

Report, Paper, or Abstract can be inserted in the Volume unless
in the Secretary's hands by 4 p.m. on Wednesday, September 3rd.
By Order of the COUNCIL.

MONTREAL, 1884.

BRITISH ASSOCIATION

FOR THE

ADVANCEMENT OF SCIENCE.

FIFTY-FOURTH MEETING, 1884.

JOURNAL

—OF—

SECTIONAL PROCEEDINGS

No. 6.

ISSUED TUESDAY MORNING, SEPT. 2,

AT EIGHT A.M.

MEMBERS WHO PROPOSE TO READ PAPERS to any Section of the Meeting are requested to forward or deliver the same immediately to the Secretaries of that Section, and to arrange without delay with these Officers, by Letter, as to the time and manner of reading the communication (see page 17).

LETTERS AND OTHER COMMUNICATIONS for the General and Sectional Officers and other Members of the Association may be left in the care of the CLERK AT THE POST OFFICE.

MEETINGS THIS DAY.

SECTIONAL COMMITTEES.....at 10 A.M.—THE COMMITTEE ROOMS.
SECTIONS.....at 11 A.M.—THE SECTION ROOMS.
COMMITTEE OF RECOMMENDATIONS...at 3.0 P.M.—MORRICE HALL.
SOIREE.....at 8.0 P.M.—VICTORIA SKATING RINK.

PRINTED UNDER THE SUPERINTENDENCE OF THE SECRETARY.

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PAPERS TO BE READ ON TUESDAY,

SEPTEMBER 2ND, 1884.

Section A.—Mathematical and Physical Science.

SUB-SECTION OF MATHEMATICS.

[IN THE COMMITTEE-ROOM OF THE SECTION, MORRICE HALL.]

1. *Professor J. C. Adams.*—Note on Newton's Theory of Astronomical Refraction, and on his explanation of the motion of the Moon's Apogee.
2. *Rev. Dr. C. Taylor.*—A Historical Note on Continuity.
3. *Professor R. S. Ball.*—On a Model of the Cyliindroid, showing the nodal line.
4. *Professor G. P. Young.*—On Solvable Irreducible Equations of prime degree.
5. *Professor Lindemann.*—On the tact-invariant of a Cubic Curve and a Conic Section.
6. *Professor W. Dyck.*—On the "Analysis Situs" of three-dimensional spaces.
7. *Professor W. M. Hicks.*—On the Expression of the Co-ordinate of a point in terms of the potential and line of force at the point.
8. *Professor W. M. Hicks.*—On the pressure at a point inside a vortex-ring of uniform vorticity.
9. *Professor A. W. Phillips.*—Transformation of the stereographic equatorial projection of a sphere by means of a certain form of the Peaucellier cell.
10. *R. F. Davis.*—A Geometrical Theorem in connection with the three-cusped Hypocycloid.

11. *E. P. Culverwell*.—On the discriminating condition between maxima and minima in the Calculus of Variations.
12. *David P. Todd*.—On the invariable plane of the Solar System.

SUB-SECTION OF PHYSICS.

[AT THE MORRICE HALL]

1. Report of Committee for facilitating the adoption of the Metric System in Great Britain.
2. *Lord Rayleigh*.—On the Colours of Thin Plates.
3. *Lord Rayleigh*.—On Clark's Standard Cells.
4. *Professor Fitzgerald*.—On an Analogy between Heat and Electricity
5. *J. Urquhart Mackenzie*.—The Telemeter System.
6. *Professors Reinold and Rücker*.—The thinning of liquid films by electric current.
7. *Professor Chandler Roberts*.—On the diffusion of metals.
8. *W. J. Millar*.—On Iron and other metals in the solid and molten states.
9. *Professor George Forbes*.—On the velocity of light of different colours.
10. *Albert A. Michelson*.—The velocity of light in carbon disulphide and the difference of the velocities of red and blue light in the same.
11. *Professor R. S. Ball*.—On a systematic research for stars with a measurable annual parallax, and its result.
12. *Dr. Stone*.—On an electro-dynamometer with extremely light moving coil for the measurement of small alternating currents.
13. *W. H. Preece*.—On the law regulating the connexion between current and intensity of incandescence of carbon-filaments in glow lamps.
14. *Professor S. P. Thompson*.—The equations of dynamo-electric machines.

15. *E. O. Walker*.—On earth currents.
16. *E. Thacher*.—On a new cylindrical slide-rule.
17. *H. Borns*.—On the inconveniences of the present mode of quoting scientific journals.
18. *P. Burton*.—An account of unusual coloured bows observed in fogs.
19. *J. B. Francis*.—On the temperature of the interior of a block of melting ice.

Section B.—Chemical Science.

[AT THE CHEMICAL CLASS ROOM. MCGILL COLLEGE.]

1. Discussion on Chemical Changes in their Relation to Micro-organisms, to be opened by Professor Frankland.
2. *R. Warington*.—On Nitrification.
3. *Professor W. O. Atwater*.—On the Assimilation of Atmospheric Nitrogen by Plants.
4. *Sir John Lawes and Dr. Gilbert*.—On some Points in the Composition of Soils, with Results illustrating the Sources of Fertility of Manitoba Prairie Soils.
5. *H. B. Dixon*.—On the Velocity of Explosions in Gases.
6. *Professor Carnelley*.—On the Colour of Chemical Compounds; chiefly as a Function of the Atomic Weights of their Constituent Elements.
7. *G. P. Girwood and J. M. Bunrose*.—Preliminary Note on a Blue-colouring Matter found in certain Wood undergoing Decomposition in the Forest.

Section C.—Geology.

1. *Gilbert, G. K., U. S. Geological Survey*.—Plan for the Subject-Bibliography of North American Geology.
2. *Claypole, Prof. E. W., B.A., B.Sc., F.G.S., Geological Survey of Pennsylvania*.—On some remains of Fish from the Upper Silurian Rocks of Pennsylvania.
3. *Marsh, Prof. O. C.*—American Jurassic Mammals.
4. *Jones, Prof. T. R., F.R.S.*—On the Geology of South Africa.

5. *Dawson, Principal Sir W., C.M.G., LL.D., F.R.S.*—On the more Ancient Land Floras of the Old and New Worlds.
6. *Gardner, J. S.*—On the Relative Ages of the American and English Cretaceous and Eocene Series.
7. *Wethered, E.*—On the Structure of English and American Carboniferous Coals.
8. *Jones, Prof. T. R., F.R.S.*—Second Report on the Fossil Phyllopora of the Palæozoic Rocks.
9. *Mackay, A. H., D.A., A.Sc.*—A Preliminary Examination of the Siliceous Organic Remains in the Lacustrine deposits of the Province of Nova Scotia.
10. *Matthews, G. F., A.M., F.R.S.C.*—The Geological Age of Acadian Fauna.
11. ————The Primitive Conocorypcean.
12. *De Rance, C. E.*—Tenth Report of the Committee upon the Underground Waters in the Permeable Formations of England and Wales, and the Quantity and Character of the Water supplied to various Towns and Districts from those Formations.
13. *De Rance, C. E., and W. Topley.*—Report of the Committee upon the Rate of Erosion of the Sea Coasts of England and Wales, and the Influence of the Artificial Abstraction of Shingle and other Material in that Action.
14. *Milne, Prof. J.*—Fourth Report on the Earthquake Phenomena of Japan.
15. *Hull, Prof. E., LL.D., F.R.S.*—The Geology of Palestine.
16. *Vine, G. R.*—Fifth Report on Fossil Polyzoa.
17. *Davis, J. W.*—Report upon the Exploration of Raygill Fissure in Lothersdale, Yorkshire.
18. *Cope, Prof. E. D.*—On the Permian genus *Cricotus*.
19. ————On the Pliocene Vertebrata of the Plateau of the Cordilleras of N. America and Mexico.
20. *Hallett, P., M.A.*—Notes on Niagara Falls.

N.B.—If time does not allow for the reading of these papers, the Section will meet at 10.30 a.m. on Wednesday.

Section D.—Biology.

[MEDICAL DEPARTMENT, MCGILL COLLEGE.]

1. Report on the Elimination of Nitrogen.
2. Remarks on the Caldwell Automatic Microtome.
3. *Prof. R. Ramsay Wright*.—On Sensory Nerve sacs in the skin of *Amiurus*, a Siluroid fish.
4. *Prof. R. Ramsay Wright*.—On the Function of the Air-bladder in *Amiurus*, and its relationship to the Auditory Organ.
5. *Albert S. Bickmore*.—On the Jessop Collection to illustrate the Forestry of the United States, in the New York Natural History Museum.
6. *S. F. Harmer*.—On the development of *Polyzoa*.
7. *Professor Shepherd*.—On Anatomical Variations. 1. Paramastoid process occurring in Man. 2. Secondary Astragalus. 3. Persistence of the left duct of Cuvier in Man.
8. *Prof. Moseley*.—On the Eyes and other Sense Organs in the Shells of the *Chitonide*.
9. *Prof. Moseley*.—On the Structure and Arrangement of the Feathers in the Dodo.
10. *William Bateson*.—The presence in the *Enteropneusta* of a structure comparable with the Notochord of the *Chordata*.
11. *Prof. P. McMurrick*.—A Contribution to our knowledge of the *Phytophi*.
12. *A. H. Mackay*.—On the Diatomaceous remains in the Lake-deposits of Nova Scotia.

SUPPLEMENTARY MEETING—PHYSIOLOGY.

In the Chemistry Lecture Room, at 11 o'clock.

Prof. SCHAFER, V.-P., in the Chair.

1. *Professor Schäfer*.—Demonstration of an Apparatus for recording changes of volume.
2. *Professor McKendrick*.—Remarks on the Problem of Aquatic breathing.

3. *Dr. G. Harley*.—On Biliary concretions; demonstrating a uniformity in the construction of concretions in the Animal, Vegetable and Mineral kingdoms.
4. *Professor Mills*.—On the Secretion of Oxalic Acid in the Dog.
5. *Professor Schäfer*.—On the Mechanism of Absorption.
6. *Rev. Dr. Dallinger*.—On a method of studying the behaviour of the germs of septic organisms under changes of temperature.
7. *A. W. Bennett*.—A Vegetable organism which separates Sulphur.
8. *Dr. W. Alexander*.—The Physiology of Therapeutics of the Chloral Hydrate, and Anæsthetics generally.
9. *C. S. Minot*.—On the Growth of Children.
10. *W. B. Halliburton and Professor Schafer*.—On the Proteids of Serum.
11. *W. H. Hingston*.—Climate of Canada, and its relations to life and health.

Section E.—Geography.

[GYMNASIUM, MANSFIELD STREET.]

1. *Lieut. P. H. Ray*, U.S.A.—Arctic experiences at Point Barrow.
Lieut. A. W. Greely U.S.A., will be present, and will take part in the discussion if his health permits.
2. *Rev. Abbé J. C. R. Laflamme*, (*Professeur à l'Université Laval*).—Notes sur quelques grands Bassins Hydrographiques du Dominion Oriental.
3. *E. T. Fletcher*.—The Crown Land Surveys of the Province of Quebec.
4. *Lindsay Russell*.—The Dominion Land Surveys in the North West.
5. *R. G. Haliburton*.—A search for lost Colonies of Northmen and Portuguese in British North America.

6. *Professor W. Boyd Dawkins, M.A., F.R.S.*—The former connection between North America and the Eastern side of the Atlantic.
7. *J. S. O'Halloran.*—A communication on Winnecke's explorations in Central Australia, with notes on the employment of Camels.

Section F.—Economic Science and Statistics.

[AT THE SYNOD HALL.]

1. *Cornelius Walford.*—International Communication by Land and Water.
2. *Ed. Wragge and Alex. McDougall.*—Transport by Land and Water.
3. *Emile de Laveleye.*—On Land Laws.
4. *Miss Maria Rye.*—Female Emigration.
5. *Mrs. Burt.*—Female Emigration.
6. *Mrs. Joyce.*—Female Emigration.
7. *J. Lowe.*—Population, Immigration and Pauperism in Dominion of Canada.
8. *T. B. Sprague.*—On the probability that a marriage entered into at any age will be fruitful, and that a marriage which has been childless for several years will subsequently become fruitful.
9. *C. Le Neve Foster.*—On the relative dangers of Coal and Metal Mining.

Section G.—Mechanical Science.

[AT THE CONGREGATIONAL COLLEGE.]

1. Report of the Patent Law Committee.
2. Report of the Screw Gauge Committee.
3. Report of the Sea-Coast Erosion Committee.
4. *Professor S. P. Thompson.*—Some points in Dynamo-Electric Machines.

5. *G. Forbes.*—The Heating of Conductors by Electric Currents.
6. *C. J. H. Woodbury.*—Automatic Sprinklers for Fire Ex-tinction.
7. *Professor Osborne Reynolds.*—The Friction of Journals.
8. *V. C. Van Horn.*—Grain Elevators.
9. *Arthur Rigg.*—Turbines.
10. *A. T. Smith.*—Ventilation of Ocean Steamers.
11. *Admiral J.E.Commerell.*—Prevention of Accidents at Sea.

Section H.—Anthropology.

[AT THE WESLEYAN COLLEGE.]

1. Report of Committee for the purpose of defraying the expenses of completing the final Report of the Anthro-pometric Committee.
2. *A. Neubauer.*—Notes on the Races of the Jews.
3. *Dr. Daniel Wilson.*—On a Skull from the Löss of Podba-ba, near Prague, and a Skull found in Alluvium at Keen-akee, Illinois, along with a Tooth of the Mastodon.
4. *Rev. H. H. Winwood.*—Recent Excavations in Pen Pits, Somersetshire.
5. *Lieut. P. H. Ray, U.S.A.*—Habits and Customs of the Ince of the Western Shore and Point Barrow.
6. *Horatio Hale.*—On some Doubtful or Intermediate Arti-culations.
7. *Professor G. Lawson.*—On Food Plants used by the Indians.
8. *R. G. Haliburton.*—On the Blackfeet Indians.
9. *C. Staniland Wake.*—Race elements of the Malagasy.
10. *Hyde Clarke.*—Notes on Researches as to American Origins.

PAPERS READ ON MONDAY,

SEPTEMBER 1, 1884.

Section A.—Mathematical and Physical Science.

1. Special Discussion on *The connexion of Sun-Spots with Terrestrial Phenomena*, opened by *Professor A. Schuster*.
2. *Professor Balfour Stewart* and *W. Lant Carpenter*.—On certain short periods common to solar and terrestrial phenomena.
3. The Report of Committee on the Harmonic Analysis of Tidal Observations.
4. Report of Committee on Tidal Observations in the English Channel.
5. *Professor A. Johnson*.—On the importance of Tidal Observations in the Gulf of St. Lawrence and the adjacent Atlantic coast.
6. Report of Committee on the Measurement of Solar Radiation.
7. Report of Committee on Meteoric Dust.
8. *Rev. S. J. Perry*.—On the Spot-Spectrum from D. to B.
9. *Professor H. A. Rowland*.—Recent progress in photographing the Solar Spectrum.
10. *C. Carpmæl*.—On a new form of Induction Inclinator.
11. *The Earl of Rosse*.—An Electrical control for Equatorial Driving-Clocks.
12. *The Earl of Rosse*.—On the Polishing of Specula.
13. *Professor Douglas Archibald*.—On some preliminary experiments with Anemometers attached to kite-wires.
14. *Professor Douglas Archibald*.—The recent Sun-Glows and Halo in connexion with the eruption of Krakatoa.
15. *Professor James Thomson*.—On Whirlwinds and Water-spouts.

16. *G. H. Henshaw*.—On the formation of "frasil" ice.
17. *H. S. Poole*.—Note on the internal temperature of the earth at Woolville, Nova Scotia.
18. *Dr. H. Muirhead*.—On the formation of mackerel-sky.

Section B.—Chemical Science.

1. *Professor W. Chandler Roberts*.—Report of the Committee on Spectrum Analysis.
2. *Harold B. Dixon*.—Report of the Committee on Chemical Nomenclature.
3. *Dr. Perkin*.—On Coal Tar Colouring Matters.
4. *W. Weldon*.—On the Manufacture of Soda and Chlorine.
5. *Professor J. Sterry Hunt*.—On the Chemistry of the Natural Silicates.
6. *Professor Dewar*.—On the Liquefaction of Oxygen and the Density of Liquid Hydrogen.
7. *Professors Goodwin and Marshall*.—On the Physical Constants of Solutions.
8. *Dr. Stevenson Macadam*.—On the Production of Permanent Gas from Paraffin Oils.
9. *Sir H. E. Roscoe*.—On the Diamondiferous Deposits of South Africa and the Ash of the Diamond.
10. *H. Robinson*.—On a Redetermination of the Atomic Weight of Cerium.

Section C.—Geology

- Hall, Professor LL.D.*—On the Fossil Reticulate Sponges constituting the Family *Dictyospongiæ*.
- On the Lamellibranchiate Fauna of the Upper Helderberg, Hamilton, Portage, Chemung and Catskill groups (equivalent to the Lower, Middle and Upper Devonian of Europe); with especial reference to the arrangement of the *Monomyaria*, and the development and distribution of the species of the genus *Leptodesma*.
- Bonney, Professor T. G., D.Sc., F.R.S.*—On the Archæan Rocks of Great Britain.

- Hunt, Dr. T. Sterry, F.R.S.*—The Eozoic Rocks of North America.
- Blake, Professor J. F., M.A.*—First impressions of some Pre-Cambrian Rocks of Canada.
- Dana, Professor J. D., LL.D.*—On the Southward Ending of a great Synclinal in the Taconic Range.
- Johnston-Lavis, H. J.*—Notice of a Geological Map of Monte Somma and Vesuvius.
- Topley, W., Geological Survey of England.*—Report upon the National Geological Surveys of Europe.
- Whitaker, W., B.A., Geological Survey of England.*—The Value of Detailed Geological Maps in relation to Water-Supply and other Practical Questions.
- Ball, V., M.A., F.R.S.*—On the Mode of Occurrence of Precious Stones and Metals in India.
- Foster, Dr. C. Le Neve, H. M. Inspector of Mines.*—What is a Mineral Vein or Lode?

Section D.—Biology.

1. *Prof. D. J. Cunningham.*—On the value of Nerve-supply in the determination of Muscular Anomalies.
2. *Prof. A. M. Marshall.*—On the mutual relation of the recent groups of Echinoderms.
3. *W. H. Caldwell.*—On the Fœtal Membranes of the Marsupials.
4. *W. H. Caldwell.*—A letter on the progress of his investigations in Australia.
5. *Dr. G. E. Dobson.*—An attempt to exhibit diagrammatically the several stages of the Evolution of the *Mammalia* as defined by Huxley.
6. *Dr. G. E. Dobson.*—On some peculiarities in the Geographical distribution and habits of certain Mammals inhabiting Continental and Oceanic Islands.
7. *Howard Saunders.*—On the Geographical distribution of of the *Laridæ* (Gulls and Terns) with special reference to Canadian species.

8. *W. B. Hemsley*.—Result of the investigations of Insular Floras.
9. *G. P. Hughes*.—Some observations on the direct descendants of *Bos primigenius*, in Great Britain.
10. *Dr. W. Fraser*.—On Natural Co-ordination as evinced in Organic Evolution.

SUPPLEMENTARY MEETING—PHYSIOLOGY.

1. *Professor H. N. Martin* and *W. H. Howell*.—On the Coagulation of Blood.
2. *Francis Gotch* and *J. P. Laws*.—On the Blood of *Limulus polyphemus*.
3. *Professor H. P. Bowditch*.—On Vaso-motor Nerves.
4. *Professor T. W. Mills*.—On the Secretion of Oxalic Acid in the Dog.
5. *Professor T. W. Mills*.—Demonstration of the Co-ordinating Centres of Kronecker.
6. *Professors Kronecker* and *Mills*.—On the Cardiac Nerves of the Turtle.
7. *V. Horsley* and *Professor Schäfer*.—On the functions of the Marginal Convolution.

Section E.—Geography.

1. *James Glaisher, F.R.S.*—Report on the Committee for promoting the Survey of Palestine.
2. *Dr. J. Beaufort Hurlbert*.—Comparison of the climates of the Eastern and Western Hemispheres.
3. *Dr. J. Beaufort Hurlbert*.—Some peculiar Storms on the North American Continent.
4. *Trelawney Saunders*.—Dominion Surveys.
5. *James Dillon*.—An Automatic Sounder.

6. Memorandum on the British Commercial Geographical Society, about to be founded on the proposal of commander V. Lovett Cameron, c.B.

Section F.—Economic Science and Statistics.

1. Report of Committee for the purpose of defraying the expenses of completing the final Report of the Anthropometric Committee.
2. Report of Committee on teaching of Science in Elementary Schools.
3. *Stephen Bourne*.—Interdependence of several portions of the British Empire.
4. *Cooke Taylor*.—Factory Acts.
5. *R. C. Adams*.—Phosphates of Canada.
6. *L. Z. Joncas*.—Fisheries.
7. *Professor Brown*.—On the Application of Scientific and Practical Arboriculture to Canada.
8. *A. T. Drummond*.—Distribution of Canadian Trees.
9. *Dr. Bell*.—Forests of Canada.
10. *G. P. Hughes*.—Forestry.
11. *F. B. Hough*.—The Future Policy of Forest Management in the United States.

SECTION G.—Mechanical Science.

1. *W. Smith*.—Light-house system of Canada.
2. *Sir James Douglass*.—Improvements in Coast Signals.
3. *W. H. Preece*.—The Watt and Horse-Power.
4. *W. H. Preece*.—Secondary Batteries.
5. *W. H. Preece*.—Domestic Electric Lighting.
6. *Dr. A. Traill*.—The Portrush Electric Railway.
7. *Holroyd Smith*.—Electric Tramways.
8. *Captain Cardew*.—A new Volt-meter.

Section H.—Anthropology.

1. *Mrs. Erminie A. Smith.*—Remarks on the Customs and Language of the Iroquois.
2. *F. H. Cushing.*—On the Development of Industrial and Ornamental Art among the Zuñis of New Mexico.
3. *Dr. Daniel Wilson.*—The Huron-Iroquois a typical race of American Aborigines.
4. *C. A. Hirschfelder.*—Anthropological Discoveries in Canada.
5. *Hyde Clarke.*—Observations on the Mexican Zodiac and Astrology.
6. *Miss A. W. Buckland.*—Facts suggestive of prehistoric intercourse between East and West.

OFFICERS AND COMMITTEES OF THE
VARIOUS SECTIONS.

Section A.—Mathematical and Physical Science.

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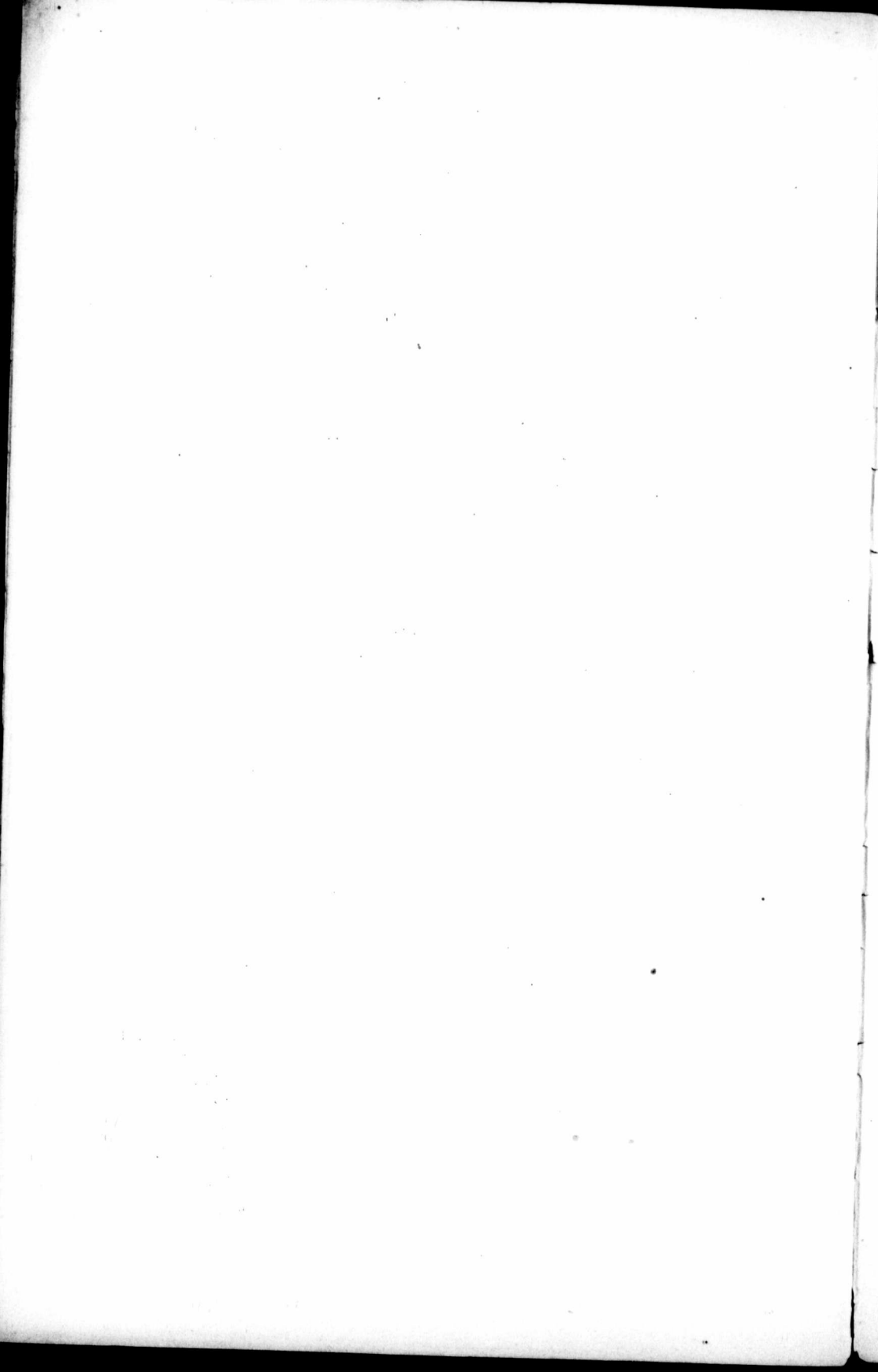
Section H.—Anthropology.

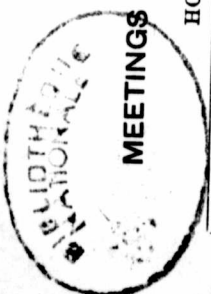
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MEETINGS OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, MONTREAL, 1884.

HOURS AND PURPOSES OF MEETING, WEDNESDAY, AUGUST 27TH, TO WEDNESDAY, SEPTEMBER 3RD.

DAYS.	COUNCIL, McGill University.	GENERAL COMMITTEE, McGill University.	Committee of Recommendations— McGill University.	Committees of Sections.	SECTIONS.	GENERAL MEETINGS.	SOIREEs.
Wednesday, Aug. 27	10 A.M.	{ * 1 P.M. To receive Report of Council. }	2 P.M.	..	{ 8 P.M. The Presi- dent's Address. }	{ 8 P.M. At McGill University. }
Thursday, " 28	10 A.M.	11 A.M.		
Friday, " 29	3 P.M.	10 A.M.	{ 8-30 P.M. Prof. Oliver J. Lodge's Dis- course on "Dust." }	
Saturday, " 30	10 A.M.	11 A.M.		
Sunday, " 31
Monday, Sept. 1	..	†	..	10 A.M.	11 A.M.	{ 8-30 P.M. Rev. W. H. Dallinger's Dis- course on 'The Modern Micros- cope in Researches on the Least and Lowest Forms of Life.' }	
Tuesday, " 2	3 P.M.	10 A.M.	11 A.M.		
Wednesday, " 3	..	{ 1 P.M. To receive Report of Committee of Re- commendations. }	10 A.M.†	{ 2-30 P.M. Conclud- ing Meeting. }	{ 8 P.M. In the Skat- ing Rink. }
		

N.B.—Excursions are proposed for Saturday, August 30th, and Thursday, September 4th, concerning which apply to the Local Secretaries.
 * At this Meeting the Sectional Officers will be elected
 † Instead of the meeting ordinarily held on this afternoon, there will be one at the Royal Institution, Albemarle street, London, England, on Nov. 11, at 3 P.M., for election of officers, fixing place of meeting in 1885, &c.
 ‡ This meeting is only held in the event of business remaining over from the previous day.