#### TRANSACTIONS

OF THE

# ROYAL SOCIETY OF EDINBURGH.

### TRANSACTIONS

OF THE

# ROYAL SOCIETY

OF

#### EDINBURGH.

VOL. XXXVII.

#### EDINBURGH:

PUBLISHED BY ROBERT GRANT & SON, 107 PRINCES STREET, AND WILLIAMS & NORGATE, 14 HENRIETTA STREET, COVENT GARDEN, LONDON.

MDCCCXCV.

No.	I.	Published	March 23, 1892.	No.	XVIII.	Published	February 24, 1893.
,,	II.	"	June 13, 1892.	,,	XIX.	,,	April 12, 1893.
"	III.	,,	" "	,,	XX.	,,	July 28, 1893.
••	IV.	"	July 7, 1892.	,,	XXI.	,,	August 26, 1893.
77	v.	"	August 5, 1892.	"	XXII.	"	September 16, 1893.
,,	VI.	,,	,, ,, <b>,</b> ,	,,	XXIII.	,,	September 15, 1893.
,,	VII.	"	August 19, 1892.	,,	XXIV.	,,	October 3, 1893.
"	VIII.	,,	August 20, 1892.	,,	XXV.	,,	November 13, 1893.
,,	IX.	,,	,, ,, ,,	,,	XXVI.	,,	March 28, 1894.
27	X.	,,	September 26, 1892.	,,	XXVII.	,,	May 1, 1894.
,,	XI.	"	November 2, 1892.	,,	XXVIII.	,,	June 20, 1894.
,,	XII.	,,	November 5, 1892.	,,	XXIX.	,,	July 12, 1894.
,,	XIII.	"	November 3, 1892.	,,	XXX.	,,	October 15, 1894.
,•	XIV.	,,	November 10, 1892.	,,	XXXI.	,,	" " "
,.	XV.	,,	December 5, 1892.	,,	XXXII.	,,	" " "
"	XVI.	,,	January 17, 1893.	,,	XXXIII.	,,	February 13, 1895.
••	XVII.	",	March 29, 1893.	,,	XXXIV.	,,	February 8, 1895.

## CONTENTS.

#### PART I. (1891–92.)

NUMBE	R .	PAGE
I.	The Chemistry of Strophanthidin, a Decomposition Product of Strophanthin. By Thomas R. Fraser, M.D., F.R.S., and Leonard Dobbin,	
	Ph.D.,	1
II.	Circular Magnetisations accompanying Axial and Sectional Currents along Iron Tubes. By Professor Cargill G. Knott, D.Sc., F.R.S.E.	
	(With a Plate),	7
III.	On the Number of Dust Particles in the Atmosphere of certain Places in Great Britain and on the Continent, with Remarks on the Relation between the Amount of Dust and Meteorological Phenomena. By John Aitken, F.R.S. (With a Plate),	17
	•	
IV.	On the New Star in the Constellation Auriga. By Professor RALPH COPELAND, Astronomer-Royal for Scotland. Together with Observations of the Same. By Dr L. Becker. (With a Plate),	51
V.	The Lateral Sense Organs of Elasmobranchs. I. The Sensory Canals of Læmargus. By J. C. Ewart, M.D., Regius Professor of Natural History, University of Edinburgh. (Plates I. and II.),	59
VI.	On the Lateral Sense Organs of Elasmobranchs. II. The Sensory Canals	
	of the Common Skate (Raia batis). By J. C. Ewart, M.D., Regius	
	Professor of Natural History, and J. C. MITCHELL, B.Sc., University	
	of Edinburgh. (Plate III.),	87

vi CONTENTS.

NUMBER	PAGE
VII. On the Latest Phases of Literary Style in Greece. By Emeritus Professor Blackie,	107
VIII. The Lower Carboniferous Volcanic Rocks of East Lothian (Garlton Hills).  By Frederick H. Hatch, Ph.D., F.G.S., of the Geological Survey.  Communicated by Sir Archibald Geikie, F.R.S. (With Two Plates),	115
IX. On the Glacial Succession in Europe. By Professor James Geikie, D.C.L., LL.D., F.R.S., &c. (With a Map),	127
X. On some Eurypterid Remains from the Upper Silurian Rocks of the Pentland Hills. By Malcolm Laurie, B.Sc., F.L.S. (With Three Plates),	151
XI. On Borolanite—an Igneous Rock intrusive in the Cambrian Limestone of Assynt, Sutherlandshire, and the Torridon Sandstone of Ross-shire.  By J. Horne, F.R.S.E., and J. J. H. Teall, F.R.S., of the Geological Survey. (Communicated by permission of the Director-General of the Geological Survey.) (With a Plate),	163
XII. On the Action of the Valves of the Mammalian Heart. By D. Noël Paton, M.D., F.R.C.P.E., Superintendent of the Research Laboratory of the Royal College of Physicians. (With Two Plates), .	179 լ
XIII. A Contribution to the Anatomy of Sutroa. By Frank E. Beddard, M.A., Prosector to the Zoological Society of London. (With a Plate),	195
XIV. A Comparison of the Minute Structure of Plant Hybrids with that of their Parents, and its Bearing on Biological Problems. By J. Muirhead Macfarlane, D.Sc., F.R.S.E. (Plates IVIII.),	203
PART II. (1892-93.)  XV. The Skull and Visceral Skeleton of the Greenland Shark, Læmargus	
microcephalus. By Philip J. White, M.B., Demonstrator of Zoology, University of Edinburgh. Communicated by Professor Ewart. (With Two Plates),	287 V

CONTENTS. vii

NUMBER		PAGE
XVI.	On the Fossil Plants of the Kilmarnock, Galston, and Kilwinning Coal Fields, Ayrshire. By ROBERT KIDSTON, F.R.S.E., F.G.S. (Plates IIV.),	307
XVII.	Electrolytic Synthesis of Dibasic Acids. By Professor A. Crum Brown and Dr James Walker. II. On the Electrolysis of the Ethyl-Potassium Salts of Saturated Dibasic Acids with Side Chains, and on Secondary Reactions accompanying the Electrolytic Synthesis of	
	Dibasic Acids,	361
XVIII.	On Impact, II. By Professor Tait,	381
XIX.	A New Algebra, by means of which Permutations can be transformed in a variety of ways, and their properties investigated. By T. B. Sprague, M.A., F.R.S.E.,	399
XX.	On the Particles in Fogs and Clouds. By John Aitken, Esq., F.R.S., F.R.S.E.,	413
XXI.	On the Path of a Rotating Spherical Projectile. By Professor Tair. (With a Plate),	427
XXII.	On the Present State of Knowledge and Opinion in regard to Colour-Blindness. By William Pole, F.R.S., F.R.S.E., Mus. Doc. Oxon., Honorary Secretary of the Institution of Civil Engineers. (With a Plate),	441
XXIII.	On the Chemical Changes which take place in the Composition of the Sea-Water associated with Blue Muds on the Floor of the Ocean. By John Murray, LL.D., Ph.D., and Robert Irvine, F.C.S.,	481
XXIV.	The Anatomy and Relations of the Eurypteridæ. By Malcolm Laurie, B.Sc., B.A., F.L.S. Communicated by R. H. Traquair, M.D., F.R.S., F.R.S.E. (With Two Plates),	509

PART III. (1893–94.)	
XXV. On Lepidophloios, and on the British Species of the Genus. By	PAGI
	529
XXVI. On the Fossil Flora of the South Wales Coal Field, and the Relation- ship of its Strata to the Somerset and Bristol Coal Field. By ROBERT KIDSTON, F.R.S.E., F.G.S. (With a Plate),	565
XXVII. On Bistratification in the Growth of Languages, with Special Reference to Greek. By Emeritus Professor Blackie, 6	<b>31</b> 5
XXVIII. On the Number of Dust Particles in the Atmosphere of Certain Places in Great Britain and on the Continent, with Remarks on the Relation between the Amount of Dust and Meteorological Pheno- mena. Part III. By John Aitken, F.R.S. (With Three Plates),	321
Plates),	,,,,,
XXIX. On the Variations of the Amount of Carbonic Acid in the Ground- Air (Grund-Luft of Pettenkofer). By C. Hunter Stewart, B.Sc., M.B. (From the Public Health Laboratory of the University of Edinburgh.) (With Three Plates), 6	395
PART IV. (1894-95.)	
XXX. Note on some Fossils from Seymour Island, in the Antarctic Regions, obtained by Dr Donald. By G. Sharman and E. T. Newton. (With a Plate),	707
XXXI. On the Partition of a Parallelepiped into Tetrahedra, the Corners of which Coincide with Corners of the Parallelepiped. By Professor Crum Brown. (With Two Plates),	711
XXXII. On the Manganese Oxides and Manganese Nodules in Marine Deposits. By John Murray, LL.D., Ph.D., of the Challenger Expedition, and Robert Irvine, F.C.S.,	721

CONTENTS. 1X

NUMBER	PAGE
XXXIII. I.—On the Estimation of Carbon in Organic Substances by the Kjel dahl Method. II.—Its Application to the Analysis of Potable Waters. By Charles Hunter Stewart, D.Sc., M.B. (From the Public Health Laboratory of the University of Edinburgh.) (With Two Plates),	? 1
XXXIV. The Chemical and Bacteriological Examination of Soil, with special reference to the Soil of Graveyards. By James Buchanan Young, M.B., D.Sc. (From the Public Health Laboratory University of Edinburgh),	Ţ
APPENDIX—	
	. <b>77</b> 8
The Council of the Society,	
Alphabetical List of the Ordinary Fellows,	. 779
List of Honorary Fellows,	. 794
List of Ordinary Fellows Elected during Session 1891-92,	. 796
List of Honorary Fellows Elected during Session 1891-92,	. 797
Fellows Deceased or Resigned during Session 1891-92, .	. 798
List of Ordinary Fellows Elected during Session 1892-93,	. 799
Fellows Deceased or Resigned during Session 1892–93,	. 800
List of Ordinary Fellows Elected during Session 1893–94,	. 801
Fellows Deceased or Resigned during Session 1893-94, .	. 802
Laws of the Society,	. 803
The Keith, Makdougall-Brisbane, Neill, and Gunning Victoria Jubiled	
Awards of the Keith, Makdougall-Brisbane, and Neill Prizes, from 1822 to 1893, and of the Gunning Victoria Jubilea Prize from 1884 to	
1893,	. 813 b

			-
ADD	TTTTTTT	-contin	
A P P	'ENDIX-		npa.

Proceed	lings of	f the Sta	tutory (	General	Meeting	ıs,	•			ра 81
List of	Public	Institut	ions and	l Individ	duals en	titled to	receive	Copies o	of the	
•					of the 1				•	82
Index,				•						