PROCEEDINGS

OF

THE ROYAL SOCIETY

OP

EDINBURGH.

VOL. VII.

NOVEMBER 1869 to JUNE 1872.

EDINBURGH:
PRINTED BY NEILL AND COMPANY.
MDCCCLXXII.

CONTENTS.

Opening Address, Session 1869-70. By the Hon. Lord Neaves, Vice-	
President,	2
On the Geological Structure of some Alpine Lake-Basins. By Archi-	
bald Geikie, Esq., F.R.S.,	33
Preliminary Notice of the Great Fin Whale, recently stranded at	-
Longniddry. By Professor Turner,	34
Note on Aggregation in the Dublin Lying-in Hospital. By Dr	UT
	00
Matthews Duncan,	3 8
On a Method of Economising our Currency. By Andrew Coventry,	
Esq.,	39
On the Old River Terraces of the Earn and Teith, viewed in connec-	
tion with certain Geological Arguments for the Antiquity of Man.	
By the Rev. Thomas Brown, Edinburgh,	41
Experiments on the Colorific Properties of Lichens. By W. Lauder	
Lindsay, M.D., F.R.S.E., F.L.S.,	43
On the Principles of Scientific Interpretation in Myths, with Special	
Reference to Greek Mythology. By Professor Blackie,	• 44
	.1.1
On Reciprocal Figures, Frames, and Diagrams of Forces. By J.	
Clerk Maxwell, Esq., F.R.SS. L. & E.,	53
On the Extension of Brouncker's Method. By Edward Sang, Esq., .	56
On the Forces experienced by Solids immersed in a Moving Liquid.	
By Sir William Thomson,	60
On the Equilibrium of Vapour at a Curved Surface of Liquid. By	
Sir William Thomson,	63
On a Bow seen on the Surface of Ice. By J. Clerk Maxwell, Esq.,	
F.R.SS. L. & E.,	69
Note on the Atomic Volume of Solid Substances. By James Dewar,	•
Esq., Lecturer on Chemistry, Veterinary College, Edinburgh,	70
Note on Inverted Sugar. By James Dewar, Esq., Lecturer on Che-	, 0
	77
mistry, Veterinary College, Edinburgh,	11
On the Flow of Electricity in Conducting Surfaces. By W. R. Smith,	
M.A., Assistant to the Professor of Natural Philosophy in the	
University of Edinburgh. Communicated by Professor Tait. (With	
a Plate.)	79
On the Kombi Arrow-poison (Strophanthus hispidus, DC.) of the	
Mangania district of Africa. By Dr Thomas R. Fraser,	99
On Thebo-lactic Acid. By J. Y. Buchanan, M.A.,	103
On the Bones of a Seal found in Red Clay near Grangemouth, with	
Remarks on the Species. By Professor Turner,	105
On the Date of Montelity of Assured Lives as experienced by Ton	100
On the Rate of Mortality of Assured Lives as experienced by Ten	
Assurance Companies in Scotland from 1815 to 1863. By James	715
Meikle, Esq. Communicated by Professor Tait,	115
Notes on Indian Society and Life in the Age when the Hymns of the	
Rigveda were composed. By John Muir, D.C.L., LL.D., Ph.D.,	119
On the Lake Basins of Eastern Africa. By Keith Johnston, Jun.,	
Esq. FRGS.	122
On the Steady Motion of an Incompressible Perfect Fluid in Two	
Dimensions. By Professor Tait,	142
Difficultions. Di Hotopori Parci.	

On the most general Motion of an Incompressible Perfect Fluid. By	143
Professor Tait,	
Depths of the Sea,"	144
Facts as to Brain-Work; in Illustration of the New and Old Methods	
of Philosophical Inquiry in Scotland. By Thomas Laycock, M.D.,	145
On Change of Apparent Colour by Obliquity of Vision. By Robert	155
H. Bow, C.E., F.R.S.E.,	100
Remarks on the Theories of Capillary Action. By Edward Sang, Esq., F.R.S.E.,	160
Theory of Construction of the Great Pyramid. By John Christie,	
Esq. Communicated by the Rev. W. Lindsay Alexander, D.D.,	162
On the bulletine of Indites. The tributes of the second of	166
Primitive Affinity between the Classical and the Low German Lan-	167
guages. By the Hon. Lord Neaves,	107
On the Genetic Succession of Zooids in the Hydroida. By Professor	168
Allman, On Green's and other Allied Theorems. By Professor Tait,	168
Proposed Method of ascertaining the Temperature of Falling Rain.	
By Thomas Stevenson, F.R.S.E., Civil Engineer,	170
Letter from Professor W. J. Macquorn Rankine as to Diagrams of	
Forces in Framework,	171
On Spectra formed by Doubly Refracting Crystals in Polarised Light.	
By Francis Deas, LL.B., F.R.S.E.,	172
On the Heat Disengaged in the Combination of Acids and Bases.	
	174
Note on Professor Bain's Theory of Euclid I. 4. By Wm. Robertson	
Smith, M.A., Assistant to the Professor of Natural Philosophy.	150
Communicated by Professor Tait,	176
A Simple Mode of Approximating to the Wave-Length of Light. By	
W. Leitch, Assistant to the Professor of Natural Philosophy in the	179
University of Glasgow. Communicated by Professor Tait, Note on Linear Partial Differential Equations. By Professor Tait,	190
On the Oxidation Products of Picoline. By James Dewar, F.R.S.E.,	190
Lecturer on Chemistry, Veterinary College, Edinburgh,	192
Notes of some Experiments on the Rate of Flow of Blood and some	102
other Liquids through tubes of narrow diameter. By J. Matthews	
Duncan, M.D., F.R.S.E., and Arthur Gamgee, M.D., F.R.S.E.,	193
On Cystine (C ₃ H ₇ NO ₂ S). By James Dewar, F.R.S.E., Lecturer on	
Chemistry, Veterinary College, Edinburgh, and Arthur Gamgee,	
M.D., F.K.S.E., Lecturer on Physiology, at Surgeon's Hall, Edin-	
burgh,	201
Notes from the Physical Laboratory of the University. By Professor	-
Tait. (With a Plate),	206
Donations to the Society, Opening Address, Session 1870–71. By David Milne Home, Esq.,	209
Additional Remarks on the Theory of Capillary Attraction. By	232
Additional Remarks on the Theory of Capillary Attraction. By Edward Sang, Esq.,	308
Laboratory Notes: On Thermo-Electricity. By Professor Tait,	3 08
Note on Linear Differential Equations in Quaternions. By Professor	0 00
Tait,	311
On some Quaternion Integrals. By Professor Tait, .	318
Note on an Ice Calorimeter. By Dr A. Crum Brown,	321
Address "On the Educational System of Prussia." By Principal Sir	
Alex. Grant, Bart.,	309

On the Physiology of Wings: being an Analysis of the Movements by which Flight is produced in the Insect, Bat, and Bird. By James Bell Pettigrew, M.D., F.R.S. Communicated by Professor Turner,
Turner,
Address on "The Results of the More Recent Excavations on the Line of the Roman Wall in the North of England." By Dr J. Collingwood Bruce,
Line of the Roman Wall in the North of England." By Dr J. Collingwood Bruce,
Collingwood Bruce,
Note on two Species of Foraminifera, and on some Objects from the Nicobar Islands of great Ethnological interest. By T. C. Archer, Esq.,
Nicobar Islands of great Ethnological interest. By T. C. Archer, Esq.,
Esq.,
Certain Phenomena applied in Solution of Difficulties connected with the Theory of Vision. By R. S. Wyld, Esq.,
the Theory of Vision. By R. S. Wyld, Esq.,
Additional Note on the Motion of a Heavy Body along the Circumference of a Circle. By E. Sang, Esq.,
Additional Note on the Motion of a Heavy Body along the Circumference of a Circle. By E. Sang, Esq.,
ference of a Circle. By E. Sang, Esq.,
On the Capture of a Sperm Whale on the Coast of Argyleshire, with a Notice of other Specimens caught on the Coast of Scotland. By Professor Turner,
a Notice of other Specimens caught on the Coast of Scotland. By Professor Turner,
Professor Turner,
On the Efficient Powers of Parturition. By Dr J. Matthews Duncan, 370 On the Pentatonic and other Scales employed in Scottish Music. By the Hon. Lord Neaves,
On the Pentatonic and other Scales employed in Scottish Music. By the Hon. Lord Neaves,
the Hon. Lord Neaves,
On the Motion of Free Solids through a Liquid. By Sir William Thomson,
Thomson,
Laboratory Notes. By Professor Tait— 1. On Thermo-electricity,
1. On Thermo-electricity,
2. On Phyllotaxis,
Account of the Extension of the Seven-Place Logarithmic Tables, from 100,000 to 200,000. By Edward Sang, Esq., 395 On the Place and Power of Accent in Language. By Professor Blackie,
from 100,000 to 200,000. By Edward Sang, Esq., 395 On the Place and Power of Accent in Language. By Professor Blackie,
On the Place and Power of Accent in Language. By Professor Blackie,
Blackie,
Notice of Exhibition of Vegetable Spirals. By Professor Alexander Dickson,
Dickson,
On the Old River Terraces of the Spey, viewed in connection with certain proofs of the Antiquity of Man. By the Rev. Thomas
certain proofs of the Antiquity of Man. By the Rev. Thomas
Brown, F.R.S.E.,
the Cetacea. By Professor Turner,
Talamatana Natas Dr. Dr. Profession Toit
Laboratory Notes. By Professor Tait—
1. On Anomalous Spectra, and on a simple Direct-vision Spec-
troscope,
2. On a method of illustrating to a large Audience the com-
position of simple Harmonic Motions under various con-
ditions,
3. On a simple Mode of explaining the Optical Effects of
Mirrors and Lenses,
On the Structure of the Palacozoic Crinoids. By Professor Wyville
Thomson,
On the Formation and Decomposition of some Chlorinated Acids. By
J. Y. Buchanan, A.M.,
Notes on the Antechamber of the Great Pyramid. Based on the
Notes on the Antechamber of the Great Pyramid. Based on the Measures contained in vol. ii. "Life and Work at the Pyramid," by
Notes on the Antechamber of the Great Pyramid. Based on the Measures contained in vol. ii. "Life and Work at the Pyramid," by C. Piazzi Smyth. By Captain Tracey, R.A. Communicated by
Notes on the Antechamber of the Great Pyramid. Based on the Measures contained in vol. ii. "Life and Work at the Pyramid," by C. Piazzi Smyth. By Captain Tracey, R.A. Communicated by St John Vincent Day, C.E., F.R.S.E.,
Notes on the Antechamber of the Great Pyramid. Based on the Measures contained in vol. ii. "Life and Work at the Pyramid," by C. Piazzi Smyth. By Captain Tracey, R.A. Communicated by

On the Fall of Rain at Carlisle and the neighbourhood. By Thomas	\$
Barnes, M.D.,	434
Mathematical Notes. By Professor Tait—	,
1. On a Quaternion Integration,	434
2. On the Ovals of Descartes,	436
On the Remarkable Annelida of the Channel Islands, &c. By W. C.	
M'Intosh, M.D.,	438
Note. On the Use of the Scholastic Terms Vetus Logica and Nova	
Logica, with a Remark upon the corresponding Terms Antiqui	
and Moderni. By Thomas M. Lindsay, M.A., Examiner in Phi-	
losophy to the University of Edinburgh,	441
On some Abnormal Cones of Pinus Pinaster. By Professor Alex-	
ander Dickson,	449
Address on Spectrum Analysis. By Professor Tait,	455
Note on the Early History of Spectrum Analysis. By H. Fox Talbot,	
Hon. F.R.S.E.,	461
On some Optical Experiments. By H. F. Talbot, Hon. F.R.S.E.—	101
1. On a New Mode of observing certain Spectra,	466
2. On the Nicol Prism,	468
Note on a New Scottish Acidulous Chalybeate Mineral Water. By	100
James Dewar, F.R.S.E.,	470
On the Homologies of the Vertebral Skeleton in the Osseous Fishes	4,0
and in Man. By Professor Macdonald,	472
Scheme for the Conservation of Remarkable Boulders in Scotland,	1,2
and for the Indication of their Positions on Maps. By D. Milne	
Home, Esq.,	475
Note of a New Form of Armature and Break for a Magneto-Electric	1,0
Machine. By R. M. Ferguson, Ph.D.,	488
Mathematical Notes. By Professor Tait—	400
1. On a Property of Self-Conjugate Linear and Vector Func-	
	49 8
2. Relation between corresponding Ordinates of two Parabolas, .	
	501
4. On an Expression for the Potential of a Surface-distribu-	501
	503
An Experimental Research on the Antagonism between the Actions	000
of Physostigma and Atropia. By Dr Thomas R. Fraser. (With a	
The amount 1	506
On the Homological Relations of the Coelenterata. By Professor	000
	512
Donations to the Society.	514
Upening Address, Session 1871–72. By Sir Robert Christison Bart	531
On the Computation of the Strengths of the Parts of Skeleton or	001
Open Structures. By Edward Sang,	575
On vortex Motion. By Professor Sir William Thomson	576
On the Ultramundane Corpuscules of Le Sage. By Professor Sir W	0,0
Inomson,	577
Note on Spherical Harmonics. By Professor Tait.	589
Laboratory Notes: On Thermo-Electricity. By Professor Tait	597
On the Relation of Magnetism to Temperature. By D. H. Marshall.	
Esq., M.A., Assistant to the Professor of Natural Philosophy	
Communicated by Professor Tait. (With a Plate).	60 3
Note on a Singular Property of the Retina By Professor Tait	605
On the Operator $\varphi(\nabla)$. By Professor Tait.	607
NOTA ON PONCHILIN Matron D. D. D. C	608

On the Decomposition of Forces externally applied to an Elastic Solid.	
By W. J. Macquorn Rankine, C.E., LL.D., F.R.SS. Lond. & Edin.,	611
On Geometric Mean Distance. By Professor Clerk Maxwell,	613
On a Singular Case of Rectification in Lines of the Fourth Order. By	
Edward Sang, Esq.,	613
On the Wheeling of Birds. By Professor Fleeming Jenkin, .	615
Notice of a New Family of the Echinodermata. By Professor Wyville	
	615
On the Principles which regulate the Incidence of Taxes. By Pro-	
fessor Fleeming Jenkin,	618
Additional Notes on the Occurrence of the Sperm Whale in the Scot-	
tish Seas. By Professor Turner,	632
Address on Thermo-Electricity. By Professor Tait,	644
Note on Cystine. By James Dewar, F.R.S.E.,	644
	64 8
On the Curves of the Genital Passage as regulating the movements of	•
the Fœtus under the influence of the Resultant of the Forces of	
	648
On a Method of Determining the Explosive Power of Gaseous Com-	
	662
Note on Sprengel's Mercurial Air-Pump. By James Dewar, Esq., .	662
Exhibition of a large series of abnormal cones of Pinus Pinaster.	
By Professor Alexander Dickson,	663
On the Connection between Chemical Constitution and Physiological	00.2
Action—Continued. On the Physiological Action of the Salts of	
Trimethylsulphin. By Professor Crum Brown and Dr Thomas R.	
Fraser,	663
Note on the Strain Function By Professor Tait,	667
On the Motion of Rigid Solids in a Liquid circulating Irrotationally	00.
through Perforations in them or in any Fixed Solid. By Sir Wil-	
	6 68
On the Extraction of the Square Root of a Matrix of a Third Order.	000
	675
Second Note on the Strain Function. By Professor Tait,	682
Note on the Rate of Cooling at High Temperatures. By Professor	
	682
Notice of a Large Boulder in the Parish of Rattray, and County of	•••
Perth, having on one of its sides Cups and Grooves, apparently	
	682
On the Fruiting of the Ipecacuan Plant (Cephaelis Ipecacuanha, Rich.)	· · ·
in the Royal Botanic Garden. By Professor Balfour,	688
On Cardiocarpon. By Professor Duns, D.D., F.R.S.E., New College,	692
On the Composition of the Flesh of the Salmon in the "Clean" and	- O
"Foul" condition. By Sir Robert Christison, Bart.,	694
On Recent Estimates of Solar Temperature. By James Dewar, Esq.,	697
On the Temperature of the Electric Spark. By James Dewar, Esq.,	699
On the Action of Water on Lead. By Sir Robert Christison, Bart., .	699
On the Preservation of Iron Ships. By James Young, Esq. of Kellie,	702
First Report by the Committee on Boulders appointed by the Society,	703
	751
On the Chemical Efficiency of Sunlight. By James Dewar, Esq On the Rainfall of the Continents of the Globe. By Alexander	101
	755
Buchan, Secretary of the Scottish Meteorological Society, A.M.,	100
On the Lunar Diurnal Variation of Magnetic Delineation at Trevan-	756
drum, near the Magnetic Equator. By J. A. Broun, F.R.S.,	(50)

Some Helps to the Study of Scoto-Celtic Philology. By the Hon	•
Lord Neaves,	. 758
Some Observations on the Dentition of the Narwhal (Monodor	750
monoceros). By Professor Turper,	759
On the Occurrence of Ziphius cavirostris in the Shetland Seas, and a	ا
comparison of its Skull with that of Sowerby's Whale (Mesoplodon	7.00
Sowerbyi). By Professor Turner,	760
On the Maternal Sinus Vascular System of the Human Placenta.	5 00
By Professor Turner,	76 0
On Dimorphic Flowers of Cephaelis Ipecacuanha, the Ipecacuan Plant.	
By Professor Balfour,	763
On the Crinoids of the "Porcupine" Deep-Sea Dredging Expedition.	-01
By Professor Wyville Thomson,	764
Laboratory Notes. By Professor Tait—	
On Thermo-electricity: Circuits with more than one Neutral	
point. (With a Plate).	773
)	779
On some Quaternion Integrals. Part II. By Professor Tait,	784
On the Currents produced by Contact of Wires of the same Metal at	
Different Temperatures. By W. Durham, Esq. Communicated by	=00
Professor Tait,	788
Remarks on the Deep; Water Temperature of Lochs Lomond, Katrine,	- 0-
and Tay. By Alexander Buchan, A.M.,	791
Donations to the Society,	796
Index,	821