, Henry Steele, John Horwood, C. D. Lennox, T. Simpson, B.A., M.B.

Dr. Daniel Wilson read a paper on "Some Stone Implements from Lake St. John, Que."

After referring to the system of barter indicated by the dispersion of the flint implements, he said that from the Gulf of Mexico to the farthest north there was not the slightest evidence of fire having been applied. At no period in the history of this continent were there any indications of the slightest knowledge of the metallurgic art. So that man has not existed on this continent, except in a low state of savage life.

Prof. Wright asked Mr. Macallum, who was present and had just returned from Mexico, whether he met with any stone implements in Mexico.

Mr. Macallum had met with them in considerable abundance, such as stone axes, arrow heads. The colour was a dark-brown, darker than that of those exhibited.

Mr. A. B. Macallum, B.A., read a paper on "Theories of Heredity."

## ELEVENTH MEETING.

Eleventh Meeting, 29th January, 1887, the President in the Chair.

Exchanges since last meeting, 30.

Messrs James Bain, jun., and John Notman, were appointed Representatives of the Institute on the Board of the Industrial Exhibition Association for the present year.

The Council announced the election of the following as Associates:—A. F. Wickson, Ernest Wilby, D. A. Hewitt, W. C. Tilley, W. L. Symons, J. P. Hynes, Harry Sproatt, Henry Simpson, J. F. Brown, F. H. Herbert, F. Otter, Charles Langley, G. T. Goldstone, F. F. Mallany, W. A. Smith.

The following were elected members:—T. M. Logic, B.A., W. B. Ewing, James G. Ramsay, J. B. Millar, Edward Thomas Carter, Gerald Fitzgerald, W. W. Fox, E. R. Parkhurst, Dr. John Hall, Charles B. Petry.

Mr. James T. B. Ives, F.G.S., read a paper on "Geology in the Public Schools," of which the following is an abstract:—

The author produced evidence that Ontario possesses vast mineral resources; and that those resources are not receiving the attention which they demand; that the dissemination of geological knowledge would promote their development; and further, that the Public School system of the province is adapted to secure such dissemination. At the close he exhibited an appliance, designed to assist the Public School teacher in conveying to the minds of his scholars the first principles of structural geology:—

"It is designated the Strata Map and consists of several layers, or *strata*, of variously coloured cardboard or other suitable material, hinged in the form of a book or otherwise put together. The SUPERPOSITION of the STRATA of the earth's crust is represented by that of the layers of the map; and it is thus seen that the order of succession of the *formations* cannot be reversed although either may be absent.

"Portions of all the *strata*, excepting the lowest, are removed according to a definite plan; a larger proportion being removed the higher the *stratum* occurs in the series. By this means a pattern is produced corresponding with the geological map of the area represented. It being pointed out that the exposure of the several geological formations is due to an analogous cause operating in nature; a correct and comprehensive conception is obtained, of the nature and operation, of the phenomenon known to geologists as DENUDATION.

"Where, in descending order, the successive *strata* make their appearance projecting beyond those by which they are overlaid,

OUTCROP is illustrated. The steps formed by the thickness of the card *stratum* at the same time illustrate another phenomenon and its verbal sign, these being miniature ESCARPMENTS.

“The term DIP, and that which it expresses, may be illustrated by tilting the map; as a whole, when all the *strata* will *dip* towards the lower end; or by placing a small object beneath some of the *strata* and pressing them down on either side of it, when those *strata* will *dip* from it in each direction. In the latter case the upraised portion will represent what is known in nature as an ANTICLINAL ridge. If a second object be placed at a short distance from the first and the *strata* be depressed between them a SYNCLINAL trough will be formed.

“Whilst illustrating DIP, another term usually very perplexing to learners, may, by means of the Strata Map, be most readily explained, viz.: STRIKE.

“By removing portions of overlying *strata* geological INLIERS are clearly exhibited; and OUTLIERS are shown by means of a portion of the *stratum* to which they belong cut to the shape of the *outlier* to be represented and attached to the underlying *stratum* in the proper position.

“The *strata* of the map being all *superimposed*, horizontally, one upon the other, that condition of things known to the geologist as CONFORMABLE stratification is exhibited, and UNCONFORMABILITY is easily explained.

“Where IGNEOUS rocks occur within the area represented, the space so occupied is marked by a distinctive colour indicating such intrusion. But as it is usually impossible to say whether underlying *stratified* rocks are pierced thereby, their presence is not indicated on underlying *strata*. In any case where, by the operations of the miner or otherwise, such rocks are found to exist, the fact may be indicated on any *stratum* affected.

“The Strata Map may be made of any size, and may consist of a small number of layers representing groups of formations or of a large number representing the several formations or their subdivisions.

“Upon the various *strata*, FOSSILS, characteristic of the formation represented, may be figured and named.

“The LITHOLOGY of the various formations may be described thereon, whether limestones, sandstones or clays, &c., and whether used, or capable of being used, in the arts and manufactures.

“The localities where economic MINERALS occur may be indicated by numbers corresponding to a key in the margin of the map in which those occurring in the area are enumerated.

“The THICKNESS of the beds represented may be expressed in feet where known. Where, by well boring or otherwise, it has been ascertained that certain subterranean strata are absent in a particular locality, corresponding portions of the stratum affected may be cut away or a note to the effect placed thereon.

“By cutting away portions of the *strata* at the margin a LEDGER INDEX is formed similar to that of an alphabetically indexed account book showing the colours of all the strata in succession. On these spaces the names of the several formations represented are written, and their approximate maximum thickness within the *area* represented is stated.”

Besides the survey map of the Dominion, geologically coloured, he illustrated his subject by means of an outline map of the province, on which he had indicated by distinctive colours the various minerals at present worked or known to exist, in localities ranging from the County of Carleton in the east to the Lake of the Woods in the west. In evidence of the variety and wide distribution of the minerals of Ontario, he quoted the reports of the Geological Survey, the Bureau of industries, Ontario, and a valuable synopsis, compiled by Mr. H. B. Small, of Ottawa. The same authorities were cited in proof that this industry is not receiving due attention, and the sketch map on which he had indicated the known localities was appealed to, as showing how much of the province still remains untouched by the miner. He showed how the dissemination of a knowledge of stratification and its attendant phenomena would check useless and wasteful operations, and at the same time promote judicious prospecting and mining. He looked to the diffusion of such knowledge as a wholesome bar to the spirit of mere speculation at present so rife here, as well as in the States. The author advocated the introduction of geology into the Public Schools, not as a separate subject, but as an expansion of geography, in its physical branch, contending that the latter cannot be taught intelligently or intelligibly without ex-

plaining the causes which have operated to produce the present contour of the earth's surface. He gave a brief resumé of the work done at the colleges of the province where geology is taught; at the High Schools, where physical science is greatly at a discount, as evidenced by extracts from the High School Inspectors' reports, and at the Normal Schools. Chemistry, zoology and botany being taught in the latter, he contended that the teachers in training would not find it difficult to acquire so much knowledge of geology as would enable them to impart it, in an elementary manner, to the pupils of the Public Schools. The curriculum of the Public Schools was briefly considered. Statistics were given from the report of the Minister of Education, showing the relative attention given to the various subjects. Geography being taught to more than two hundred and eighty thousand pupils, out of the total number of four hundred and sixty-six thousand on the register, the author inferred that the systematic inculcation, in connection with that subject of elementary structural geology, would be of incalculable value to the Province in the proximate future, and of great immediate service. He combated the view that the subject is too abstruse for Public Schools, outlined the scope of such teaching and its method, and made a suggestion as to the course to be adopted in initiating the introduction of geology into the Public Schools.

Mr. Boyle thought that the map would be very useful in teaching geology. As an old teacher, however, he did not think that it would be advisable to place the subject of geology in the curriculum for Public Schools. The subjects were already too numerous, and he did not see how geology could be introduced with advantage. In accordance with the representations of a deputation of the Natural History Section, the study of natural history had been put on the Normal School programme, but practically no attention was given to it. The very slight acquaintance that it was possible to impart, under the circumstances, was of little value. In order to have it taught with efficiency, the teacher should be saturated with the subject.

Mr. J. L. Hughes, Public School Inspector for Toronto, agreed with Mr. Boyle as to the value of Mr. Ives's map for

purposes of illustration. The subjects on the Public School curriculum were already too numerous. It was impossible to teach them all thoroughly. Nearly all the subjects specially intended to develop the observing faculties of pupils had been suffered to drop out. It was true that geology was of great utility, but a study should not be put on the programme merely on account of its utility. He thought that the branches taught in the school should vary according to the wants of the locality. Steps should be taken to allow the local authorities an optional power in regard to certain subjects, so that those may be taught that were best suited to the circumstances of the place.

Dr. Hamilton thought that the subject of geology should be made a prolongation of physical geography. As to the introduction of the subject into the classes of Mechanics' Institutes, it would be of very little benefit, owing to the inefficient management of classes by those institutions.

Mr. Macallum had come to the conclusion from his own experience that geology was a subject that should not be taught in the Public Schools. He was not in favour of local options, but thought that a strict rule as to the subjects to be taught should be made uniform through the province. It may be taught in the High Schools, and made optional with them. Chemistry, however, should have the precedence. He agreed with Mr. Boyle that to teach efficiently a teacher should be saturated with the subject.

The President communicated a paper from Prof. Campbell, of Montreal, "Etruria Capta," Part II., "The Eugubine Tables."

The President stated that he presented many points to Prof. Campbell that he had not been able to solve to his (Mr. VanderSmisssen's) satisfaction. Should these not be solved, he considered that Prof. Campbell's theory must fall to the ground.

Mr. Boyle presented a very remarkable Indian pipe of curious workmanship, found on a farm in the western part of

the Province. He stated that it was one of the most interesting specimens of the kind he had ever seen.

A letter was read relative to an offer of the remains of the Mammoth lately found at Eglinton. A tooth was at present in the Museum of the Academy of Science at Buffalo, but the owner offered to give it to whoever would find the rest of the body.

---

### TWELFTH MEETING.

Twelfth Meeting, 5th February, 1887, the President in the Chair.

Donations were announced from Dr. Rosebrugh of "The Electrical World for 1886," and from Lieut. A. R. Gordon, R.N., of Seventeen Skins of Arctic Birds, collected on the shore of Hudson's Strait, for which thanks were tendered.

Exchanges since last meeting, 27.

The following were elected members:—G. S. Ryerson, M.D., Wallace Nesbitt, A. Percival Will.

Prof. Dunlop read a paper on "The Quichua Language."

The Quichua language, spoken by the Incas, or ancient native rulers of Peru, previous to the conquest of that country by the Spaniards, under Francisco Pizarro. The paper was strictly philological and dealt altogether with the grammar of the language, going as fully into a detailed account of its structure as the time would allow. The Quichua belongs to the agglutinate order of languages, and differs greatly from those of the Aryan and Semitic type, as may be supposed. It had its cradle in the districts around the ancient city of Cuzco in Peru, and it was the policy of the Incas to introduce it into every country which they conquered. Thus its use was gradually extended over the vast region from Quito in Ecuador on the north, to the boundaries of Araucania on the south, and from the Pacific to the Atlantic, exclusive of Brazil, an area of some 3,600,000 square miles. The conquered tribes nearly all spoke dialects of Quichua, which occupied, to the literary dialect of the capital, much the same position



that the Prākrits, or dialects of modern India, do to the literary and sacred Sanskrit. Thus the people of Quito spoke a dialect which differed scarcely at all from that at the capital ; no greater difference subsisting between them than subsists between the Queen's English and the dialect of Yorkshire, if indeed there was so much. In the northern and central parts of the sierra of Peru the Chinchay-Suyu was spoken. The Yunca was the language of the Peruvian coast, the Lama of the tribes near the great River Huallaga and the Cauqui of the people of Tauyos in Central Peru. Round the shores of Lake Titticaca the Aymara language is still spoken, from the city of Puno to the south of Bolivia. Aymara is certainly very different from Quichua in pronunciation, but not more than Lowland Scotch from English south of Tweed, the vocabulary being on the whole the same, and the grammatical construction is identical with that of Quichua. Further south, in Tucuman, in the Argentine Republic, the Calchaqui, a variety of Aymara, is spoken. With the exception of the Lama, which is a branch of the great Tupi family of languages, all these dialects, and a large number more, are from one common stock, and Quichua is to be considered the elder sister and representative of the group, even if we do not regard it as the parent of them all. During the period of Inca ascendancy, Quichua superseded all the other dialects as the language of the governing race ; it was the language of a people far advanced in civilization ; it was assiduously cultivated by learned men for several centuries ; and it may therefore be selected as the most perfect of the extensive American group of languages. Hence its importance to the philologist. Through the rapid diminution of the aboriginal population, and the constantly increasing corruption of their ancient tongue, through the substitution of Spanish for Quichua words, the introduction of Spanish idioms and the loss of all purity of style, this language, once so flourishing, which was used by a polished—and we might even say splendid court—and a well-established Government, which was once spoken throughout a vast empire, is fast disappearing. Ere long, perhaps, it will entirely fade away from the memory of living generations. With it will disappear the richest form of the great American group of languages—no small loss to the student of philology. With it will be lost all the traditions which yet remain of the old glory of the Incas—all the poems, elegies and love songs which stamp the character of a once

happy people. The paper closed with a brief account of Quichua literature, a couple of short fragmentary specimens of which were translated, an analysis of the most important Quichua drama "Ollautay," and a translation of its most interesting scenes being promised on some future occasion.

T. B. Browning, M.A., read a paper on "The Alaskan Boundary."

He entered into the history of the dispute between the United States and Great Britain, and described the position which Russia occupied in the question. He said there was no mention of dominion over sea in the treaty. The rights conceded were expressed to be over the firm land and islands adjoining. Authorities were cited to show that it was the custom of nations when seas were conveyed or presumed to be conveyed to specify them in the grant, and therefore the seizure of a British vessel for trespassing on the waters off Alaska could scarcely be defended. Under the convention of 1825 Britain had rights in the North Pacific of commerce, of navigation, of fishing, which both in the Atlantic and Pacific includes seal hunting, of landing on unoccupied coasts—a fifth right respects refuge in stress of weather. The Pacific Ocean was then to Britain not a *mare clausum*, but a *mare liberum*. The paper also contained a description of the eastern limit of the territory, and showed the difficulties of accurately defining it.

---

### THIRTEENTH MEETING.

Thirteenth Meeting, 12th February, 1887, the President in the Chair.

Exchanges since last meeting, 25.

The Council announced the election of the following as Associates:—Frank Douglas, A. H. Gregg, George W. King

Dr. Scadding read a paper entitled "Canada in Sculpture," and exhibited a photograph of a marble statue of George II. in the Senate house of the University of Cambridge in England, which represents the King as a Roman general or imperator, crowned with laurel, and encircling with his right

arm a globe, inscribed with the word Canada, in rather large characters, the whole being commemorative of the conquest of Canada in the reign of this king. This photograph was taken expressly for the lecturer, the statue in the Senate house having been never before copied in this way. The smallness of the scale, however, does not allow the word Canada to be visible to the ordinary eye. Dr. Scadding also exhibited a photograph of the graceful idealization of Canada in the grand group entitled America, by the sculptor, John Bell, at the north-west angle of the lower platform of the Prince Consort memorial in London. This fine figure of Canada, who is seen "pressing the Rose of England to her breast," was expressly prepared for the illustration of this paper by Mr. Lemaitre, 324 Yonge street, who skilfully detached it from a photograph of the general group and enlarged it.

In addition to the photographs mentioned in the paper, Dr. Scadding exhibited an engraving of the interior of the Senate House of the University of Cambridge, showing the four statues; a large medallion with heads of George II. and Queen Caroline facing each other on the obverse, and on the reverse their seven sons and daughters; an engraved portrait of Queen Caroline; a two pound gold piece (1739) of George II. inserted in a contemporary silver cup, and having, in addition to the usual titles of the king, the following:—*Brunsvicensis et Lunenburgensis Dux: Sacri Imperii Romani Archi Thesaurius et Elector*, abbreviated thus: B:ET:L:D:S:R:I:A:T:ET:E. Also an engraving of the seated bronze figure of the Prince Consort in the Memorial.

C. Gordon Richardson read a paper on "Dextrine Maltose in Beer-Worts," of which the following is an abstract:—

When malt is acted upon by the peculiar ferment of malt called diastase it breaks up into dextrine and maltose. The proportion which these two bodies when found will bear to each other depends upon three things: The heat at which the mash is made, the length of time it is permitted to stand, and the diastatic capacity of the malt

itself. Dextrine is the first product of diastase—it is, so to speak, the half-way house between starch and sugar. To the brewer it possesses many valuable qualities. It ferments but slowly, lends palate-flavor and body to the beer, and also those keeping qualities so essential to the production of sound stock ales. To the maltose on the other hand, the brewer is indebted for the source of the alcohol which finished beer always contains, in more or less quantity. On the due proportion, therefore, between these two bodies, maltose and dextrine, the future history of the beer largely, if not wholly, depends.

All authorities agree in assigning 145° F. as the temperature of the malt infusion or mash most favorable to diastatic action, and consequently to the production of maltose. But, unfortunately, a great difference of opinion exists amongst the standard authorities as to the temperature most favorable to the increased relative proportion of dextrine to maltose. The English authorities declare in favor of low heats, viz., below 150° F., and the American chemists in favor of high, viz., above 150° F. Now since all diastatic action ceases at a heat of 172° F.—diastase itself being destroyed at that heat, it might reasonably be inferred that as we approached this maximum limit we should find the diastatic action decrease, and if such were the case, only the half-way stage in the conversion of starch, viz. dextrine, would be attained, and the practical test of experience bears this reasoning out. The English chemists base their reason for advocating low heats for the formation of dextrine upon similar chemical considerations; that, as at very low temperatures diastase is inactive, so by a lowering of the mashing temperature we limit the action of diastase to the production of dextrine. But this is not borne out by experiment, and the fallacy lies in confounding the checking of too vigorous quantitative action of diastase by the influence of low temperature with the qualitative and destructive influence of high heats upon the nature of diastase itself. Although 145° F. is the temperature most favorable to diastatic action, yet at that heat the relative proportion of dextrine and maltose vary very considerably with different malts, and according to the results obtained from a large number of test brews and analyses, made by the writer, seemingly in direct proportion to the diastatic capacity of the malt used. The ordinary standard of diastatic capacity of malt is the absolute amount of starch converted into maltose, at a given temperature, and in a given unit of time; each analyst having to make his own standard,

but the relative proportions of dextrine-maltose obtainable at given temperatures is of far more consequence, ordinarily, to the brewer than is the absolute convertible capacity of the diastase contained in a given sample.

In view of the fact that under the present system of estimating the diastatic capacity of malt, no comparison can be made between the results obtained by different observers, each analyst having to make his own standard, and the doubtful utility of such returns to the prudent brewer, the writer is led to propose the following method of analysis and stating results. In brief, to take a fixed quantity of malt, infuse at a given temperature, preferably 150° F. ; keep at that temperature half an hour, then boil. Estimate the dextrine and maltose formed and return as such. And the diastatic capacity to be judged by the relative proportions of these two bodies, as referred to a certain fixed ratio. This latter the writer trusts shortly to be able to suggest, or at least to produce some data for fixing the same, from the results obtainable from a series of experiments he is now conducting.

In answer to an enquiry of Dr. Bryce, Mr. Richardson said that the result was much affected by the difference in the quality of the grain. The English barley was heavy in albuminoids, which was counteracted by the infusion of more hops. The Canadian barley through manuring also contained more albuminoids, which affected the diastatic action. The effect of free oxygen was so small as not to be noticed in practical work in England.

---

#### FOURTEENTH MEETING.

Fourteenth Meeting, 19th February, 1887, the President in the Chair.

The Curator announced a donation from Mr. Finlay McCallum, of Milton, of a valuable carved Stone Pipe, for which thanks were tendered.

Exchanges since last meeting, 79.

Mr. R. H. Bethune was elected a member.

The following paper was read by W. A. Douglas, B.A., on "The Antagonism of Social Forces."

When Adam Smith pointed out what a vast advantage accrues to mankind from the division of labour, he first gave a clear indication of the grand harmonies existing in society. Other writers have followed in the same direction, and with much beauty and eloquence have pointed out what an inestimable blessing society is to itself. This department of economics has received very ample treatment. Indeed, so much has the attention of writers been fixed on these harmonies that a very large majority teach either explicitly or by implication that harmony prevails throughout all our social organization, for they make no mention of antagonisms.

Some writers, indeed, go so far as to deny that there are antagonisms, and the few who have noticed and pointed out their existence have done so in a manner much more brief and meagre than their importance deserves.

In his celebrated illustration of the pin-makers, Smith showed that by the sub-division of labour the product was increased between two and three hundred-fold. In the same way the nail-makers' product is also increased. When, therefore, the pin-maker exchanges with the nail-maker each gives more and each receives more, each enriches and each is enriched—the benefit is mutual. This is harmonious trade—toil for toil, burden for burden, service for service, reward for reward, enrichment for enrichment.

I shall endeavour to show (first) that there exists another kind of trade, not harmonious—mutually enriching, but antagonistic—enriching one by the impoverishment of another; and (second) that this antagonistic trade is one of the most important factors in determining the condition of the bulk of humanity.

To prove the existence of such antagonism I ask attention to the following question:

In what length of time could society, by the utmost exertion of industry and frugality, accumulate sufficient supplies to maintain all succeeding generations free from toil? Obviously never. Each season brings its share of toil, and each year we consume the bulk of the product. Wonderful as have been the applications of steam and electricity, we have no indication that humanity will ever be exempted from toil. The physical law is inexorable: "By the sweat

of thy brow shalt thou eat bread." But a portion of the race now enjoy incomes which exempt them from toil, and with every guarantee, so far as our laws and customs can guarantee anything, that such exemption shall continue to the end of time

What are the inevitable conclusions from these two considerations ?

First.—Since no man or number of men can produce sufficient supplies to maintain them for all time without further toil, therefore, that part of society which enjoys everlasting incomes that require no toil from their recipients for their maintenance, possesses the power of appropriating an amount of wealth that could not by any possibility be the result of its own productive effort.

Second.—All society cannot possibly live for all time without toil; some now possess that power. Therefore some enjoy a privilege from which others by inexorable physical law must be for ever excluded.

Whence comes it that we see this extraordinary division in society ? One part empowered to live without toil, another part doomed to everlasting toil. This I shall now try to make plain.

Let us first try to ascertain what is the law of distribution of the products of labour. Two men settle on the prairie, each taking a section. One section continues to be a farm, the other becomes a town site. After thirty years the farmer has a property worth, say, three or four thousand dollars, while the land-owner's property is worth, say, three or four hundred thousand dollars. The toil of the farmer has exceeded that of the land-holder a thousand fold. The reward of the land-owner has exceeded that of the farmer a thousand fold. Reward is inversely as service. The distribution is not according to production, but it depends mainly on the *increase of value*. To understand, therefore, the laws of distribution we must examine the nature of value.

Why has a fresh egg value and an unseasonable egg none? Because the former possesses that quality called "utility;" the latter does not.

Why has air, which has much utility, no value, while a diamond, with little utility, has very great value? The air is super-abundant and immediately accessible, while diamonds are scarce.

Value, therefore, may arise in two ways. First, it may come by the production of utilities that are scarce, or, second, it may arise from the scarcity of certain utilities.

Machinery is scarce. Toil takes the ore and converts it into a machine. This is one way of acquiring value by the path of utility.

Let a drought come until water sells, as it has sold sometimes in Australia, for three shillings a bucketful; this is another way of acquiring value; it arises from the increased scarcity.

In the first case an increase of value caused by the increase of a utility, as in the production of machinery, is an increase of wealth. In the second when the value is the result of scarcity, as in the increased value of water from drought, the increased value is an indication of increased poverty.

To distinguish these two kinds of value, let us call the former "toil-produced value," and the latter "scarcity value." The commodities included in the former are our food, clothing, buildings, machinery, etc., while the scarcity values include minerals, forests, water-power, land, etc.

As distribution takes place according to the "production or growth of values," and as values arise in two different ways, there are two different ways in which a person may acquire wealth:

1. By producing utilities, as houses, clothing, etc.
2. By holding some natural commodity that acquires value by becoming scarce, such as lands, mines, etc.

The first method requires toil. We can convert the crude ore into a machine, the raw cotton into a garment, only by toil. But the increased value of mines, or at least a large portion of these values, is due in no way to the labour of the holders of these lots or mines.

Our present method of distribution, therefore, has the following most momentous results:

First,—One part of society obtains a share of the products of labour only after it has produced utilities, after producing wealth; the other portion obtains wealth by the growth of scarcity values that requires no toil. Hence we see the division of society into toilers and idlers, or, what is the same thing, the imposition of the whole toil of maintaining society on one part of the population, allowing the rest to enjoy a share of the product, to the production of which they have contributed no effort.

Labour-produced values are transient. The food of this season will be consumed by the next, the clothing will soon be worn out, buildings will crumble and decay, our dwellings and clothing will



quickly become soiled, machines will rapidly wear out. To replace the worn out or consumed, to repair the broken or decayed, requires toil, and we have no evidence that we can ever be free from the necessity for toil.

But some of the scarcity values do not possess this transitory character. The value of a city lot continues as long as the population clusters round that spot. It requires no effort to maintain its value, for it is not subject to decay or consumption, like other utilities. To allow such values to be appropriated by individuals, therefore, allows them not merely to become rich without effort, but allows their wealth to continue undiminished for ages. The division of society into toilers and idlers is thus perpetuated.

*Let a drought come till water becomes a salable commodity, then the populace become poorer in water. If a few individuals possess some unfailing springs, then the increased value of water would render these persons richer. Let population increase till land becomes relatively more scarce, the people are poorer in land; but values advance and the holders become richer. Here we notice a movement in society not mutually enriching, but enrichment of one part accompanied by, and as the consequence of, the impoverishment of the rest of society. This is a movement not harmonious, but antagonistic, enriching one by impoverishing another.*

Scarcity itself is a calamity. To be cooped up in tenements is not the kind of life that is resorted to of free choice; a breathing space would be no small fortune to many in our most congested centres of population. But by our present system this calamity is not simple, but compounded and intensified.

Let population become dense, and we must not only crowd each other to the degree of discomfort and inconvenience, but we must furnish the owner of the land with wealth, in some cases to an enormous amount; we must board, lodge, and furnish him and his family, it may be in princely style. Two calamities—first, crowding; second, tribute to idleness. First, impoverishment in space; second, impoverishment in surrender of product to a non-producer. The calamity is compounded.

But this is not all. The division in society is still further intensified by another characteristic of the law of values. With increased population there is diminished competition for the sale of lands,

forests, mines, and water privileges. But increased population facilitates production of some commodities in two ways—first, by permitting better organization, and second, by permitting the more extended use of machinery. Hence, in the sale of labor-produced commodities there is intensified competition. While we witness the values of town lots advance from almost nothing per acre to sums ranging amongst the millions, we at the same time see the price of steel rails decline from two hundred and fifty dollars per ton to one-tenth that figure. The holders of scarcity values therefore become richer in a compounded degree—first, by the advanced price of their own possessions, and second, by the diminished price of the commodities with which they are paid. As the brokers say, the market is “bullied” when they sell and “beared” when they buy. Thus is still further widened the breach between the toiler and the non-toiler.

One of the most intense passions of man is for wealth. For the gratification of this passion we see him on the one hand using every device to increase production, and thus enrich, at the same time by allowing the appropriation of the scarcity values by individuals we see a disposition to push the scarcity values to their utmost limit, thus tending to impoverish the producer for the benefit of the non-producer.

If I have correctly interpreted these phenomena I have shown why it is that our social development presents such remarkable contrasts—toil degraded and impoverished, while many enjoy lives of luxurious idleness, why every city on this continent presents the same features—ostentatious wealth at one end and penury at the other; and I have shown further that our social mechanism is not arranged according to the principle of mutual assistance and mutual elevation; but that we make the advantage of one part of society dependent on the degradation and impoverishment of another part. The scarcity values of our mines, our town sites and other natural opportunittes have risen to enormous figures. These values are increasing and persistent. What is the relation of these values? What is the meaning of a ground rental of ten thousand dollars yearly? It means, on the one side, an everlasting surrender by the toilers of the products of their labour to the value of ten thousand dollars yearly, and on the other side, the appropriation of these products without the obligation to render any service in return.

Alas ! how little knowledge of these simple but far-reaching principles has been manifested by those in whose hands have been intrusted the destinies of nations. In the settlement of the new territories of this continent one of the grandest opportunities ever offered to mankind to lay the foundation in such a way that society would develop harmoniously has slipped by. But what do we witness everywhere? The obligation of the toiler to yield up his product to a number of his fellow men, who are thus relieved more or less from the necessity to toil. As population increases, this obligation increases ; the mortgage on labour becomes greater and greater. Is it not true that labour is now mortgaged to the finger-ends? And is it not also true that no amount of industry, frugality, improved education or better organization can remove this obligation? The only means of escape is by the resumption of the scarcity values by the public and thus cutting off the possibility of any able-bodied man escaping his fair share of toil. To remedy our method of distribution we must abolish the law of "distribution by values" and substitute the true law, "to each according to his work."

Mr. Browning objected to Mr. Douglas's division of individuals into classes, toilers and idlers, as invidious. He did not know of any class that were either all toilers or all idlers. The ordinary meaning of the word toiler was a mechanic, or any one that lived by manual labour ; if the professional class was included, the class of idlers would be reduced to a very small number, as there were very few that lived entirely without some kind of labour, so that to include all under these two classes would be virtually to include all in the one class and none in the other. He objected also to the division into utility and scarcity as components of value.

Mr. Douglas said that every person that produces something for his fellow men is a toiler, but there were individuals who produced no more for the benefit of society than if they were chloroformed on the first of January and remained so to the last of December. In his remarks he did not propose any levelling of incomes, but to point out the existence of antagonisms.

Mr. Elvins expressed the pleasure he felt in having the question put before them in so clear a light. He had spent much time in endeavouring to solve the question. The only difficulty with him was how to find a remedy. He hoped that thoughtful men would give the subject due consideration, and find a remedy for the evil before it was too late, and thus obviate a great and impending danger.

Dr. Hamilton agreed with the reader of the paper as to the existence of the antagonisms, which had indeed long agitated the world. He referred to the agrarian contests in the Roman State, the troubles connected with the Gracchi, and the Servile wars, so that the question was really a very old one. He thought that the gentleman who had read the paper had clearly made out his case, though he had not shown the remedy.

Mr. Ives thought that the subject was one of great practical utility. He gave from his own experience, when a tenant of the Duke of Portland, an instance confirming the views of the reader of the paper.

Mr. J. J. Kelso read a paper on "The Necessity of a Society for the Prevention of Cruelty in Toronto."

He pointed out that there was no society of the kind at present in existence in Toronto, and he proposed the establishment of one as a general humane association, having before it the following among other objects :

To stop cruelty to children : to rescue them from vicious influences and remedy their condition. The beating of animals ; overloading street cars ; overloading waggons ; working old horses ; driving galled and disabled animals. To introduce drinking fountains ; better laws ; better methods of horseshoeing ; humane literature into schools and homes. To induce children to be humane ; everybody to practise and teach kindness to animals and others. As a humanizing, educating and refining influence, he believed there was no better society in existence than this would prove. Its foundation would rest upon a religious but undenominational basis. It would include in its membership young and old, rich and poor, Catholics and Protestants,

and all could unite in the unselfish and ennobling work of alleviating and removing human and animal suffering. The object of the society would be to prevent rather than to punish. As instances of what might be accomplished, he gave the following examples from the record of the Illinois Humane Association :—“ Arrested a man, who was fined \$10 and costs and put under bonds of \$200 to keep the peace, for extreme and repeated cruelty to a girl in his family, 16 years old. Took the child away from him and placed her in charge of this society.” . . . “ Arrested a little girl, 14 years old, for obtaining money under false pretences ; had the prosecution dismissed and sent her to the Industrial school for girls at Evanston.” . . . “ Rescued four little children from a worthless, drunken father and a disreputable mother, and placed them in the St. Joseph orphan asylum.” . . . “ Took a little girl, who was badly abused, kicked and knocked down and overworked by a cruel, heartless woman, child working like a slave in the kitchen, dirty and ragged, and placed her in the Industrial school for girls.” . . . “ Arrested a man who was fined \$75 and costs for drunkenness and extreme cruelty to his little boy, eight years of age, whom he compelled to sleep out of doors. This society placed the child in the Home for the Friendless.” . . . “ Arrested a man, who was fined \$50 and costs, for stabbing a horse with a knife.” . . . “ The officers of this society, after a prolonged search, found a little girl of 16 years of age who had been abducted from her home and led astray for immoral purposes, and restored her to her parents. There were three persons connected with the abduction who were arrested by the officers of the society and held to the criminal court and indicted by the grand jury. Still pending.”

On motion of Mr. Houston, seconded by Dr. Bryce, it was resolved, “ That in the opinion of the Institute the formation in this city of a society for the prevention of cruelty would be conducive to the interests of public morality, and this meeting desires to express its sympathy with the object contemplated.”

A communicating respecting “ The Elizabeth Thompson Science Fund,” was referred to a committee composed of the President, Dr. Ellis, and Prof. R. Ramsay Wright.

## FIFTEENTH MEETING.

Fifteenth Meeting, 26th February, 1887, the President in the Chair.

Exchanges since last meeting, 30.

G. M. Rae and T. G. Mason were elected members.

Mr. A. F. Chamberlain, B.A., read a paper on "Pre-historic Ethnology."

He said man probably originated in a continent occupying in former times the ocean south of Africa and Australia. He approximated in physical features to the negro. At a very early date the primitive stock divided into two branches, one with lighter skin and hair less woolly than the other. From the latter of these the surviving negro races have descended; from the former the brown races of Africa, from the parent stem of which have descended the Aryan and Semitic nations, who passed into Europe and Asia respectively from Africa. The Semites are probably less Caucasian in type than the Aryans. The primitive seat of the Aryans before their dispersion was in Europe; The Swiss lake dwellers and the old Pelasgians, who survive in the Albanians of to-day, were descended from the primitive Aryan stock. The Eskimo reached America from Europe, and from their parent stock have descended the Mongol tribes of Asia, with the Japanese and the Chinese. Two points which are of great importance in prehistoric ethnology are the antiquity of man in America and the extensive range of the old Caucasian type in early times. It is well to note that the evidence gained from the study of the languages does not bear out the theory that language originated in monosyllabic roots. The rest of the paper was taken up with the discussion of surviving primitive races, *e. g.*, the Basques, Fulahs, Australians, Ainos and Eskimos, and their bearing on prehistoric ethnology; and with the proofs that archæology and comparative mythology and folk-lore afford of the attainments and culture of primitive man.

Mr. Rouse thought that too high an antiquity had been assumed for the lake dwellings of Europe. He had visited the museums of the lake dwellings at Zurich, and had noticed that a number of the specimens of cereals showed the action of fire. May not this have occurred at the time of the inv

sion of Julius Cæsar? as we read in his commentaries that the Helvetians then burned their possessions and abandoned their dwellings.

Mr. Chamberlain replied that lake dwellings were found all over central Europe. No one would imagine that the Helvetii had burned all the lake dwellings in Europe.

Mr. VanderSmitten said that much that related to prehistoric antiquity was purely conjectural. Great care should be exercised in forming opinions on those matters. The same results in different parts of the globe did not prove a similarity of race, or original relationship, but a similarity arising from general principles of human nature.

Mr. H. R. Wood, B.A., read a paper by Prof. T. Nelson Dale, on "The Geology of Mount Greylock," of which the following is an abstract:—

The paper gave a brief review of several months geological field work in Berkshire County, Mass, in the service of the U. S. Geological Survey (Archean Division, in charge of Prof. Raphael Pumpelly, of Newport, R.I.). After a few remarks on the general aim of the U. S. Geological Survey, the topographical basis of its work in Massachusetts, and an explanation of the method pursued in the summer's work on Greylock, the general lithological and structural character of the mountain was outlined, and some of the difficulties which beset the geologist in a highly metamorphic region were dwelt upon in detail. The paper closed with a brief allusion to the various industries, occupations and characteristics of the inhabitants of the region described.

---

#### SIXTEENTH MEETING.

Sixteenth Meeting, 5th March, 1887, the President in the Chair.

Exchanges since last meeting, 29.

Mr. John Phillips read a paper on "The Centrifugal Forces of the Planets."

Mr. J. A. Livingston read a paper entitled "Notes on Astronomy."

## SEVENTEENTH MEETING.

Seventeenth Meeting, 12th March, 1887, Dr. George Kennedy in the Chair.

Exchanges since last meeting, 35.

The Council announced the formation of a Philological Section, which was approved on motion by Mr. Marling, seconded by Mr. Williams.

The Council announced the election of the following as associates: U. T. Phillips, Thomas Stevenson, J. C. Maybee, G. F. Timms.

Wm. Campbell and W. R. Strickland were elected members.

Mr. A. B. McCallum, B.A., read a paper on "Some Pathological Growths in Lower Animals."

Mr. Macallum exhibited a number of cat-fish affected with cancer in various stages.

In answer to questions from Mr. Livingston and Mr. Rouse, as to whether there was any danger in eating the fish so affected,

Mr. Macallum replied that he did not think there would be any danger at all.

Mr. Macdougall called attention to the salmon disease, or *Saprolegnia*, which affects not only salmon but perch and eels. He had noticed the perch with large holes cut out of the body, jump out of the water as if in pain. The internal organs and the flesh were perfectly sound, and people ate of them without injury. The disease seemed to be the same as the cancer in the fish exhibited by Mr. Macallum.

Mr. Macallum said that the disease attacked all fish that were not in a normal condition. To prevent it a normal amount of food and aerated water were necessary. The sewage in water in the old country caused it.

Dr. Kennedy referred to the number of dead fish sometimes seen floating in the bay, and asked the cause of it.



Mr. Macallum said it was the inability to procure suitable food. They stood the first season very well, but could not procure food the second. There were no parasites in them, they were in a perfectly normal condition.

Mr. Brodie asked the difference between pathological and normal growths.

Mr. Macallum could not, he said, tell which was pathological and which was normal, until all the conditions were understood.



FIRST SERIES—Begun August, 1852; concluded December, 1855; 41 numbers, 3 vols. 4to.

SECOND SERIES—Begun January, 1856; concluded January, 1878; 92 numbers, 15 vols. 8vo

THIRD SERIES—Begun 1879.

#### NOTES.

1.—The First Series has for title, "The Canadian Journal : a Repertory of Industry, Science and Art; and a Record of the Proceedings of the Canadian Institute." The Second series has for title, "The Canadian Journal of Science, Literature, and History." The title of the Third Series is, "Proceedings of the Canadian Institute." Parts 1 & 2, Third Series, are entitled "The Canadian Journal : Proceedings of the Canadian Institute."

2.—By inadvertence, No. 85 (November, 1873) of the "Canadian Journal," 2nd Series (Vol. XIV.) immediately follows No. 79. There is, however, no *lacuna* between these two numbers, as is shown by the fact that the paging is consecutive.

3.—Societies wishing to exchange back numbers of their Proceedings can be supplied with complete sets of the Publications of the Canadian Institute, except Vol. XV., No. 5, Second Series, and Vol. I., Part 1, Third Series.

4.—Members having either of the above, Vol. XV., No. 5, Second Series, April, 1877, or Vol. I., Parts 1, 3 & 5; Vol. II., Parts 1 & 2; Vol. III., Part 1, Third Series, and being willing to part with them, will please communicate with the Assistant Secretary.

