

S. 101. A. 9.

PROCEEDINGS
AND
TRANSACTIONS
OF THE
NATURAL HISTORY SOCIETY
OF GLASGOW.

VOL. IV.

(NEW SERIES.)

1892-96.



GLASGOW: PUBLISHED BY THE SOCIETY
AT ITS ROOMS, 207 BATH STREET.
MARCH, 1897.

GLASGOW: PRINTED BY ROBERT ANDERSON,

22 ANN STREET.

CONTENTS.

TRANSACTIONS—	PAGE
Remarks on some of the Land and Fresh-water Mollusca of Palestine. By Rev. G. A. Frank Knight, M.A. (with One Plate [I.]), - - - - -	9
Meteorological Notes, and Remarks upon the Weather during the Year 1893, with its General Effects upon Vegetation. By James Whitton, Superintendent of Parks, Glasgow, - -	16
Copy of Meteorological Record kept at Queen's Park, Glasgow, -	23
The Ustilaginæ of North Ayrshire. By D. A. Boyd, - -	24
The Peronosporæ of North Ayrshire. By D. A. Boyd, - -	28
Notes on the Anatomy of a form of Cyclopean, with Remarks on the Significance of Cyclopeans. By R. Broom, M.B., C.M., B.Sc., - - - - -	31
Occurrence of the Clouded-yellow Butterfly (<i>Colius edusa</i> , Fab.) in Ayrshire. By John Smith, - - - - -	35
<i>Pholus crispata</i> , Linn., as a Borer. By John Smith, - - -	37
<i>Alchemilla vulgaris</i> , Linn., and allied Forms. By P. Ewing, -	40
Report on the Disappearance of Native Plants. Edited by Professor Thomas King and D. A. Boyd, - - - - -	44
Vine-culture in India. Communicated by Johnston Shearer, -	49
Notes on the Habits of some Common Birds. By D. A. Boyd, -	50
Swallow (<i>Hirundo rustica</i> , Linn.), - - - - -	51
Robin (<i>Erythacus rubecula</i> , Linn.), - - - - -	52
Blue Titmouse (<i>Parus cæruleus</i> , Linn.), - - - - -	54
Blackbird (<i>Turdus merula</i> , Linn.), - - - - -	55
Rook (<i>Corvus frugilegus</i> , Linn.), - - - - -	56
Sparrow (<i>Passer domesticus</i> , Linn.), - - - - -	57
List of Fungi, &c., observed at Kilmahew, Finlaystone, and West Kilbride. By Professor Thomas King and D. A. Boyd, -	61
On some Entomostraca from Castlemilk, near Rutherglen. By Thomas Scott, F.L.S., Naturalist to the Fishery Board for Scotland, - - - - -	69
<i>In Memoriam</i> —Robert Turner, - - - - -	73
Jottings from my Note-Book. By David Robertson, F.L.S., F.G.S.—	
<i>Sacculina carcini</i> , Thompson, - - - - -	79
<i>Amphithoe podoceroïdes</i> , Rathke, and <i>Podocerus pulchellus</i> , Milne Edwards, - - - - -	80
<i>Buccinum undatum</i> , Linn., - - - - -	81
<i>Anceus maxillaris</i> , Montagu, - - - - -	82
<i>Aglaophenia myriophyllum</i> , Linn., - - - - -	83

	PAGE
Excursion Reports—	
Eglinton, - - - - -	85
Garnkirk, - - - - -	86
Hawkhill, - - - - -	86
Craignethan Castle, - - - - -	87
Ashgrove and Kerelaw, - - - - -	88
Brisbane, - - - - -	88
Erskine, - - - - -	89
Mauldslic, - - - - -	92
Dougalstoun and Baldernock, - - - - -	95
Redlands and Westmount (Kelvinside), - - - - -	99
Mains, - - - - -	100
Dalzell, - - - - -	101
Botanic Gardens, - - - - -	103
Edinbarnet, - - - - -	106
Garelochhead, - - - - -	107
Stepps, - - - - -	110
Garscube, - - - - -	110
Little Cumbrae, - - - - -	111
Woodside (Paisley), - - - - -	112
Pitcon Glen, - - - - -	113
Pollok, - - - - -	115
Balmaha, - - - - -	116
Troon, - - - - -	116
Milton-Lockhart, - - - - -	118
Murdostoun, - - - - -	120
Kilmahew, - - - - -	121
Blairquhosh, - - - - -	121
Finlaystone, - - - - -	122
Blythswood, - - - - -	122
Ardgowan, - - - - -	123
 PROCEEDINGS—	
Fungi from Loch Ard and Gartmore, - - - - -	126
Occurrence of <i>Peziza majalis</i> , Fr., in Scotland, - - - - -	126
Report of the Council on the Business of Session 1891-92, - - - - -	126
Death of Mr. Robert Bullen, - - - - -	127
Election of Office-Bearers for Session 1892-93, - - - - -	130, 133
<i>In Memoriam</i> —David Corse Glen, C.E., F.G.S., - - - - -	132
Notes on <i>Tornaria</i> , the free-swimming Larva of <i>Balanoglossus</i> . By Professor Edward E. Prince, B.A., F.L.S., - - - - -	133
Notes on the Porbeagle Shark. By Professor James Dunlop, M.D., On the Comparative Anatomy of the Organs of Hearing. By Professor Edward E. Prince, B.A., F.L.S., - - - - -	134
Death of Sir Richard Owen, K.C.B., D.C.L., LL.D., F.R.S., &c., On the Tarpon or Giant Herring (<i>Megalops thrissoides</i>). By Professor Edward E. Prince, B.A., F.L.S., - - - - -	137
	138
	139

A House Sparrow (<i>Passer domesticus</i> , Linn.) with three legs, -	139
On the Occurrence of <i>Doris inconspicua</i> , A. & H., at Cumbræ. By David Robertson, F.L.S., F.G.S., - - - - -	142
Abstract Statement of Accounts for Session 1891-92, - - -	144
On the Spermogonia of <i>Puccinia suaveolens</i> (Pers.), Winter. By D. A. Boyd, - - - - -	145
Occurrence of <i>Carex limosa</i> , Linn., at Kilmalcolm, - - -	146
A male Golden Eagle (<i>Aquila chrysaëtus</i> (Linn.)), from Suther- landshire, - - - - -	147
<i>In Memoriam</i> —Sir Michael Connal, - - - - -	148
Occurrence of <i>Peronospora urticae</i> , Lib., at Troon, - - - - -	152
Notes on a Visit to Roxburghshire and Berwickshire. By John Renwick, - - - - -	152
Spiders from Corrie, Ailsa Craig, &c., - - - - -	153
Fungi from Moffat, - - - - -	155
Report of the Council on the Business of Session 1892-93, - - -	156
Election of Office-Bearers for Session 1893-94, - - - - -	158
Occurrence of <i>Aulacomnium androgynum</i> , Linn., at Cadder, - - -	159
Remarks on Trepan (<i>Holothuria edulis</i> , Less). By John Grieve, M.D., F.R.S.E., F.L.S., - - - - -	163
Abstract Statement of Accounts for Session 1892-93, - - - - -	166

TRANSACTIONS—

Occurrence of <i>Cladium germanicum</i> , Schrad., in Bute. By James Ballantyne, Rothesay, - - - - -	167
A day with the Dredge at Machrie Bay, Arran. By Rev. G. A. Frank Knight, M.A., - - - - -	169
<i>Bonnemaisonia asparagoides</i> , C. Ag., that gave a blue stain to paper. By David Robertson, F.L.S., F.G.S., - - - - -	172
<i>Halicystis ovalis</i> (Areschoug), an Alga, from Lamlash. By David Robertson, F.L.S., F.G.S., - - - - -	174
A Passing Glance at the Flora of Palestine. By Rev. Hugh Macmillan, D.D., LL.D., F.R.S.E., Corresponding Member, - - -	175
Notes on the Irruption of Little Auks (<i>Mergulus alle</i> (Linn.)) in the Winter of 1894-5 on the West of Scotland—Oban to Ayr. By John Paterson, - - - - -	195
Contribution to the Topographical Botany of the West of Scot- land. By Peter Ewing, F.L.S., - - - - -	199
<i>Cystopteris montana</i> , Bernhardt, in Stirlingshire. By A. Somer- ville, B.Sc., F.L.S., - - - - -	215
<i>Lima hians</i> , Gmel., and its Mode of Life. By J. D. F. Gilchrist, M.A., B.Sc., Ph.D., - - - - -	218
<i>Plantago maritima</i> , Linn., its Distribution in Ayrshire. By John Smith, Corresponding Member, - - - - -	226
Meteorological Notes, and Remarks upon the Weather during the year 1894, with its General Effects upon Vegetation. By James Whitton, Superintendent of Parks, Glasgow, - - -	229
The Little Auk (<i>Mergulus alle</i> (Linn.)). By W. Craibe Angus, - - -	241

	PAGE
Jottings from my Note-Book. By Dr. David Robertson, F.L.S., F.G.S.—The Gulls and their Neighbours, - - - -	244
Records of Measurements of Trees made in 1893 and 1894. By Richard M'Kay and John Renwick (with Two Plates [II. and III.]), - - - - -	246
A Word about Wasps. By James Campbell, C.M., - - -	265
Reports on Excursions—	
Castle Wemyss; Ross Hall, Crookston, - - - -	268
West Kilbride, - - - - -	269
Roseneath, - - - - -	271
Dougalston Loch; Tullichewan Castle, - - - -	272
Garnkirk; Monkton; Botanic Gardens; Balfron, -	274
Auchenharvie and Montgreenan, - - - - -	274
Ardeer Sandhills, - - - - -	274
Strathleven, - - - - -	275
Cochno, - - - - -	277
 PROCEEDINGS—	
Some Results of "Anchor Work in the Laminarian Zone." By Rev. G. A. Frank Knight, M.A., - - - - -	280
Spiders from Corrie and Dalry. By Frank L. Grant, M.A., -	282
On the Occurrence of <i>Pyrola minor</i> , Linn., var. <i>arenaria</i> , L.B., on the Ardeer Sandhills. By John Smith, Corresponding Member, - - - - -	283
Waste-heap Plants from Crossmyloof. By T. B. Wilkie, -	284, 286
On the Occurrence of <i>Puccinia ribis</i> , DC., new to Britain. By Rev. Dr. Keith, Forbes, Corresponding Member, - - -	287
Report of the Council on the Business of Session 1893-94, - -	288
Election of Office-Bearers for Session 1894-95, - - - -	290
Invitation to Members to visit the Marine Station at Millport. By Dr. David Robertson, F.L.S., F.G.S., - - - - -	291
<i>In Memoriam</i> —Mr. Donald Farquhar and Mr. John Stewart, -	292
Notes on the "Cruickston Dollar." By C. Sherry, - - - -	294
A List of Wigtownshire Plants. By James M'Andrew, Corres- ponding Member, - - - - -	295
Notes on the Molluscan genus <i>Lima</i> , Bruguière. By A. Somer- ville, B.Sc., F.L.S., - - - - -	297
New Library Catalogue; gift of Mr. D. Mackinnon, - - -	299
Appointment of Finance Committee, - - - - -	299
On <i>Sargassum bacciferum</i> , Agardh. By Professor Thomas King,	300
On the newly-determined Pondweed, <i>Potamogeton Bennettii</i> , Fryer. By Colonel J. S. Stirling and R. Kidston, F.R.S.E., F.G.S.,	300
Abstract Statement of Accounts for Session 1893-94, - - -	302
List of Office-Bearers, Members, and Associates, - - - -	303
 TRANSACTIONS—	
On the Anatomy of a Four-winged Chick. By Robert Broom, M.B., C.M., B.Sc., Taralga, New South Wales, - - - -	315

	PAGE
Note on the Supposed Nasal Valves of Ornithorhynchus. By Robert Broom, M.B., C.M., B.Sc., Taralga, New South Wales, - - - - -	317
A Short Account of the Meeting of the Scottish Cryptogamic Society in Glen Urquhart, 1895. By Professor Thomas King, Observations on the Habits of Echidna (<i>Echidna aculeata</i> , Shaw). By Robert Broom, M.B., C.M., B.Sc., Taralga, New South Wales, - - - - -	319
Remarks on "The London Catalogue of British Plants," Ninth Edition, 1895. By Peter Ewing, F.L.S., - - - - -	321
Jottings from My Note-Book. By David Robertson, LL.D., F.L.S., F.G.S.—	324
On <i>Lima hians</i> , Gmel., - - - - -	331
On <i>Cancer pagurus</i> , Linn., - - - - -	332
On <i>Amphidotus cordatus</i> , Penn., - - - - -	333
The Coloration of Fishes. By W. Anderson Smith, - - - - -	335
Botanical Notes for 1895.—Wigtownshire. By James M'Andrew, Assoc. Bot. Soc. Edin., New Galloway, - - - - -	344
Notes on a "List of the Birds which have been observed in the district of Ardnamurchan, Argyllshire," with additions thereto. By John J. Dalgleish, F.S.A.Scot., M.B.O.U., - - - - -	347
Notes on Some Australian Mammals. By R. Broom, M.D., B.Sc., Taralga, New South Wales, - - - - -	351
<i>Bolbitius bulbillosus</i> , Fr., a Fungus new to Britain. By William Stewart, - - - - -	355
<i>In Memoriam</i> —John Grieve, M.A., M.D., F.R.S.E., F.L.S., - - - - -	357
Reports on Excursions—	
Redlands, Kelvinside, - - - - -	358
Lee Castle [Plate IV.], - - - - -	358
Botanic Gardens, - - - - -	359
Kilmalcolm, - - - - -	359
Maich Glen, - - - - -	360
Aikenhead, - - - - -	360
Tullich Hill and Ben Reoch, - - - - -	360
Ballagan; Botanic Gardens; Rowardennan, - - - - -	360
Millport, - - - - -	361
Rowallan, - - - - -	361
Torrance, East Kilbride, - - - - -	361
Blair, - - - - -	361
Dumbarton, - - - - -	362
Howwood, - - - - -	363
Braidwood, - - - - -	364
Botanic Gardens, - - - - -	364
Brodick, - - - - -	365
Millport, - - - - -	366
Queen's Park, - - - - -	366
Toward, - - - - -	368

	PAGE
Reports on Excursions (<i>Continued</i>)—	
Kilmun, - - - - -	369
Manuel, - - - - -	369
Arrochar Hills; Ardentinny, - - - - -	370
Dalry, - - - - -	370
PROCEEDINGS—	
Gifts to the Society's Library, &c., - - - - -	372, 377, 379, 381, 383, 385, 386, 387, 389, 391
On <i>Argyria canescens</i> , D. Don. By Professor T. King, - - - - -	372
On <i>Crambe maritima</i> , Linn. By A. Somerville, B.Sc., F.L.S., - - - - -	374
<i>Equisetum arvense</i> , Linn., var. <i>alpestre</i> , Wahlenb., from Killin. By P. Ewing, F.L.S., - - - - -	374
Exhibit of Lepidoptera. By Mr. Robert Dunlop, - - - - -	375
Fungi from Tullichewan, - - - - -	376
<i>Carex fusca</i> , Allioni (<i>C. Buxbaumii</i> , Wahl.), and <i>Rhynchospora</i> <i>fusca</i> , R. & S., from Loch Shiel, near Arisaig, - - - - -	377
Report of the Council on Year 1894-95, - - - - -	378
Election of Office-Bearers, - - - - -	379
Great Snipe (<i>Gallinago major</i> , Gmel.) from Eaglesham, - - - - -	380
<i>Ceterach officinarum</i> , Willd., from the "Isle" of Rosneath, - - - - -	381
Appointment of Editor of <i>Transactions</i> , - - - - -	382
Spotted Crake (<i>Porzana maruetta</i> , Leach) from Argyllshire, - - - - -	382
Alterations in Constitution, - - - - -	383, 384
<i>Aquilegia alpina</i> , Linn., from Canlochan, Forfarshire. By P. Ewing, F.L.S., - - - - -	384
<i>Hedwigidium imberbe</i> , Smith, from Loch Trool, - - - - -	385
On an old notice of the Occurrence of the Sturgeon (<i>Acipenser</i> <i>sturio</i> , Linn.) in the Clyde. By Dr. John Grieve, M.A., F.R.S.E., F.L.S., - - - - -	385
Recent Work on Sporangia. By Professor F. O. Bower, D.Sc., F.R.S., - - - - -	386
On a Bittern (<i>Botaurus stellaris</i> , Linn.) from Stirlingshire, and a Buffon's Skua (<i>Stercorarius parasiticus</i> , Linn.) from Lanark- shire. By John Paterson, - - - - -	387
On a Common Scoter (<i>Edemia nigra</i> (Linn.)) from Campbeltown. By H. M'Culloch, - - - - -	387
On <i>Amblystegium radicale</i> , P. Beauv., and <i>Hypnum micans</i> , Wils., from Moidart. By Symers M. MacVicar, - - - - -	387
Alterations in the Constitution, - - - - -	388
On Fifty-eight Plants in Flower in Arran in the first week of April, 1896. By A. Somerville, B.Sc., F.L.S., - - - - -	389
On <i>Porcellio pictus</i> , Brandt & Ratz, from Great Cumbrae. By Dr. David Robertson, F.L.S., F.G.S., - - - - -	390
<i>Volvox minor</i> , Stein., from Hogganfield Loch, - - - - -	391
Photographs of the Bark of Trees. By George Paxton [Plates V. and VI.], - - - - -	391

	PAGE
Amended Constitution of the Society adopted, - - - -	392
Fossils from the Bone-breccia Deposit near the Wombeyan Caves, N.S.W. By Dr. Broom, B.Sc., Taralga, New South Wales,	393
<i>Lentinus lepideus</i> , Fr., from Paisley, - - - -	394
Abstract Statement of Accounts—Session 1894-95, - - -	396
List of Office-Bearers 1895-96, - - - -	397
List of Societies, &c., with which publications are exchanged, -	398
 GENERAL INDEX, - - - -	 404
 TOPOGRAPHICAL INDEX, - - - -	 406
 INDEX to Names of Contributors, - - - -	 415
,, Popular Names, - - - -	417
,, Scientific Names, Zoology, - - - -	421
Botany, - - - -	425

E R R A T A.

Page vii (Contents, Part I.) <i>chrysaetos</i> read <i>chrysaëtus</i> .	
,, 70 line 7, <i>Limnocythere</i>	,, <i>Limnocythere</i> .
,, 88 ,, 13, <i>Hypochoëris</i>	,, <i>Hypochoëris</i> .
,, 90 ,, 35, <i>Bargarran</i>	,, <i>Bargaran</i> .
,, 100 ,, 2, <i>Sparmannia</i>	,, <i>Sparmannia</i> .
,, 100 ,, 4, <i>Dalhousianum</i>	,, <i>Dalhousieanum</i> .
,, 100 ,, 6, <i>Loweianum</i>	,, <i>Lowianum</i> .
,, 100 ,, 9, <i>Pescatoriï</i>	,, <i>Pescatorei</i> .
,, 100 ,, 16, <i>Veitchii</i>	,, <i>Veitchi</i> .
,, 100 ,, 17, <i>Hookerii</i>	,, <i>Hookeri</i> .
,, 120 ,, 1, <i>pseudo-acacia</i>	,, <i>Pseud-acacia</i> .
,, 145 ,, 20, <i>Boenninghauseniana</i>	,, <i>Boenninghausiana</i> .
,, 147 ,, 8, <i>chrysaetos</i>	,, <i>chrysaëtus</i> .
,, 155 ,, 14, <i>carthagenense</i>	,, <i>carthaginense</i> .
,, 185 ,, 25, <i>Euphratica</i>	,, <i>euphratica</i> .
,, 185 ,, 36, <i>Egyptiaca</i>	,, <i>egyptiaca</i> .
,, 186 ,, 9, <i>Indicus</i>	,, <i>indicus</i> .
,, 186 ,, 13, <i>farnesiana</i>	,, <i>Farnesiana</i> .
,, 192 ,, 14, <i>donax</i>	,, <i>Donax</i> .
,, 197 ,, 16, north	,, south.

Page 202 line 24, <i>rigda</i>		read <i>rigida</i> .
„ 206 „ 2, <i>Buglossoides</i> , Arw.		„ <i>buglossoides</i> , Arv.
„ 206 „ 9, <i>Scoticum</i>		„ <i>scoticum</i> .
„ 206 „ 18, <i>stenolepis</i>		„ <i>stenolepis</i> .
„ 206 „ 21, <i>Backhouseii</i>		„ <i>Backhousei</i> .
„ 206 „ 27, <i>orarium</i>		„ <i>Orarium</i> .
„ 210 „ 39, <i>Sardous</i>		„ <i>sardous</i> .
„ 211 „ 24, <i>selmeri</i> , Linn,		„ <i>Selmeri</i> (Lindeb.).
„ 228 „ 2, Auct.,		„ Willd.
„ 252 „ 7, <i>pseudo-platanus</i>		„ <i>Pseudo-Platanus</i> .
„ 252 „ 19, 1830		„ 1822.
„ 253 „ 1, <i>pseud-acacia</i>		„ <i>Pseud-acacia</i> .
„ 257 „ 9, after ‘ <i>Transactions</i> ’ insert	‘of the Highland and	
	Agric. Soc. of Scot-	
	land.’	
„ 259 „ 30, after ‘ <i>Transactions</i> ’	„ ‘of the Highland and	
	Agric. Soc. of Scot-	
	land.’	
„ 275 „ 24, <i>Hypochæris</i>	read <i>Hypochæris</i> .	
„ 280 „ 8, Lindl.,	„ Moench.	
„ 283 „ 32, <i>athamanticum</i>	„ <i>Athamanticum</i> .	
„ 286 „ 11, <i>poacoides</i>	„ <i>poæoides</i> .	
„ 287 „ 17, <i>Mara</i>	„ <i>Mora</i> .	
„ 287 „ 35, <i>cotinus</i>	„ <i>Cotinus</i> .	
„ 291 „ 11, Hort.	„ Host.	
„ 292 „ 14, <i>scandens</i> , L.	„ <i>scandens</i> , Benth.	
„ 292 „ 19, <i>discolor</i> , L.	„ <i>discolor</i> , Blume.	
„ 379 „ 25, one year	„ two years.	

15 JUN. 97.



TRANSACTIONS
OF THE
NATURAL HISTORY SOCIETY
OF GLASGOW

(INCLUDING THE PROCEEDINGS OF THE SOCIETY)

VOL. IV. (NEW SERIES.) PART I.

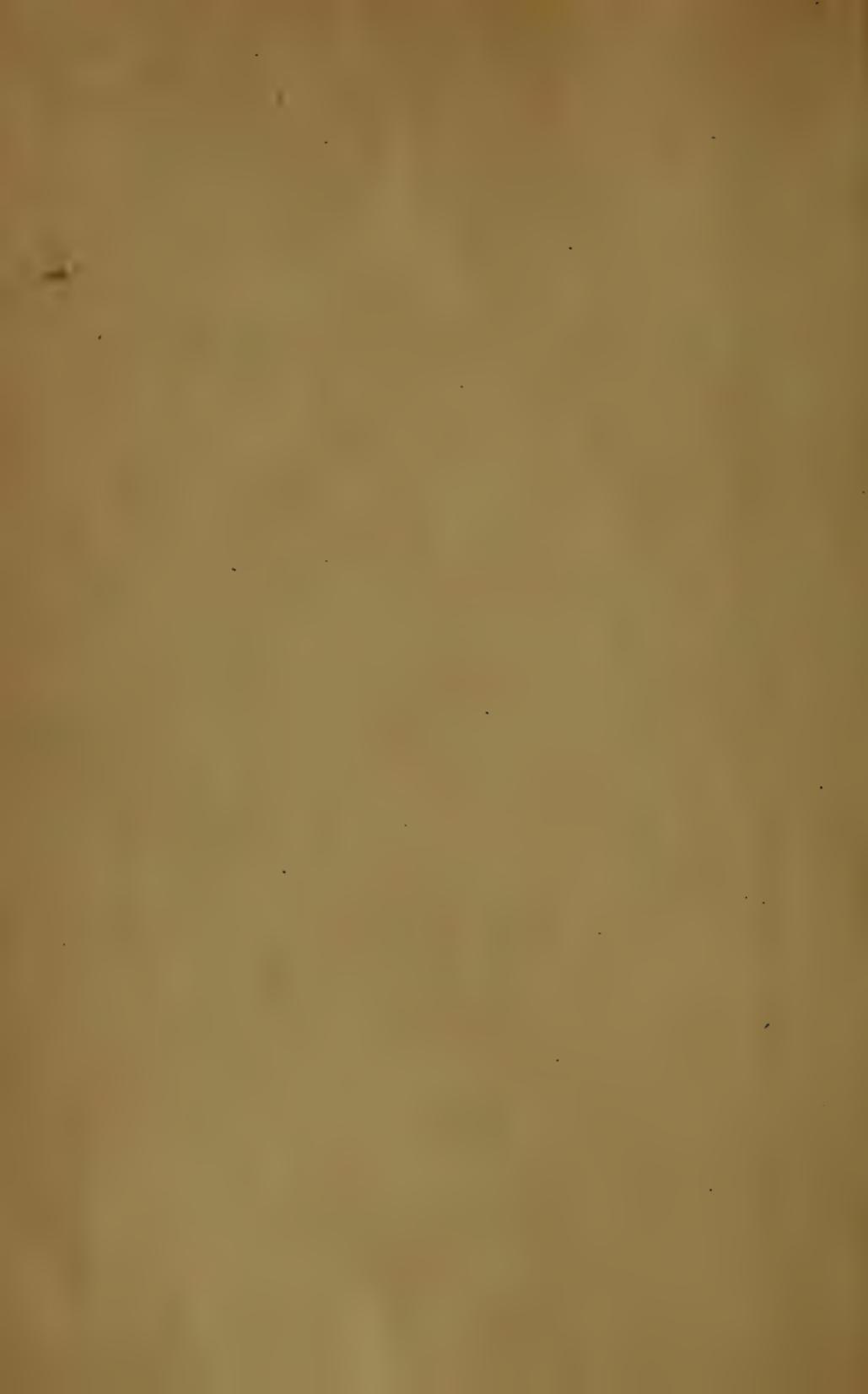
1892-94.

WITH ONE PLATE.

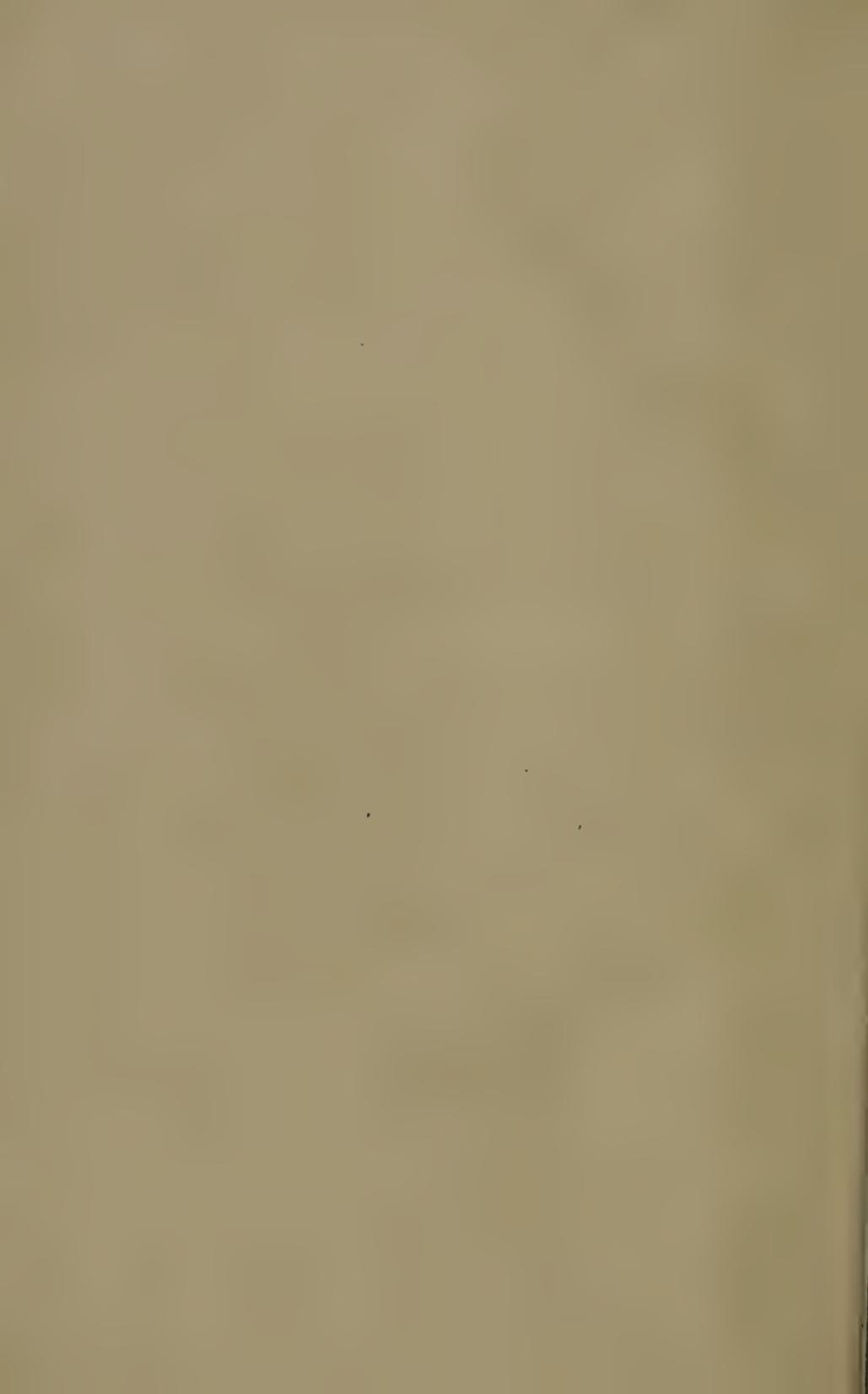


GLASGOW: PUBLISHED BY THE SOCIETY
AT ITS ROOMS, 207, BATH STREET.

1894.



TRANSACTIONS
OF THE
NATURAL HISTORY SOCIETY
OF GLASGOW.



TRANSACTIONS

OF THE

NATURAL HISTORY SOCIETY

OF GLASGOW

(INCLUDING THE PROCEEDINGS OF THE SOCIETY)

VOL. IV. (NEW SERIES.) PART I.

1892-94.

WITH ONE PLATE.



GLASGOW: PUBLISHED BY THE SOCIETY
AT ITS ROOMS, 207 BATH STREET.

1894.

CONTENTS.

	PAGE
Remarks on some of the Land and Fresh-water Mollusca of Palestine. By G. A. Frank Knight, M.A. With one Plate [I.], - - -	9
Meteorological Notes, and Remarks upon the Weather during the year 1893, with its General Effects upon Vegetation. By James Whitton, Superintendent of Parks, Glasgow, - - -	16
Copy of Meteorological Record kept at Queen's Park, Glasgow, -	23
The Ustilagineæ of North Ayrshire. By D. A. Boyd, - - -	24
The Peronosporæ of North Ayrshire. By D. A. Boyd, - - -	28
Notes on the Anatomy of a form of Cyclopean, with Remarks on the Significance of Cyclopeans. By R. Broom, M.B., C.M., B.Sc., Hillgrove, New South Wales, - - - - -	31
Occurrence of the Clouded-yellow Butterfly (<i>Colias edusa</i> , Fab.) in Ayrshire. By John Smith, - - - - -	35
<i>Pholas crispata</i> , Linn., as a Borer. By John Smith, - - -	37
<i>Alchemilla vulgaris</i> , Linn., and allied Forms. By P. Ewing, - -	40
Report on the Disappearance of Native Plants. Edited by Professor Thomas King and D. A. Boyd, - - - - -	44
Vine-Culture in India. Communicated by Johnston Shearer, -	49
Notes on the Habits of some Common Birds. By D. A. Boyd,	50
Swallow (<i>Hirundo rustica</i> , Linn.), - - - - -	51
Robin (<i>Erythacus rubecula</i> , Linn.), - - - - -	52
Blue Titmouse (<i>Parus cæruleus</i> , Linn.), - - - - -	54
Blackbird (<i>Turdus merula</i> , Linn.), - - - - -	55
Rook (<i>Corvus frugilegus</i> , Linn.), - - - - -	56
Sparrow (<i>Passer domesticus</i> , Linn.), - - - - -	57
List of Fungi, &c., observed at Kilmahew, Finlaystone, and West Kilbride. By Professor Thomas King and D. A. Boyd, - -	61
On some Entomostraca from Castlemilk, near Rutherglen. By Thomas Scott, F.L.S., Naturalist to the Fishery Board for Scotland, - - - - -	69
<i>In Memoriam</i> —Robert Turner, - - - - -	73
Jottings from my Note-Book. By David Robertson, F.L.S., F.G.S.— <i>Sacculina carcini</i> , Thompson, - - - - -	79
<i>Amphithoe podoceroïdes</i> , Rathke, and <i>Podocerus pulchellus</i> , Milne Edwards, - - - - -	80
<i>Buccinum undatum</i> , Linn., - - - - -	81
<i>Anceus maxillaris</i> , Montagu, - - - - -	82
<i>Aglaophenia myriophyllum</i> , Linn., - - - - -	83

	PAGE
Reports on Excursions—	
Eglinton, - - - - -	85
Garnkirk, - - - - -	86
Hawkhill, - - - - -	86
Craignethan Castle, - - - - -	87
Ashgrove and Kerelaw, - - - - -	88
Brisbane, - - - - -	88
Erskine, - - - - -	89
Mauldslie, - - - - -	92
Dougalston and Baldernock, - - - - -	95
Redlands and Westmount (Kelvinside), - - - - -	99
Mains, - - - - -	100
Dalzell, - - - - -	101
Botanic Gardens, - - - - -	103
Edinbarnet, - - - - -	106
Garelochhead, - - - - -	107
Stepps, - - - - -	110
Garscube, - - - - -	110
Little Cumbræ, - - - - -	111
Woodside (Paisley), - - - - -	112
Pitcon Glen, - - - - -	113
Pollok, - - - - -	115
Balmaha, - - - - -	116
Troon, - - - - -	116
Milton-Lockhart, - - - - -	118
Murdostoun, - - - - -	120
Kilmahew, - - - - -	121
Blairquhosh, - - - - -	121
Finlaystone, - - - - -	122
Blythswood, - - - - -	122
Ardgowan, - - - - -	123
Proceedings of the Society, - - - - -	124-166
Fungi from Loch Ard and Gartmore, - - - - -	126
Occurrence of <i>Peziza majalis</i> , Fr., in Scotland, - - - - -	126
Report of the Council on the Business of Session 1891-92, - - - - -	126
Death of Mr. Robert Bullen, - - - - -	127
Election of Office-Bearers for Session 1892-93, - - - - -	130, 133
<i>In Memoriam</i> —David Corse Glen, C.E., F.G.S., - - - - -	132
Notes on <i>Tornaria</i> , the free-swimming Larva of <i>Balanoglossus</i> . By Professor Edward E. Prince, B.A., F.L.S., - - - - -	133
Notes on the Porbeagle Shark. By Professor James Dunlop, M.D.,	134
On the Comparative Anatomy of the Organs of Hearing. By Professor Edward E. Prince, B.A., F.L.S., - - - - -	137
Death of Sir Richard Owen, K.C.B., D.C.L., LL.D., F.R.S., &c., -	138
On the Tarpon or Giant Herring (<i>Megalops thrissoides</i>). By Professor Edward E. Prince, B.A., F.L.S., - - - - -	139

	PAGE
A House Sparrow (<i>Passer domesticus</i> , Linn.) with three legs, -	139
On the Occurrence of <i>Doris inconspicua</i> , A. & H., at Cumbræ. By David Robertson, F.L.S., F.G.S., - - - - -	142
Abstract Statement of Accounts for Session 1891-92, - - -	144
On the Spermogonia of <i>Puccinia suaveolens</i> (Pers.) Winter. By D. A. Boyd, - - - - -	145
Occurrence of <i>Carex limosa</i> , Linn., at Kilmalcolm, - - -	146
A male Golden Eagle (<i>Aquila chrysaetos</i> , Linn.) from Sutherland- shire, - - - - -	147
<i>In Memoriam</i> —Sir Michael Connal, - - - - -	148
Occurrence of <i>Peronospora urticae</i> , Lib., at Troon, - - -	152
Notes on a Visit to Roxburghshire and Berwickshire. By John Renwick, - - - - -	152
Spiders from Corrie, Ailsa Craig, &c., - - - - -	153
Fungi from Moffat, - - - - -	155
Report of the Council on the Business of Session 1892-93, - -	156
Election of Office-Bearers for Session 1893-94, - - - -	158
Occurrence of <i>Aulacomnium androgynum</i> , Linn., at Cadder, - -	159
Remarks on Trepang, <i>Holothuria edulis</i> , Less. By John Grieve, M.D., F.R.S.E., F.L.S., - - - - -	163
Abstract Statement of Accounts for Session 1892-93, - - -	166

TRANSACTIONS
OF THE
Natural History Society of Glasgow.

Remarks on some of the Land and Fresh-water Mollusca
of Palestine. By G. A. FRANK KNIGHT, M.A.

[Read 26th December, 1893.]

IT has occurred to me that a few remarks on the mollusca of Palestine—a country which I visited during 1892—might not be without interest to the members of this Society. The land itself is, of course, to us of perennial interest as the scene of the most sacred events in the history of our earth, and it is probably in consequence of this that its fauna and flora have, in comparison with those of other lands, been carefully studied.

So far as the shells of Western Palestine are concerned, the ground has been tolerably well worked. Ferussac, Ehrenberg, Olivier, Boissier, Bourguinat, Roth, and Lortet have all given us their contributions to the elucidation of the subject; but it was reserved for Canon Tristram, of Durham, to make the most exhaustive conchological survey, and to complete the labours of his predecessors. Since the publication of his *Fauna and Flora of Western Palestine*, however, M. Locard, of Lyons, has issued a sumptuous work on the *Fluviatile Mollusca of the Jordan System* in which he makes large additions to previous records. Tristram and Locard, therefore, are the standard authorities on the subject.

To one who visits Palestine with a "conchological" eye, it is a matter of profound astonishment that in scripture there are so very few references to the mollusca. The Hebrews were not a maritime

people, and they may have had little occasion to observe the sea-shells which litter the shores of their Mediterranean border, although such beautiful genera as *Cypræa*, *Marginella*, *Bulla*, *Nassa*, *Dentalium*, *Murex*, *Mactra*, *Cerithium*, &c., are plentifully represented. But inland the ground for long stretches is actually white with land shells; it appears sometimes as if beach and dry land had exchanged their natural characteristics. This is especially the case in the inland sandy deserts, where one unacquainted with conchological science might readily make the mistake of supposing that the shells, which strew the ground as abundantly as do cockles and mussels our own marine shores, were not *land* molluscs, but the remains of *marine* forms which had existed in some primeval ocean. On riding out from Jericho, for instance, towards the Dead Sea—a distance of about ten miles—the traveller crosses a great sandy plain dotted with miserable, stunted shrubs, which become scarcer and scarcer as the margin of the Salt Sea is approached. Yet it is just here, round the bases of these shrubs, that the shells are most abundant. What the animals get to subsist on is a perpetual marvel. Many may be seen hanging on to the withered leaves of the shrubs, with their mouths firmly glued by means of their calcareous exudations. Often they do dry up and die, but this secretion makes them retain their hold of the leaves till the fierce desert wind arises and breaks off both branch and mollusc. In order to protect themselves from the more than tropical heat of the valley—even in spring I experienced 100° F. in the shade—the animals provide themselves with a singularly thick shell, which is at the same time colourless and lustreless. Beauty of outline is no part of their programme; defence against the sun's rays is what they alone seem to desire.

Of such species, I collected in this quarter large numbers of *Helix variabilis*, Drap.; *Helix caperata*, Mont.; *Helix candidissima*, Drap., var. *hierochuntica*, Boiss.; *Helix seetzeni*, Koch, a species of which the sea-gulls of the southern desert are particularly fond; and *Helix hierochuntica*, Roth, one of the few desert specimens not bleached white, but readily distinguishable by its red peristome and flattened spire. In addition, one solitary shell caught my eye as I was riding past, and dismounting, I secured a specimen of what is one of the rarest among the Syrian mollusca. "*Helix tuberculosa*" (Conrad in Lynch), says Canon Tristram, "is the

most peculiar and interesting *Helix* in Palestine, and is found only sparingly in very restricted localities in the Highlands West and South-west of the Dead Sea." It is a shell not unlike one of our British marine *Trochi*, having a sharp apex and a beautifully granulated exterior. Bourguinat erroneously identified it with *H. despreauxii* from the Canaries. Unfortunately this specimen was the only one of its kind I was able to secure.

Leaving the Dead Sea Valley, one ascends by means of rocky terraces and bare precipitous slopes to the Central Highlands of Judea and Samaria. Almost the whole Southern portion of Judea is of Cretaceous limestone, and thus forms a natural home of terrestrial mollusca. The sides of the hills are everywhere perforated with crevices and caves, and in such holes one finds in abundance the peculiar shell-types for which Palestine is famous. "The same variety," says Tristram, "marks the molluscan fauna as is observable in the other branches of Syrian animal life. There are, however, fewer exceptions to its general character as a part of the Mediterranean basin, and fewer traces of the admixture of African and Indian forms."

Between Jerusalem and Hebron, the chalky hills afford a good field for conchological work, but as one goes northwards shells are not so abundant. Specially numerous, however, is the large and handsome *Helix caesareana*, Parr., widely distributed, and easily recognisable from its beautiful markings. Several specimens I brought home alive, and one—from the ruined temple at Shiloh—is still prolonging his existence in a glass fern-case at the Glasgow University Hunterian Museum. *H. prasinata*, Roth—a species which Tristram did not come across—was obtained from Bab-el-wady, Dothan, and Nazareth; *H. berytensis*, Fér., on Mount Tabor; *H. cavata*, Mouss., on Mount Ebal and at Shiloh; *H. syriaca*, Ehrenb., almost everywhere in abundance, from Maarath near Hebron in the south, to Cana of Galilee in the north, on the walls of Jerusalem, and even inside the (supposed) tomb of Christ; *H. caespitum*, Drap., on the hill Calvary, at Samaria, Dothan, Mount Tabor, and Nazareth where it was most abundant among ploughed fields; *H. pisana*, Müll., only on the maritime belt at Jaffa; *H. cariosa*, Oliv., on Mount Ebal and at Nazareth; the beautiful flattened *H. spiriplana*, Oliv.—very fragile when young—at Solomon's Pools, the Garden of Calvary,

and especially on Mount Ebal; and *H. hedenbergi*, on the Dog River, Beyrout. *Zonites cellaria*, Mull., was taken in the romantic glen of the Robber's Fountain, in the heart of Ephraim.

Perhaps, however, the most characteristic shell of Palestine is not one of the *Helicidae*, but the large *Bulimus labrosus*, Oliv. It is found concealed in small fissures of the limestone rocks, or among the ruins of ancient buildings. "It is widely distributed through the whole of Western Palestine, as far as the Jordan Valley, but no record has been given of its having been taken beyond" (Tristram). I secured some examples from Mount Ebal and from Shiloh. Among other *Bulimi* which I lighted upon, were *B. attenuatus*, from Bab-el-wady; *B. jordani*, from Mount Ebal; *B. sidonensis*, Charp., in the plain of Phœnicia and on Mount Ebal.

The genus *Clausilia* is especially represented by *C. boissieri*, Charp., which abounds at the Dog River, near Beyrout. These curious shells, with their expanded peristomes, hang in clusters from the rocks, with their apices pointing downwards.

Passing from the terrestrial mollusca of Palestine, we find the fluviatile and lacustrine shells to be of a much more tropical type. Of those which I gathered in the streams and fountains of the land, I may mention the following:—*Melanopsis prærosa*, which, with its pink interior, and black, smooth, and glossy epidermis, was found plentifully in Elisha's fountain at Jericho; *M. sauleyi*, Bourg., also found more sparingly in the same fountain; *M. jordania*, Roth, which appears to be restricted to the Sea of Galilee and the Jordan below it. Every stone and rock under water near the town of Tiberias seemed to be covered with this species, even more plentifully than are our own coasts with *Littorina* and *Purpura*, and bathing from the shore was rendered, in consequence, rather inconvenient. The beach, along the lake, was largely composed of the spiral shells of *Melania tuberculata*, and of the beautiful little variegated shells of *Neritina jordani*, Butler, whose favourite habitat, however, is said to be under the leaves of water-lilies in the lake of Merom, above the Sea of Galilee. Another little shell, abundant in almost every stream and spring, is *Neritina michonii*, Bourg., which I found principally in Elisha's fountain at Jericho.

The *Unionidae* of Palestine have recently been brought to the front by the publication of M. Locard's monograph. By dredging

in the Sea of Galilee, he discovered many species of this genus hitherto unknown to science, and, what will strike a conchologist as being most extraordinary, he has found that there are types of *Unio*, each specific in character, ranging downwards from 25 to 50, and even to 100 fathoms! Only one species was I able to secure (being without my dredging apparatus), viz., *Unio tristrami*, Locard, three valves of which I picked up at the spot where the Jordan runs out of the lake. The only other bivalve acquired was the well-known *Cyrena cor.*, Lam., found in the Sea of Galilee.

Now, while some of these lacustrine and fluviatile mollusca are closely allied to species found in the Nile and Euphrates, the fact remains that a large proportion are nevertheless confined exclusively to Palestine, some, for instance, of the genus *Melanopsis* and no less than sixteen species of *Unio* being peculiar to the Jordan and its feeders. The question arises whether the explanation of this fact is not to be sought, not merely under the laws regulating the dispersal of shells (so admirably laid down in Mr. Kew's recent work*), but also in looking at the connection which we find always subsisting between animal life and the physical changes of the earth's crust. On the lines of a suggestion by Professor Hull in his "*Geology of Western Palestine*," I venture to submit the following as a probable solution of the question.

The Jordan Valley or Ghor is the deepest depression on the surface of the globe. Long subsequent to the deposition of the Cretaceous limestone beds which form so extensive a portion of the Syrian territory, a great change came over the country. The Cretaceous beds began to be bent into folds, and one of the results of this movement was the formation of the immense north-and-south fracture of the Jordan Valley—a fracture which extends for more than 350 miles. Contemporaneously with the gradual elevation of the hills of Palestine on the West, and of the tablelands of Moab and Bashan on the East, there was a falling-in or subsidence of the crust along the western line of this great fault, and the deep depression now filled by the Sea of Galilee, the Jordan, and the Dead Sea, was thus formed. A great arm of the sea thus at one time—probably during the Miocene period—extended up the Gulf of Akaba, from the shores of Africa, right

* *The Dispersal of Shells* (Intern. Scient. Series).

into the heart of Palestine, and enabled the marine fauna of the former country to migrate to the latter.

As Tertiary time went on, however, the land was still further elevated, and with its great lines of fracture assumed somewhat its present form. The district between the Dead Sea and the Gulf of Akaba was raised above the ocean, and, in consequence of this, the molluscan fauna of the Jordan system was enclosed as in a trap. The struggle for existence grew keener and keener; the laws of natural selection, and of the survival of the fittest, had the fullest scope for exercise. The newly formed great inland sea gradually dried up into three lakes—namely, the Lake of Merom, the Sea of Galilee, and the Dead Sea—and all three were connected by a river channel, that of the Jordan. The southern lake—the Dead Sea—became salter and salter owing to its total want of outlet, to the excessive evaporation, and to the nature of its subsoil; the Lakes of Merom and of Galilee became fresher and fresher by the influx of pure water from the hills.* Many of the old marine forms by degrees died out. The Miocene corals and crinoids would disappear: the less adaptable species would succumb to the altered conditions. The process of change in the quality of the water, from salt to brackish, and from brackish to fresh, would be so slow, however, that many of the more plastic forms of molluscan life were able to adapt themselves to the slowly altering environment, and the result was the creation of a series of apparently totally new species.

But a further time of trial was in store for these survivals of the old Miocene marine forms. The Ice Age arrived: the slopes of Hermon and of Lebanon were covered with snow, and probably glaciers; the Jordan Valley was depressed nearly 300 feet, and

* NOTE.—Will it ever be found that increase of salinity may be used as a basis in calculating geological time? If the specific gravities of several of the salt lakes of the world (such as the Dead Sea, the Caspian, the Sea of Aral, the Lake of Urumia, the Great Salt Lake) were compared with that of the ocean, and allowance made for the respective difference in the time since each lake was cut off from the sea, might not the ratio thus found prove of service? Of course the disturbing factors would in each case be very great—the most stupendous being the glacial period—and special allowances would here and there require to be made; but with care an approximate result might be arrived at, and might be, in the main, satisfactory.



1

2



3

4

5

6



7

8

9



11

12

10



13

14

15

1. *Helix cæsareana*.
2. *Bulimus labrosus*.
3. *Helix tuberculosa*.
4. *Helix spiriplana*.
5. *Clausilia boissieri*.

6. *Helix syriaca*.
7. *Helix hedenbergi*.
8. *Helix cariosa*.
9. *Melania tuberculata*.
10. *Helix cavata*.

11. *Helix cæspitum*.
12. *Helix berytensis*.
13. *Melanopsis praerosa*.
14. *Melanopsis sauleyi*.
15. *Bulimus attenuatus*.



immense torrents of icy water poured into and chilled the three lakes. Still further, the deposits on the sides of the Jordan Valley, north of the Sea of Galilee, prove that the influx of water must have been so great as to fill up almost the entire trough, and thus to form one vast lake upwards of 200 miles in length, and 2,000 feet deep. There is no evidence, however, that any ocean connection was established in the south by the level of the inland waters overleaping the high water-shed leading towards the Gulf of Akaba. Now this change from a tropical to that of an almost sub-arctic climate must have tested severely the endurance of many of the molluscan fauna of the Sea of Galilee and its feeders; and when we take into consideration also the slight increase of salinity in the waters owing to their mixing with the salt Dead Sea, we may easily understand how it is that so few of the old marine forms have survived to this day.

But again, when the ice retired, the battle was by no means over. Along with the cold had come boreal immigrants, who, with characteristic vigour, dispossessed the old molluscan inhabitants (especially those of the land), and assumed ownership of all the colder districts in the north of Palestine. The struggle has been going on ever since; but still, in all the long ages which have elapsed since the glacial period, the ancient types, which survived so many vicissitudes, have not yet succeeded in re-establishing themselves over their lost dominion. We see in these peculiar Jordanic molluscs, therefore, simply another beautiful illustration of the truth of evolution, and of the derivation of specific forms by descent with modification.

In concluding, I must acknowledge my indebtedness to the kindness of Canon Tristram in agreeing so readily to name my specimens for me. The total number of molluscan species found in Palestine, according to this well-known authority, is 213, of which 57 are Palearctic, 8 are Ethiopic, 8 are Indian, and no less than 140 are peculiar to the country.

Meteorological Notes, and Remarks upon the Weather during the year 1893, with its General Effects upon Vegetation. By JAMES WHITTON, Superintendent of Parks, Glasgow.

[Read 24th April, 1894.]

THE hope expressed by my predecessor, Mr. M'Lellan, in the closing paragraphs of his Report on the Weather for 1892, has been amply fulfilled. While 1892 was chiefly remarkable for a long series of low temperatures, with an average rainfall, the weather of 1893 has been characterised by a continuous higher range of temperature and a rainfall somewhat similar in amount. Another striking feature of 1893 was the comparative absence of spring frosts, so that vegetation, which started early, received no check; and, the season being so favourable all through, there has been a luxuriance in the growth of trees and shrubs such as is now rarely experienced in or about the City, with its ever-increasing volumes of smoke and deleterious vapours, so inimical to plant life.

January.—The wintry weather which prevailed during December, 1892, continued during the first week of the year, when, with about 4 inches of snow on the ground, there was intensely hard frost. On the 6th, 22° frost were registered, which proved to be the lowest reading of the year. A thaw, accompanied by high winds, which lasted three days, set in on the 8th, and caused the snow to disappear rapidly. The wind having veered to north-east, the weather got colder, and hard frost was experienced from 11th to 16th, with a fall of snow on 14th. With south-westerly winds from 16th to end of month, the weather was open and comparatively mild, which caused spring flowering plants to grow rapidly. In the Queen's Park, Christmas roses (*Helleborus niger*) were plentifully in bloom by 20th. The highest (day) temperature was 51° on the 23rd, and the lowest at night 10° on the 6th. The thermometer was at or below freezing point (32°) on fifteen

mornings, and a total of 113° frost was registered. The rainfall, which includes melted snow, amounted to 1.14 inches. There were seventeen dry days.

February.—For the first three weeks there was a continuance of south-westerly winds, and the weather was somewhat unsettled, but still mild. The winter aconite (*Eranthis*), snowdrops, and primroses came into bloom during the first week, and *Erica carnea* towards the end of the month. Frost, with easterly winds, set in on 22nd, and there was a snowstorm on 26th and 27th, accompanied with high winds. On eight mornings, frost, amounting to 37°, was registered—the lowest (night) reading being 22° on 25th, and the highest (day) temperature 55° on the 20th. There were only eight dry days in the month, and 2.94 inches of rain fell.

March.—The month opened with a smart snowstorm and easterly winds. After the 3rd, with a change of wind to south and west, fine open mild weather was experienced until the 16th, when, from that date, for ten days or so, there was frost, with snow-showers on 16th and 17th. The frost, however, was not severe, as the thermometer was only at or below 32° on twelve mornings, and the small total of 31° of frost recorded, a state of matters rarely experienced in March. The lowest (night) temperature was on 19th, when the thermometer fell to 24°, and the highest (day) temperature was 65° on the 26th and 27th. The month was also remarkably dry, the rainfall amounting to 0.74 inch, and nineteen days on which there was neither rain nor snow. Consequent on the open weather, spring flowering plants came rapidly into bloom. Crocuses opened during the first week, while, by the middle of the month, squills (*Scilla*), grape hyacinths (*Muscari*), dog's tooth violet (*Erythronium*), and a white variety of *Rhododendron*, were plentifully in bloom throughout the Parks. Balsam poplars were bursting their buds by 10th.

April.—The remarkably fine weather which prevailed so much in March continued, to a greater degree, throughout this month. The absence of severe frost and rain was very notable, frost only occurring on five mornings, when a total of 9° was registered. The average maximum temperature was 58°, and the average minimum 38°, the highest readings being 71° on the 20th, and the lowest 29° on the 4th. There were twenty-three dry days, while the rainfall amounted to 1.11 inches.

The general character of the weather may be exemplified by noting that the oak and ash burst into bud on the 28th, a rare occurrence, as the oak usually precedes the ash by from three to ten days, and the oak this year was fully three weeks earlier than in 1892. In fact, it may be here noted that vegetation generally was about three weeks in advance of the previous year. There was a profuse display of bloom on most of the flowering trees and shrubs throughout the Parks, while the bulbous plants in the flower-beds of the Parks and Squares bloomed satisfactorily and brilliantly.

May.—During this month the phenomenally fine weather continued, and no frost was registered in any of the Parks—an extremely rare experience.

The first half of the month was delightfully pleasant, only a few showers of rain falling, which, while refreshing vegetation, tended to lay the dust. On the 19th a severe thunderstorm occurred, and the accompanying heavy rains proved very beneficial to plant life generally. The rainfall amounted to 3·28 inches, the bulk falling from the 16th to the 23rd. Eighteen days of the month were dry with variable winds. The day temperature averaged 61°, and the night 45°. The cuckoo was heard at Queen's Park on the 4th, which, like the leafing of the oak, was three weeks earlier than the previous year.

June.—The first three weeks of the month were very hot and dry, and, however pleasant and enjoyable it might have been for holiday makers, it was somewhat trying on vegetation, especially newly planted material. Excepting one shower on the 6th, no rain fell until the 22nd, when for a week there were frequent heavy showers, to the salvation of the plants in flower-beds, which were beginning to suffer from the drought. There were twenty-three dry days, the other seven giving a total of 2·40 inches. The average (day) temperature was 68°, the thermometer being at or above 70° for ten days. The hottest day of the year was on the 19th, when the thermometer in the shade at Queen's Park rose to 83°, being 3° higher than the hottest day of 1892. The average (night) temperature was 49°. Light easterly winds prevailed in the early part of the month, followed by south-westerly in the latter part.

July.—There was a continuance of the hot, dry weather until

the 7th, when, after a thunderstorm, which extended over the 8th, the heat was tempered by occasional showers, and the weather assumed a softer and more pleasant character. The refreshing rains gave an impulse to vegetation, and there was a striking advance in the growth of all plants. By the middle of the month the plants bedded out in the Parks were in full bloom, and they, with the trees and shrubs, presented a luxuriance of growth not usually obtained even in ordinary good seasons until the first week of August.

The maximum thermometer reading was at or above 70° on eight days, the day temperature averaging 67°, and the night 50°, giving a mean temperature of 58°, similar to last month. Rain fell on thirteen days, to the amount of 2·19 inches, and the winds were easterly during the first half, and westerly in latter part of the month; in fact, throughout there was a very close resemblance in the weather to that of June.

August.—From the 1st to the 7th the weather was warm and showery, and from 8th to 20th oppressively hot. A heavy thunderstorm occurred on the 10th, and the 16th proved the second hottest day of the year, when 80° were registered in the shade. On the 21st a severe storm of wind and rain caused a considerable amount of damage. Many trees in the Parks, especially limes and elms, were almost denuded of their foliage. This month was the warmest of the year, the day temperature averaging 68°, and the night 52°, giving a mean temperature of 68°. Rain fell on sixteen days, to the amount of 3·34 inches.

September.—After the first week of this month there was a steady decline in the temperature, and the weather became showery and unsettled. Although no frost was registered, snow and sleet fell on 23rd. A thunderstorm, with heavy rain, prevailed on 29th and 30th, the barometer falling an inch within three days, being at 28·70 on the 29th. The winds were chiefly from the west and south-west. The rainfall amounted to 3·25 inches, and there were eleven dry days. Average day temperature 60°, while the night was 45°.

October.—Showery, unsettled weather predominated this month, which proved to be the wettest month of the year, there being only seven dry days. A total of 5·02 inches of rain was recorded. The first frost of autumn was on the 5th, when 5° frost were

registered, after which the weather kept open and comparatively mild for the season until the end of month, when 5° and 7° frost were recorded on 30th and 31st respectively. The average day temperature was 54° , and that of night 40° . The winds were generally westerly.

November.—The first few days were somewhat cold and wet. Frost set in on the 5th, and continued intermittently for nearly three weeks. The lowest reading was on 21st, when the thermometer fell to 22° . A total of 61° of frost was registered on thirteen mornings. During the month the readings of thermometer and barometer show sudden and erratic changes. On the 17th, when the great and destructive storm of wind swept over the country, the barometer fell from 29.65 to 28.30 within twenty-four hours, and as rapidly rose again. The winds were very variable, the greater proportion being from the north-west. There were nineteen dry days, and a rainfall of 3.07 inches in this month. The average day temperature was 43° , and the night 32° .

December.—With the exception of the first three days, when hard frosts prevailed— 14° of frost being registered on the 2nd—the weather was remarkably mild and open. As in the preceding month, the changes were frequent and sudden, the barometer readings being exceedingly erratic. These varied from 29.20 on the 2nd to 28.30 on the 8th, and with striking fluctuations from that low point up to 29.40 on the 30th. High winds prevailed in the early part of the month; towards the end the winds were south-westerly and rains were frequent, and the temperature was comparatively high for the season. The last week of the year was exceeding mild and spring-like in character. Rain fell on twenty-three days, to the amount of 4.57 inches. The average day and night temperatures were respectively 45° and 36° —being higher than in November. Frosts were registered on seven mornings, the total amount being 36° —a striking contrast to that of December of 1892, when 315° of frost were registered on twenty mornings.

Comparing the records of 1893 with those of the previous year, there is a striking similarity in the rainfall. The rainfall of 1892 amounted to 33.84 inches. Rain fell on 171 days. In 1893 the amount was 33.05 inches, rain having fallen on 179 days. The totals in each case are slightly under the average of the previous

twelve years. The wettest month in 1892 was August, when 6·13 inches of rain fell, and it had only eleven dry days. In 1893, October had the heaviest rainfall, when 5·02 inches of rain fell, while it had only eight dry days. The driest month in both years was March, when the rainfall was under an inch in each case.

Looking at the temperature, we find that during every month of 1893—excepting November, which was slightly lower—a higher range prevailed. The mean temperature of 1893 was 47°, as compared with 45° in 1892. The highest (day) temperature of 1893 was 83° in the shade on 19th June, while in 1892 the highest was 80° on 10th June. There is a marked difference in the night temperatures. In 1892, 27° of frost were registered on 18th and 19th February, while the lowest record for 1893 was only 22° of frost on 6th January. The totals are 306° frost on 56 mornings in 1893, compared with 798° frost on 101 mornings in 1892.

The barometrical charts (which, unfortunately for comparison, have not been tabulated) show a remarkably even range of pressure in 1892. The pressure was above 30 inches on 41 occasions and 6 times under 29, whereas in 1893 it was 65 times above 30 inches and 18 times under 29. The highest reading of 1893 was 30·40 on 30th December, and the lowest 28·30 on the 17th November and 8th December. The gale which caused so much destruction to woods and other property throughout Scotland occurred on the 17th November.

Regarding the wind, it may be of interest to note the number of days on which it blew from the various points. From S.W., 121; W., 98; N.E., 52; E., 40; S.E., 21; N.W., 20; S., 10; and N., 3 days. Excluding the direct north and south, the western group show 239 times against 113 for the eastern.

So far as Glasgow and the West of Scotland generally is concerned, the weather of 1893 was propitious, and was such as is rarely experienced. The absence of spring frosts, and the long spell of genial sunny weather from March to September, suited the locality admirably. While various parts of the country suffered severely from the want of rain, the occasional showers which fell in this district during the hottest months kept vegetation in a healthy condition, and crops generally were satisfactory in bulk and quality. A vigorous, healthy growth was made by

trees and shrubs, and the promise of bloom for the current year in most cases is very good, the rhododendrons especially being covered with flower buds. It is difficult to over-estimate the effects of a sunny season on the health of the community, and the bright weather of the year allowed thousands of the inhabitants of this immense City to enjoy the open air to a degree seldom experienced. It is to be hoped that we have entered upon a series of fine seasons, productive of good to all. Annexed is the Meteorological Record for the last three years, as kept at Queen's Park, and the averages for the last twelve years.

COPY OF METEOROLOGICAL RECORD KEPT AT QUEEN'S PARK, GLASGOW.
RAIN GAUGE 143.95 FEET ABOVE SEA LEVEL.

MONTHS.	1891.			1892.			1893.			AVERAGES FOR THE LAST 12 YEARS.						
	Rainfall. Inches.	THERMO- METER.		Rainfall. Inches.	THERMO- METER.		Rainfall. Inches.	THERMO- METER.		Years.	Rainfall. Inches.	Average Tem- perature.	Dry Days.	Number of Days on which 1° or more of Frost was registered.	Degrees of Frost registered.	
		Max.	Average.		Min.	Max.		Average.	Min.							Max.	Average.	Min.
January,	3.87	41	32	2.32	40	30	1.14	40	32	17	1882	41.35	46	173	38	193
February,	0.54	48	34	2.00	43	32	2.94	45	34	8	1883	40.87	47	200	42	182
March, ...	2.63	45	29	0.58	45	29	0.74	52	35	19	1884	40.54	47	192	58	195
April, ...	0.81	51	34	0.67	54	34	1.11	58	38	23	1885	28.70	46	200	62	361
May, ...	2.75	59	39	4.09	61	41	3.28	61	45	18	1886	29.96	46	194	97	518
June, ...	0.92	67	48	3.66	64	45	2.40	68	49	23	1887	25.78	47	203	97	417
July, ...	1.35	69	51	1.72	65	48	2.19	67	51	18	1888	32.33	46	190	81	232
August, ...	4.52	64	50	6.13	66	49	3.34	68	52	15	1889	26.18	47	194	59	250
September,	4.78	62	48	4.12	58	44	3.25	60	45	11	1890	38.04	47	170	74	273
October,	3.63	53	40	3.77	49	35	5.02	54	41	7	1891	36.09	46	184	85	371
November,	3.61	45	35	3.11	47	36	3.07	44	32	19	1892	33.84	45	194	101	798
December,	6.68	43	34	1.67	38	28	4.57	45	36	8	1893	33.05	47	186	56	306
	36.09		184	33.84			33.05			186	Aver- ages,	33.89	46.42°	190	71	342°

JAS. WHITTON.

The Ustilagineæ of North Ayrshire. By D. A. BOYD.

[Read 27th December, 1892.]

SINCE the publication of the *Mycologia Scotica* in 1879, comparatively little information has been recorded regarding the microfungi of the West of Scotland. In the various Supplements to Dr. Stevenson's work, which have since appeared in the *Scottish Naturalist*, numerous additions have been made to mycological records for the area of "Clyde," but these have been chiefly among the Hymenomycetes and other large forms; and although the important series of revisional papers, published from time to time by Professor James W. H. Trail, M.D., F.L.S., in the *Scottish Naturalist*, have greatly extended the list of Scotch species, most of the new records reported by him are for the northern and eastern districts, and comparatively few for the south-west. The only noteworthy contributions to the subject are contained in Professor Trail's Report on the Micromycetes observed at the Conference of the Cryptogamic Society of Scotland held at Inveraray in the autumn of 1888 (*Scot. Nat.*, Vol. IV., New Series, pp. 57-76), and in another paper by him in the same journal (*l.c.*, pp. 224-226).

In the absence of any systematic catalogue of the microfungi of the West of Scotland, the following list of Ustilagineæ observed in North Ayrshire may perhaps possess some interest as a local contribution towards such a work. Most of the species enumerated appear to be widely distributed, and will probably be found to occur in other parts of the Clydesdale district.

For a description of the British species, with much important information regarding their life-history, reproduction, &c., the student is referred to the admirable *Monograph of the British Uredineæ and Ustilagineæ* by Mr. Charles, B. Plowright, F.L.S., M.R.C.S.

Genus *Ustilago*, Persoon.

1. *Ustilago longissima* (Sow.) Tul.—Forming long parallel lines on the leaves of *Glyceria fluitans*; frequent; Largs, West Kilbride, Ardrossan, Stevenston.

2. *U. segetum* (Bull.) Winter [*U. carbo*, Tul.].—Producing “smut” in ears of *Avena sativa*; very common; West Kilbride. In ears of *Triticum vulgare*; frequent; West Kilbride.

3. *U. caricis* (Pers.) Winter [*U. urceolorum*, Tul.].—In ovaries of *Carex glauca*, producing a firm black mass of spores, which finally protrudes from the affected florets; not common; near Seamill.

4. *U. utriculosa* (Nees) Tul.—In ovaries of *Polygonum Hydropiper* and *P. Persicaria*, destroying the internal floral organs, and finally protruding in pulverulent sooty masses from the perianth; locally abundant; Ardneil Bank.

5. *U. violacea* (Pers.) Winter [*U. antherarum*, Fr.].—In anthers of *Lychnis Flos-cuculi*, producing pulverulent masses of violet-coloured spores; locally common; Ardneil Bay.

Genus *Tilletia*, Tulasne.

6. *Tilletia tritici* (Bjerk.) Winter [*T. caries*, Tul.].—This species produces the wheat-disease commonly known as “bunt,” and is developed in the ovaries of *Triticum vulgare*, filling the grains with an olive-black mass of spores which emits a fœtid and fishy odour; apparently less common in Ayrshire than in many other parts of the country; near Seamill, only once found.

7. *T. decipiens* (Pers.) Winter [*T. sphaerococca*, F. von Waldheim].—In ovaries of *Agrostis vulgaris*, causing the plant to assume the dwarfed condition known as “variety *pumila*,” and filling the seed-grains with a dark mass of spores which emits a fishy odour when rubbed; frequent; near Seamill, Ardneil Bay, Gailes, and Barrassie.

8. *T. striæformis* (Westd.) Winter [*Ustilago Salveii*, B. & Br.].—In parallel lines on the leaves and leaf-sheaths of *Holcus mollis*; common; various places near West Kilbride. On leaves of *Dactylis glomerata*; frequent; near West Kilbride.

Genus **Urocystis**, Rabenhorst.

9. **Urocystis anemones** (Pers.) Winter [*U. pompholygodes*, Lév.].—In the petioles and midribs of leaves of *Ranunculus repens*, producing rounded or irregular swellings, which finally rupture and disclose the black masses of spore-balls; frequent; Noddsdale and Kilbride Glens. On leaves of *Anemone nemorosa*; not common; Noddsdale.

Genus **Entyloma**, De Bary.

10. **Entyloma Fergussoni** (B. & Br.) Plow. [*Protomyces Fergussoni*, B. & Br.; *E. canescens*, Schröt.].—Producing pale rounded spots on leaves of *Myosotis arvensis*; not common; roadside at Tarbert Hill.

11. **E. ranunculi** (Bon.) Winter.—Producing conidia (= *Cylindrosporium ficariæ*, Berk.) on whitish spots on leaves of *Ranunculus Ficaria* in early summer, which spots afterwards become yellow or pale brown and contain the teleutospores; very common; Noddsdale, Ardneil Bank, Seamill, Glenhead Braes, &c.

12. **E. matricariæ**, Trail.—Producing small white bands or spots on the leaves, or rounded spots on the stems, of *Matricaria inodora*; clusters of conidiophores are pushed out through the stomata, and the affected parts afterwards become brown and withered; teleutospores abound in the withered leaves. Common in cultivated fields near West Kilbride; it has also occurred at Irvine.

13. **E. microsporium** (Unger) Schröt. [*E. Ungerianum*, De Bary].—On leaves of *Ranunculus repens*, producing rounded swellings which become yellowish-brown and cracked on their upper surface; frequent; Noddsdale, Kilbride Glen, &c.

14. **E. calendulæ** (Oud.) Schröt. [*Protomyces hieracii*, Berk.].—On leaves of *Hieracium sylvaticum*, producing whitish spots which afterwards become brown; not common; Noddsdale and Kilbride Glens.

DOUBTFUL USTILAGINEÆ.

Genus **Protomyces**, Unger.

15. **Protomyces macrosporus**, Unger.—Producing tumefactions on the petioles and midribs of leaves of *Agopodium*

Podagraria; very common; Largs, West Kilbride, Seamill, Ardrossan, Stevenston, &c.

16. *P. pachydermus*, Thümen.—In petioles and midribs of leaves of *Taraxacum officinale*, producing tumefactions; frequent; roadsides near West Kilbride, Seamill, &c.

In the *Scottish Naturalist*, Vol. IV. (New Series), pp. 367-373, Professor Trail has published a "Revision of the Ustilagineæ of Scotland," showing the ascertained distribution of the species throughout the various districts defined in *Mycologia Scotica*. Seven species are there recorded for "Clyde," including Nos. 1, 2, 5, 7, 9, and 13 of the foregoing list, together with *Graphiola phœnicis*, Moug., found on leaves of *Phœnix dactylifera* in the palm-house of Glasgow Botanic Garden, but not yet detected in Ayrshire. The remaining ten species of the foregoing list (viz., Nos. 3, 4, 6, 8, 10, 11, 12, 14, 15, and 16) are not recorded for "Clyde" in Professor Trail's paper.

The Peronosporæ of North Ayrshire. By D. A. BOYD.

[Read 24th April, 1894.]

DURING the last four seasons, I have attempted to ascertain the number of species of Peronosporæ occurring in the North-western district of Ayrshire, with the host-plants on which they are parasitic. My observations have been made chiefly in the parish of West Kilbride, but I have also been able to include a few localities for species found in the adjacent parishes of Largs, Ardrossan, &c. Owing to the small area examined, it is probable that the list of 21 species is by no means exhaustive.

The investigation of these parasitic microfungi has hitherto been much neglected in the West of Scotland, and little is known regarding their local distribution. The following list, although admittedly incomplete, is submitted in the hope that it may lead to further research.

Genus *Cystopus*, Levéillé.

1. *Cystopus candidus* (Pers.) Lév.—On *Capsella Bursa-pastoris*; very common; Largs and West Kilbride. On *Cardamine hirsuta*; frequent; Seamill. On *C. pratensis*; not common; Chapelton. On *Sisymbrium officinale*; frequent; Noddsdale, Yonderfield, &c. On *Brassica oleracea*; frequent; Seamill. On *Arabis alpina*; Seamill.

2. *C. spinulosus*, De Bary.—Locally common on *Cnicus palustris*, and less frequently on *C. lanceolatus*; Kilbride and Kirkland Glens.

Genus *Phytophthora*, De Bary.

3. *Phytophthora infestans* (Mont.).—Very common on *Solanum tuberosum*, producing the well-known "potato-disease"; Largs, West Kilbride, Ardrossan, &c.

Genus *Peronospora*, Corda.

4. *Peronospora nivea*, Unger.—On *Egopodium Podagraria*; common; Largs and West Kilbride. On *Sanicula europæa*; frequent; Ardneil Bank Wood. On *Angelica sylvestris*; frequent; West Kilbride and Ardrossan. On *Anthriscus sylvestris*; frequent; Noddsdale and Kilbride Glens.
5. *P. densa*, Rabh.—On *Rhinanthus Crista-galli*, common; Noddsdale, Crosbie, Ardneil Bank, West Kilbride, &c. On *Bartsia Odontites*; frequent; Noddsdale, Ardneil Bank, West Kilbride. On *Euphrasia officinalis*, not common; various places near West Kilbride.
6. *P. lactucæ*, Regel.—On *Senecio vulgaris*; frequent; Seamill. On *Sonchus asper*; rare; Noddsdale.
7. *P. calotheca*, De Bary.—On *Galium verum*; not common; sea-shore near Yonderfield and Seamill. On *G. Aparine*; rare; near Carlung. On *Asperula odorata*; not common; Noddsdale.
8. *P. myosotidis*, De Bary.—On *Myosotis arvensis*; rare; Ardneil Bay.
9. *P. viciæ*, Berk.—On *Pisum sativum*; locally common; Seamill. On *Vicia sativa* and *V. angustifolium*; frequent; various places near West Kilbride.
10. *P. alsinearum*, Caspary.—On *Stellaria media*; common; Kilrusken, Seamill, &c. On *Cerastium triviale*; frequent; Seamill.
11. *P. arenariæ*, Berk.—On *Arenaria trinervia*; not common; Noddsdale. On *A. peploides*; common; sea-shore at Yonderfield, Chapelton, &c.
12. *P. parasitica*, Pers.—On *Cheiranthus cheiri*; not common; Seamill.
13. *P. ficariæ*, Tul.—On *Ranunculus Ficaria*; common; Noddsdale and West Kilbride.
14. *P. obovata*, Bon.—On *Spergula arvensis*; frequent (probably common, but readily overlooked); various places near West Kilbride.
15. *P. trifoliorum*, De Bary.—On *Trifolium medium*; not common; near Seamill. On *T. minus*; not common; Noddsdale.

16. *P. grisea*, Unger.—On *Veronica Beccabunga*; common; Noddsdale, and in many places near West Kilbride.

17. *P. effusa*, Grev.—On *Chenopodium album*; not common; West Kilbride and Seamill.

18. *P. urticæ* (Lib.) De Bary.—On *Urtica urens*; frequent; Boydstone and Troon.

19. *P. alta*, Fckl.—On *Plantago major*; not common; West Kilbride.

20. *P. rumicis*, Corda.—On *Rumex Acetosa*; not common; West Kilbride. On *Polygonum aviculare*; frequent; West Kilbride.

21. *P. sordida*, Berk.—On *Scrophularia nodosa*; rare; Kilbride Glen.

In his "Revision of the Scotch Peronosporæ," read at the Aberdeen Conference of the Cryptogamic Society of Scotland in 1886, and afterwards published in the *Scottish Naturalist*, Professor Trail enumerated the species then known to occur in Scotland, with particulars of the divisional areas in which they had been detected. The only species at that time recorded for "Clyde" were *Cystopus candidus*, *Phytophthora infestans*, and *Peronospora parasitica*. To these were subsequently added *Peronospora lactucæ*, found by Professor Trail at Tarbet; and *P. alta*, observed by him at Inveraray (*Scot. Nat.*, Vol. IV., New Series, p. 58); with *Cystopus spinulosus*, gathered by myself at West Kilbride, and submitted to Rev. Dr. Keith for verification (*Ibid.*, p. 224). The remaining 15 species of the foregoing list do not appear to have hitherto been recorded for "Clyde."

**Notes on the Anatomy of a form of Cyclopean, with
Remarks on the Significance of Cyclopeans.** By R.
BROOM, M.B., C.M., B.Sc., Hillgrove, New South Wales.

[Read 24th April, 1894.]

SEVERAL years ago I exhibited to the Society an unusual form of abnormality in the head of a lamb—apparently a form of Cyclopean—and promised to communicate to the Society the result of my detailed examination of its anatomy.

The lamb itself was of average size, and, with the exception of the peculiarity of the head, was well-developed. As regards the head, the abnormality consists in arrested development of the face and the absence of eyes, but with well-developed lower jaw and ears normally placed. The facial region is flattened, and is quite devoid of any form of proboscis. The lower jaw projects $\frac{3}{4}$ in. beyond the aborted face, and the mouth is fairly well completed by a thin flat triangular upper lip, devoid of any cartilage or bone. On more careful examination, there is found to be an attempt at the formation of eyelids. At the point where the eye should have appeared, had the case been that of a normal Cyclopean, there is a little inverted triangular space $\frac{5}{16}$ in. from side to side and $\frac{3}{16}$ in. from above downwards. The three sides of this small triangular interval are in reality three minute eyelids. Within the eyelids is an irregular epidermal structure, from which at the lower part projects a small warty growth—probably an attempt to form cornea and lens.

All that there is to suggest a snout is the presence, between the aborted eye and the upper lip, of a small patch of skin with slightly thickened epidermis and with very short hairs radiating from the centre.

On removing the skin, there is found immediately beneath the frontal bone, and occupying the situation of the orbit in ordinary Cyclopeans, a flattened space $\frac{3}{4}$ in. from side to side and nearly

$\frac{1}{2}$ in. vertically. This is really part of an imperfect orbit, and in the upper half of each side is a distinct lachrymal gland.

On the inner aspect of the cranial floor, the arrangement of cranial nerves and foramina is normal in the occipital and otic regions. In the anterior part, the absence of eyes and nose makes the arrangement peculiar. Immediately behind the region of the imperfect orbit already mentioned is an elevated median ridge running half-way back the cranial floor. This is found to be a mass of adipose tissue in which are embedded a number of bundles of muscular tissue, representing the ocular muscles, and in the centre a small rounded fibrous structure, probably the tissue which should have formed the sclerotic. Into this mass of orbital tissues can be easily traced the 3rd, 4th, and 6th nerves, and the orbital branch of the 5th, the latter passing to the lachrymal glands and forming two supra-orbital nerves.

The median ridge of orbital tissues is roofed by two small bones and by a fibrous band connecting them. The anterior is a small triangular cartilaginous bone, articulates with the frontal, and probably represents the fused orbito-sphenoids. The posterior roofing bone is dagger-shaped, articulates with the alisphenoids, and is probably the rudimentary basisphenoid. The alisphenoids, which are well-developed, articulate with the basioccipital and with each other posteriorly, and on the under side are in contact with the united pterygoids. The palatines are united, and, while fairly normally formed in the palatal region, send a broad plate upwards and backwards, occluding what ought to have been the posterior nares, and there is developed forwards a median plate in the region where the vomer would have been expected.

With regard to the brain, the medulla, cerebellum, and midbrain are normally developed. Anteriorly development has stopped in the region of the conario-hypophysial tract. I fail to detect the presence of the pineal body and of the anterior quadrigeminal bodies, while the posterior lobes of the corpora quadrigemina appear to be enlarged. To the under surface of the anterior part of the brain is attached, apparently only by pia mater, a rounded body about the size of a pea, which I believe to be the anterior lobe of the pituitary body. In short, the brain is well-formed, except that the anterior primary vesicle has not given rise to ocular vesicles, cerebrum, or olfactory lobes, as is normally the case.

In seeking for an explanation of Cyclopeans and various other monsters, we constantly are met by the reply—an arrest of development. But this merely leads to the further question—why is the development arrested? When there has been failure of development of a part through embolism or thrombosis in the vessels supplying the part, the arrest is satisfactorily accounted for. But if we find that the cells of a part have not multiplied in a certain axis or line of growth as they normally should, no pathological condition of the vessels can account for it.

For some time I have been led to think that atavism plays a larger part in the formation of monsters than has commonly been supposed. In the paper which I read before this society "On a Monstrosity of the Common Earthworm, *Lumbricus terrestris*, L.,"* I suggested the connection between double monsters and the process of development in *Lumbricus trapezoides*, Dugès, where normally two embryos are formed from one ovum, and that possibly in double monsters we had an attempted reversion to an ancestral mode of development. The development of an additional toe on each foot of the horse is an undoubted case of atavism, as pointed out by Prof. Marsh. When we meet with a case where a branchial cleft is left patent in the neck, it is customary to look at the case as one where development has been arrested in the part at the stage corresponding to the adult fish. But if, in the case of the horse, we admit that Nature at times develops one showing some of the characters of the three-toed ancestor, we may also admit that at times there are developed in the mammalian young some of the still more remotely ancestral characters of the fish.

In the Cyclopeans we find preserved still more primitive characters. Between the Acrania, with its representative the *Amphioxus*, and the Craniota or head-bearing vertebrates, there is an immense gap in which we have no link at present known, unless, perhaps, it be found in some of the anomalous Devonian fishes.

The head of the higher vertebrates probably represents nine segments of the primitive form, with the additional development of parts not represented in the rudimentary vertebrates. The cerebro-spinal axis is continued forward by the addition of cerebral

* *Trans. Nat. Hist. Soc. Glasg.*, vol. ii. (1887-88), p. 203.

hemispheres, optic vesicles, and olfactory lobes, and there is a corresponding continuation of the skeletal axis by the development of the trabeculæ and the skeletal structures which arise in connection with them.

In the head I have just described there are developed all the primitive vertebrate structures, but there is a complete absence of most of those peculiar to the craniota. The failure in development could not have been produced by an occlusion of blood-vessels, since the ground plan must have been laid down before any blood-vessels were formed; and the only conclusion which seems tenable is that there has been some alteration of the potentiality of the developing cells of the ovum, so that they have completed their evolution when they reached the stage corresponding to the adult development of the remote ancestor.

The ordinary form of Cyclopean is probably the result of a compromise between the present extreme form and the normal development.

Occurrence of the Clouded-yellow Butterfly (*Colias edusa*, Fab.) in Ayrshire. By JOHN SMITH.

[Read 25th October, 1892.]

IN the *Fauna and Flora of the West of Scotland* (1876), two localities for this butterfly are given, viz., Largs and Troon, the record for Largs being from a male taken on 12th September, 1852. Mr. Newman, in his *British Butterflies*, states that Mr. Birchall took a female at Largs on the above date, and this may possibly have been the same insect as is referred to in the *Fauna and Flora*.

More than twenty years ago, Mr. John Marshall, blacksmith, Stevenston, took two specimens in that district, and they are still in his possession. He believes that about a dozen have been obtained in the Stevenston district, but none have been known to occur within the last twenty years.

On 4th September of the present year, Mr. Robert Linton, Kilmaurs, had a specimen brought to him by a boy who had captured it about half-a-mile from the village.

After hearing from Mr. Linton about this capture, I resolved to keep a look-out for other examples of this rare Scotch butterfly. My steps were naturally turned towards the Stevenston district, and the day (13th September) being extra fine, I saw several specimens of the Silver-Y Moth (*Plusia gamma*), the Ear Moth (*Hydræcia nictitans*) on flowers of ragwort, and the Small Copper Butterfly (*Polyommatus phlæas*).

On 22nd September, I saw a veritable *Colias edusa* on an old road near Auchenskeith farm steading, Dalry. I was within six yards of the insect, and believe that it could easily have been captured, as it does not appear to be a strong flier; but there were

uncut fields of corn on either side of the road, and it escaped into one of them. The day was delightfully fine with strong sunshine, and many Silver-Y and other moths were flying about where disturbed.

Dr. F. Buchanan White, in his *Butterflies of Perthshire*, states that *C. edusa* has occurred both in Dumfriesshire and in Ayrshire.

This butterfly is common in the South of England, especially in Cornwall, where, in one season, from August to 14th October, as many as 346 specimens have been taken by a single collector.

Pholas crispata, Linn., as a Borer. By JOHN SMITH.

[Read 28th March, 1893.]

VARIOUS theories have been advanced to account for the manner in which the different species of *Pholas* excavate their burrows. These theories are (1) that the shell turns round in the burrow, in the manner of an auger, the sharp edges and spines of the shell thus cutting away the rock; (2) that sharp siliceous spicules are embedded in the foot of the animal; (3) that the animal secretes an acid which it ejects into the burrow; and (4) that the hole is bored by the mere action of the bare foot on the rock or other substance to be excavated.

If the first theory were true, we should certainly see indications of wearing on the edges of the shells and on the spines. Even the most highly-tempered steel cannot resist being worn when used as an auger with which to bore holes into rocks. But there are no signs of wearing on the shells of *Pholas*; neither is the foot provided with any siliceous spiculæ, as the second theory would demand. If the holes had been excavated by means of a chemical solvent, they would show indications of corrosion, whereas the sides and bottom of every burrow are nearly smooth. The fourth and last theory seems to afford the most satisfactory explanation, and only requires a slight augmentation to render it perfect.

A few years ago I discovered a small colony of *Pholas crispata* on the Ayrshire coast. They had bored into a reddish volcanic ash of carboniferous age. On digging out a few dozen specimens, I found that in each case, so far as specially observed, the sole of the foot (if I may be allowed the expression) was thickly covered with a layer of sand firmly fixed to it by mucous secretion. On observing this, I saw at once that the boring was effected by the animal using its foot primed with sand, in the manner that some savages are said to bore holes with a stick, the point of which is now and then wetted and dipped into sand.

In digging its burrow, *Pholas crispata* very seldom impinges on the excavation of its neighbour, although a dozen holes may be quite close together; and in this respect it differs much from *Saxicava rugosa*, which constantly runs its burrow broadside into another already formed. The holes formed by *P. crispata* are carried down to a depth of six or seven inches, and are very small in diameter at the surface, but increase gradually in width with the growth of the animal.

When in the act of digging, it appears to open out its valves till they fit tightly into the hole, and in this position it can use considerable force in excavating with its foot. The fine material ground off at the bottom of the burrow will be easily ejected therefrom by the animal inverting the action of its siphon, which it can do instantly and with vigour.

It may be asked whether the *Pholas* is always in a position to command a supply of sand wherewith to prime its foot; and this question may, we think, be answered in the affirmative. The habitat of *Pholas* is between tides, or a short distance below low water mark; and in this zone there is always plenty of gritty material, owing to the constant agitation of the water.

When *P. crispata* bores into rock (generally limestone, shale, fire-clay, or volcanic ash) it is invariably much smaller in size than when it bores into muddy clay, and even in glacial and raised-beach strata this difference in size may be observed. Boring into rock is evidently for it a much heavier undertaking than boring into clay, and in the former case it has clearly less time to "grow fat" than when engaged in the latter operation.

The light emitted by the species of *Pholas* has engaged the attention of naturalists since the time of Pliny. It must be of considerable service to the mollusk, by attracting small marine animals which get drawn into the siphon and are used as food, and may also possibly help to illumine its otherwise rather dark dwelling.

In her *Popular History of the Mollusca*, Mary Roberts has collected a few notes on the subject of this light, which may be worthy of quotation. "There is another quality in this tribe of mollusks which demands a brief description. It is that of emitting a phosphorescent liquor, which illuminates whatever it touches. This peculiarity, observed by Pliny and other ancient naturalists,

has furnished a subject for various observations and experiments to different learned men, especially to M. Reaumur and M. Becarius, who particularly devoted their attention to the subject of phosphoric light. The luminous quality of the *Pholas* is in proportion to its freshness, but even when in a dry state it may be revived by the application of fresh or salt water. Brandy immediately extinguishes the light. A solution of seawater (*sic*) increases it; and ammoniac diminishes it a little; oil of tartar nearly extinguishes it, and the acids entirely. The luminous water, when poured upon fresh calcined gypsum, rock crystal, or sugar, becomes more vivid. Milk, rendered luminous by the *Pholas*, loses its shining quality when mixed with sulphuric acid, but regains it on the addition of oil of tartar. Colour substances are differently and powerfully affected by it; white appears to imbibe and emit the greatest quantity; yellow and green in less proportion; red will emit hardly any light; violet least of all. A single *Pholas* will render seven ounces of milk so beautifully luminous that surrounding objects are clearly visible by its light. This luminous quality entirely disappears when the milk which contains it is excluded from the air, but again revives on exposure to the atmosphere. In the exhausted receiver of an air-pump, the *Pholas* loses his light. The reason for this remarkable provision, as well as the purpose to which it is applied in the animal economy, are unknown."

Alchemilla vulgaris, Linn., and allied Forms.

By P. EWING.

[Read 27th February, 1894.]

A VERY able paper on this plant and its forms, by Mr. G. C. Druce, M.A., F.L.S., appeared in the *Annals of Scottish Natural History* for January, 1894. I may remark that the origin of the paper is Austro-Hungarian, translated by A. Kerner, and communicated to the above magazine by Mr. Druce.

The paper has given rise to some interesting discussion, in which various botanists have taken part; and the first point referred to was the much-disputed one as to the effects of cultivation on *A. alpina* in converting it into the form known as *A. conjuncta*. It is very doubtful whether such a change really takes place. The first instance ever brought under my notice was reported to me one day on Ben Lawers by the late Professor J. H. Balfour, who stated that a plant of *A. alpina*, taken from that mountain and grown in the Edinburgh Botanic Gardens, had, after a few years' cultivation, assumed the form known as *conjuncta*. I accordingly took home a plant of *A. alpina* for garden cultivation. It has grown luxuriantly, and spread over a rockery, but after twenty-three years' culture it still remains *A. alpina*, and shows no deviation from the typical form. At Uddingston, for eight years, I have grown *A. alpina* and *A. vulgaris* side by side, and often intermixed with each other, in the hope of getting *A. conjuncta* by cross-fertilisation; but although I get many seedlings of *A. vulgaris*, there are none of *A. alpina*, and none approaching *A. conjuncta*.

Although this experiment seems very conclusive, I have so often heard of this plant changing under cultivation that I am not perfectly convinced that it may not sometimes do so under certain conditions. I have here before me a specimen of *A. conjuncta*, said to have been taken from Ben Lawers many years ago by Provost Smith, Kinghorn, as a souvenir of his first visit to

that mountain. Now, if he took *alpina*, and no other person substituted *conjuncta* for it, *alpina* must certainly in this case have changed into *conjuncta*; but as the latter is so often grown in gardens as a hardy herbaceous plant, it is just possible that in this case also the change may have been very much due to the gardener.

Whatever *A. conjuncta*, Bab. (*A. argentea*, Don) is, or may have been, we have not, as a rule, had any difficulty in determining *A. vulgaris*, Linn. It seems, however, that the plant generally known as *vulgaris* may be one of two or three forms.

Linnæus distinguishes (1) *A. vulgaris*, with a variety B; (2) *A. alpina*, with a subspecies *hybrida*; and (3) *A. pentaphyllea*. There can be no question as to *A. alpina* or *A. pentaphyllea*, and later botanists have never raised any doubt regarding them. The latter species does not occur in Britain, while the former is so common in alpine situations that it may at once be dismissed from our notice. We have therefore only to deal with *A. vulgaris* and its variety B, and with the subspecies *hybrida* of *A. alpina*.

We will first examine the forms noticed in Hooker's *Student's Flora* (Third Edition, 1887), beginning with *A. vulgaris*. After describing the species, he remarks (p. 127) that "*A. montana*, Willd. (*A. hybrida*, Pers.) is a dwarf mountain form with leaves and petioles very pubescent or silky." It is to be regretted that he has countenanced the erroneous view that *montana* and *hybrida* are synonymous, and not truly distinct forms. It is therefore obvious that a fuller description is necessary to remove the confusion which exists regarding these plants.

Linnæus describes *A. vulgaris* as a hairy plant, which we know to be true, for all the forms we have ever seen of it are more or less hairy at one or other stage of their existence. What, then, is the form which Willdenow describes as *A. montana*? He ranks it with the species which he regards as *A. vulgaris*, L., and says of it that the leaves are "glabris," while those of *montana* are "subtus pubescentibus." Although this appears to be entirely the reverse of what Linnæus states, I think there can be little doubt that Willdenow used the descriptive term "glabrous" in a comparative sense. This conclusion may, at least, be safely arrived at when we compare the descriptions

given by the older botanists, for we know that some of the forms lose their hairs at a comparatively early stage of growth, while others retain the hairs on the calyx until the seed has ripened.

Let me now refer to *A. hybrida*. Botanists seem agreed that this is a cross between *A. vulgaris* and *A. alpina*. I was of opinion that *A. conjuncta* also might be a hybrid between these two plants. Both views may possibly be correct, and the form *hybrida* may take as much after *vulgaris* as *conjuncta* does after *alpina*, the difference being probably due to parentage. Descriptions seem to point to a plant resembling *conjuncta* but smaller in all its parts, the under side of its leaves alone being covered with a silky pubescence.

A. hybrida seems also to have given rise to considerable confusion. Linnæus, as we saw, regarded it as a subspecies of *alpina*, and synonymous with *A. alpina pubescens minor*, Tournef. ; and it seems also to have been viewed as synonymous with *A. splendens*, Christ, and *A. pubescens*, Biberstein. Whatever this form may be, it is certainly not a common plant with us. It is very interesting to notice that Willdenow unites *A. hybrida*, L., with his own *A. vulgaris*, and the description he gives of it shows that he did not refer to the same plant as Linnæus. It seems to me quite probable that Willdenow regarded *vulgaris*, *montana*, and *hybrida* as distinct forms.

I have stated that Linnæus recognised a variety B under his *A. vulgaris*, which he described as a form with large yellowish-green glabrous leaves and more decumbent stems, while he remarks that it is rare and only found in sandy places. I feel confident that we have this plant, but in Britain it does not grow in the habitat stated. It occurs beside alpine rills, and on wet sheltered rocky ledges, and is better known as *A. vulgaris* var. *glabra*, Wimmer et Grabowski.

To have rendered justice to the translation by A. Kerner, which forms the first part of Mr. Druce's paper, I should have had to occupy very much more time than the plant may be considered worth, and will therefore attempt briefly to state the conclusions arrived at after reading that paper.

There can be no doubt that we have four forms of *A. vulgaris* in Scotland, and these are as follows:—(1) *A. vulgaris*, L., which is certainly the plant described by Linnæus. At an early stage

of development its parts are entirely covered with shining silky hairs; but these soon begin to disappear, and by the time the leaves are developed there are few hairs to be seen, unless a small quantity which form a tuft at the point of each tooth on the leaves, and a few remaining on the teeth of the calyx up to the time when the petals are shed. The leaves of this plant are of a dull green colour and thickish texture, and it occurs from sea-level up to an elevation of about 2,000 feet.—(2) Var. B, Linn. (= Var. *glabra*, Wimm. et Grab.), has long engaged my attention. By the time when its parts are fully developed, it differs from the type in the absence of hairs, except those forming tufts at the points of the teeth on the leaves; the petioles are smooth and shining; and the colour of the lamina is a soft yellowish-green, becoming light yellow in drying, while all the other parts become dark brown. This, so far as my experience goes, is a truly alpine or subalpine form.—(3) We now come to Var. C, and to more dangerous ground. I feel confident, however, that this is the plant described by Willdenow as *A. montana*. All its parts are covered with a very dense short greyish pubescence, which remains on the leaves and stems during the winter. In the growing state, this pubescence gives the plant a light greyish appearance, and the colour becomes darker in specimens which have not been carefully dried. This form occurs from the sea-shore up to a high elevation on our mountains.—(4) Of the fourth form (Var. D) I cannot speak very definitely, but it is distinguished by its covering of long brown hairs, and usually occurs on ballast-heaps and canal-banks.

Although familiar with the flora of the Perthshire and Forfarshire mountains, I have not yet succeeded in finding *A. conjuncta*; but if I should discover it, I will also have a look round for *A. hybrida*, the rarest of all the forms. It is satisfactory to know that there is still something for us to hunt for on our Scotch mountains.

Report on the Disappearance of Native Plants.

Edited by Professor THOMAS KING and D. A. BOYD.

[Read 28th February, 1893.]

THE following information, relating to the Flora of the West of Scotland, was compiled by members of this Society for the Committee appointed by the British Association to investigate the causes which have led to the total or partial disappearance of native plants from their known habitats. It was included in the Report submitted by the Committee at the Meeting of the British Association held at Edinburgh in 1892.*

The number prefixed to the name of each species corresponds with the enumeration in the *London Catalogue of British Plants* (Eighth Edition, 1886), and the nomenclature and general arrangement of that list have been followed throughout.

5. *Thalictrum flavum*, L.—Formerly on the bank of the River Clyde at Clyde Iron Works; now extinct, from unknown cause (D. A. Boyd).
13. *Ranunculus fluitans*, Lam.—In a small stream between Clydebank and Dalmuir, Dumbartonshire; extinct, through stream having been transformed into a conduit for sewage (L. Watt).
23. *R. sceleratus*, L.—Marshy ground on side of River Clyde between Clydebank and Dalmuir, Dumbartonshire; extinct, marsh reclaimed (L. W.).
39. *Trollius europæus*, L.—Formerly, but scarce, on banks of Gourrock Burn, West Kilbride, Ayrshire; now extinct, from unknown cause (D. A. B.).
59. *Glaucium flavum*, Crantz.—Seashore between Dunoon and Toward, Argyllshire; extinct, probably all gathered by collectors and summer visitors (T. King).
89. *Arabis Turrita*, L.—Old quarry in wood near Partick, Lanarkshire; extinct since about 1880 (T. K.).

* *Report of the Brit. Association for 1892*, pp. 782-785.

- 107 *Cochlearia officinalis*, L.—As No. 23 (L. W.).
138. *Senebiera Coronopus*, Poir.—Waste ground on seashore at Seamill, Ayrshire; extinct, washed away during a high tide, January, 1884 (D. A. B.).
- 249c. *Lepigonum salinum*, Fr., var. *neglectum* (Kindb.).—As Nos. 23 and 107 (L. W.).
277. *Malva moschata*, L.—Reported formerly to grow below Innellan, Argyllshire; now apparently extinct, from an unknown cause (T. K.).
352. *Trifolium striatum*, L.—Sandy fields at Seamill, Ayrshire; extinct in several places where formerly abundant, on ground now built over (D. A. B.).
506. *Rosa spinosissima*, L.—Among coarse grass on seashore, Seamill, Ayrshire; extinct in several spots where formerly abundant, washed away during a high tide, January, 1882 (D. A. B.).
589. *Peplis Portula*, L.—Quarry-hole in field behind Tarbert Hill, West Kilbride, Ayrshire; extinct; site filled up by farmer (D. A. B.).
672. *Daucus Carota*, L.—Waste ground, Seamill, Ayrshire; extinct; ground now built over (D. A. B.).
800. *Carduus crispus*, L.—The same (D. A. B.).
917. *Andromeda Polifolia*, L.—Stewarton Moss, Ayrshire; extinct within the last thirty years, from unknown cause (D. Landsborough).
- [*Ledum palustre*, L.—Lecropt Moss, West Perth; formerly in considerable quantity, but almost extirpated by botanical class from Edinburgh University, who were guided to the spot by a local botanist (J. Shearer).
941. *Primula vulgaris*, Huds.—Island of Cumbrae, Buteshire; rapidly diminishing, being carried off in basket loads by lady visitors (D. Robertson).
993. *Mertensia maritima*, Don.—Seashore between Dunoon and Toward, Argyllshire; extinct on all parts of the shore till far past Toward, being probably all gathered by collectors and summer visitors (T. K.).

1006. *Echium vulgare*, L.—On sandy soil, Bog Farm, Stevenston, Ayrshire; extinct, being smothered by drifting sand (J. Smith).
1009. *Calystegia Soldanella*, R. Br.—Fintry Bay, Cumbrae, Bute-shire; extinct, mainly, it is believed, through ravages of botanical students from Glasgow (T. K.).
1131. *Scutellaria minor*, L. — Rosebank, near Cambuslang, Lanarkshire; extinct, through railway construction (D. A. B.).
1270. *Myrica Gale*, L.—Biglees Moor, West Kilbride, Ayrshire; extinct, through draining of bog (D. A. B.).
1329. *Neottia Nidus-avis*, Rich.—Wood near Kilwinning, Ayr-shire; extinct, rooted out by school children who were receiving instruction in botany (J. S.).
1338. *Cephalanthera ensifolia*, Rich.—Island of Arran, Buteshire; extinct in many former stations, the plants being carried off by collectors (D. L.).—Cunninghamhead, Ayrshire; extinct, all the plants being dug up for removal to a garden (D. L.).
1380. *Narcissus Pseudo-narcissus*, L.—On banks of Gourrock Burn, West Kilbride, Ayrshire; formerly abundant, but now greatly reduced in number, being carried off to gardens (D. A. B.).
1385. *Galanthus nivalis*, L.—Crosbie Glen, West Kilbride, Ayr-shire; formerly removed in large quantities to gardens, but removal now prohibited by proprietor (D. A. B.).
1470. *Alisma Plantago*, L. }
 1477. *Triglochin maritimum*, L. } As No. 23 (L. W.).
1479. *Potamogeton natans*, L. }
 1496. *P. crispus*, L. } Paisley Canal, Renfrewshire;
 1502. *P. pusillus*, L. } almost extinct, as the canal is
 drained and a railway made
 along the greater part of its
 course (D. A. B.).
1534. *Scirpus Tabernamontani*, Gmel.—As No. 23 (L. W.).
1538. *S. maritimus*, L.—The same (L. W.).

1541. *S. rufus*, Wahlb.—Bank of River Clyde, between Old Kilpatrick and Bowling, Dumbartonshire; habitat slowly disappearing, being washed away by the tide (L. W.).
1560. *Carex disticha*, Huds.—In a ditch near River Clyde, between Dalmuir Burn and Old Kilpatrick, Dumbartonshire; ground reclaimed, ditch drying up, and plants in it disappearing (L. W.).
1561. *C. arenaria*, L.—Seashore, Seamill, &c., Ayrshire; since 1882, owing to a series of remarkably high tides, the sandbanks, formerly protected by the rhizomes and roots of this plant, have been considerably reduced in extent (D. A. B.).
1582. *C. acuta*, L.—As No. 23 (L. W.).
1667. *Ammophila arundinacea*, Host.—See No. 1561, the remarks in which apply, even more strongly, to this plant (D. A. B.).
1687. *Phragmites communis*, Trin.—As No. 23 (L. W.).
1766. *Cryptogramme crispa*, R. Br.—Western Islands, &c.; large numbers of fern roots, exposed on barrows, are frequently offered for sale in the streets of Glasgow, and it is believed that the main supply is derived from the Western Islands (Arran, Jura, &c.) and the Argyllshire Hills (D. A. B.).
1770. *Asplenium Adiantum-nigrum*, L.—The same (D. A. B.).
1771. *A. marinum*, L.—The same (D. A. B.).—Chapelton Wood, West Kilbride, Ayrshire; nearly extirpated by collectors (D. A. B.).
1772. *A. viride*, Huds.—See No. 1766 (D. A. B.).
1773. *A. Trichomanes*, L.—The same (D. A. B.).
1781. *Ceterach officinarum*, Willd.—On a wall near Paisley, Renfrewshire; formerly plentiful, but now almost extinct, taken, it is believed, by a fern-dealer (T. K.).
1782. *Scolopendrium vulgare*, Symons.—Ardneil Bank Woods, near Portincross, Ayrshire; formerly carried off in large quantities, but removal now forbidden by proprietor (D. A. B.).—Hindog Glen, Dalry, Ayrshire; abundant thirty years ago, but since extirpated (J. S.).

—Island of Cumbrae, Buteshire; about fifty years ago this fern was growing abundantly on the island, now it is difficult to find a single plant. It has been said that the ferns have been taken by nurserymen for their own interests. In summer, however, the lady visitors were seldom seen leaving the island without taking with them a basket of ferns—a practice carried on year after year, till now, when the ferns are nearly exhausted, the gathering mania is passing from ferns to primroses (see remarks on No. 941 (D. R.).—The remarks on No. 1766 are applicable also to this species as a plant of the Western Islands, &c. (D. A. B.).

1806. *Osmunda regalis*, L.—Hunterston, Ayrshire; formerly luxuriant on the cliffs and low ground facing the sea, but now extinct, the plants being carried away (D. L.).—Portincross, Ayrshire; a few plants formerly grew here, but were all dug up and carried away (D. A. B.).—Shewalton Moss, Dundonald, Ayrshire; extinct, the moss being reclaimed (J. S.).—Island of Cumbrae, Buteshire; formerly plentiful in places, this fern has now almost entirely disappeared, being carried away with No. 1782 and others (D. R.).—Island of Arran, Buteshire; up till 1860 abundant in many places, but now extinct, or nearly so, having been carried away by cartload and boatload (D. L.).—Roots are sometimes still offered for sale to visitors in the island (D. A. B.).—Achacha District, Benderloch, Argyllshire; formerly plentiful, but now none has been seen for twelve or fourteen years, the roots having been continually sought after and removed by collectors (W. Anderson Smith).—Loch Fyne District, Argyllshire; becoming extremely rare through ruthless collections for sale (W. A. S.).—Western Islands, &c.; see remarks on No. 1766, very applicable to this species (D. A. B.).
1822. *Lycopodium Selago*, L.—Moors near West Kilbride, Ayrshire; much less common than formerly, probably owing to drainage (D. A. B.).—Western Islands, &c.; occasionally exposed for sale in the streets of Glasgow. As No. 1766, &c. (D. A. B.).

Vine-Culture in India.

Communicated by JOHNSTON SHEARER.

Read 25th April, 1893.

IN a letter, dated 28th January, received from a friend who resides in the Punjaub district of Northern India, the following account is given of the process of vine-culture as practised in that country:—

“I have just been superintending the pruning of my vines and roses. We are now going to put new bamboos in the trellises, to repair the ravages of the white ants; and when that is done we will spread the dry branches of the vines out on the trellises, and in about four months we shall expect an abundant crop.

“The way we cultivate the vine here will be interesting to you. After the leaves have come out thickly, they are all cut off, and the plants are severely pruned. The roots are then all opened out (except the points of the main roots), and exposed to the sun and air for some weeks. I should mention that the bottom of the trench in which the vines are planted is filled with a thick layer of bones pressed hard. When the roots have been exposed for a sufficient time, they are liberally treated with bullocks' blood from the slaughter-house, and are filled in with sheep-droppings and covered over with earth. The vines are then left without water till the fruit begins to form, when it is supplied plentifully. The reason for this peculiar treatment is that unless the first leaves are cut off, the strength goes into the foliage, and few new shoots are thrown out; but many new branches are produced by pruning, and the fruit grows on them and not on the old wood. If water were supplied before the fruit had appeared, the growth would again run to leaves; but after the fruit has begun to form, water increases its size and lusciousness.”

Notes on the Habits of some Common Birds.

By D. A. BOYD.

[Read 27th September, 1892.]

ANYONE who lives in the country may derive considerable amusement from studying the habits of common birds. Such observations may be conducted with little difficulty; and if the birds are frequently fed, especially during the period of frost and snow in winter, when they approach the house in search of food, they soon become comparatively tame, and return morning after morning in expectation of a free breakfast. When the snow lies deep on the frozen ground, we may soon gather a motley crowd of feathered dependents. Crumbs of bread, oatmeal, cold potatoes, and scraps of cooked meat, all furnish a varied and acceptable repast, and it is exceedingly amusing to watch the scramble for a share of the supplies. We usually scrape away some of the snow from a paved court outside the kitchen, so that the birds may readily get at their food. The sparrows watch these preparations from the top branches of the neighbouring trees, and are, of course, the first to arrive upon the scene, and the last to take their departure; but they are speedily followed by robins, blackbirds, thrushes, hedge-sparrows, chaffinches, greenfinches, blue titmice, great titmice, and various other birds. Among all these, it is needless to say that the sparrow secures, at least, its own share. Occasionally, however, in very severe weather, a flock of starlings descend on the feeding-ground, and soon empty it of every scrap and morsel. It is then amusing to see the sparrows reluctantly compelled to give way before their more numerous and powerful rivals. Quarrels are frequent, especially among the blackbirds and robins, and these prove, beyond doubt, that the golden rule forms no part of the birds' code of morals.

The following notes on the habits of some common species may, perhaps, prove interesting to the members of the Society:—

SWALLOW (*Hirundo rustica*, Linn.).

Three summers ago a pair of swallows built their nest under the roof of an out-house, and in due course brought out their brood. A few days after the first appearance of the birds next season, a pair were seen entering the house where the nest of the previous year still remained. This nest they at once took possession of, and renewed its lining with a few fresh feathers. One day, shortly afterwards, a great commotion was heard amongst the swallows, and it became evident that a battle was in progress. The noise was renewed at short intervals for about two hours; and in the afternoon, when the commotion had subsided, I entered the house to learn, if possible, the cause of the disturbance, and ascertain if the nest had been interfered with by any of the combatants. When passing beside a narrow barrel-shaped washing-tub, which at that time contained only a little soapy moisture at the bottom, I happened to look inside, and was surprised to observe two small objects much resembling a pair of drowned mice. These proved to be a pair of swallows, which seemed, from their exhausted condition and utterly miserable appearance, to have been in the tub for not less than two or three hours. In their efforts to escape, the feathers of their wings had become very much abraded, as well as drenched with the soapy water. When I took the birds out, they were too feeble to fly away; and although I held them in my hand for some time, and afterwards laid them in the sunshine, nearly an hour elapsed before they had fully recovered. At least six or seven swallows seemed to take an interest in the progress of the battle, and flew in and out of the house, uttering their shrill cries; but whether they were all engaged as combatants, or merely as on-lookers, could not be determined. There can be little doubt, however, that the prompt occupation of the old nest by one pair of birds had disappointed another pair of intending tenants, and that the latter had attempted to eject their more successful rivals. It is, of course, impossible to say whether the pair that took possession of the nest were the parent birds of the previous year, or whether these had re-paired and were striving together for the nest, or

whether the combatants were young birds of the previous season ; but the early occupation of the nest so soon after the arrival of the birds induces me to think that they already knew of its existence, and had resolved to secure it for their domestic quarters. As no fewer than three successive broods were reared in the coveted nest during that season, we may hope that the dispute was ultimately settled in a manner satisfactory to all concerned. The nest was occupied during the following summer, apparently without further dispute as to rightful ownership.

On several occasions I have seen a cat put to flight by swallows. If she is in an exposed place, where they can get readily at her, they raise a shrill cry, and make a rapid downward swoop, so as to pass close to her head, picking out a few hairs with their bill as they pass. The cat soon learns to dread the approach of the swallows, whose movements are much too rapid for her to evade. Sometimes a little bald spot may be seen on a cat's head between the ears, caused by swallows picking out the hairs.

ROBIN (*Erythacus rubecula*, Linn.).

The robin's character is a curious mixture of amiable and unamiable qualities ; and while we cannot but love him for his confiding ways, we must admit that he is both selfish and cruel, as well as a perpetual quarreller, whose mellow voice is too often raised in battle-cry. Even the modest little hedge-sparrow comes in for a good deal of persecution from her ungallant relation, especially when she ventures to approach the winter feeding-place.

Young robins, with their first mottled plumage, are often exceedingly tame, and may then be very easily petted. We have had several pets, but never for a longer period than two years, after which time they probably fell a prey to some feline wanderer. Twice have I had them so tame as to fly to my finger and pick from it a little piece of butter, of which they soon became remarkably fond. During the warm summer months, when the windows of the house had been left open, the condition of the butter-pats sometimes showed that the birds had found their way thither and helped themselves.

It is a remarkable fact, which I have repeatedly confirmed by observation, that these birds seem to maintain among themselves

a sort of territorial right. In a garden where robins are common, a particular corner will generally be found in possession of an individual bird, which maintains its right against all comers. The presiding robin will generally be found in or near his own corner, from which any intruder is at once expelled. Two of our pets held despotic sway over adjoining territories. One of these was a robin which in the course of his numerous quarrels had had the misfortune to lose an eye. I used often to dig worms near the boundary of the rival kingdoms, and try to tempt the despots into each other's domain, with the result that war was instantly declared. When assuming the offensive or defensive, the one-eyed robin had a very sinister aspect; and the excess of military ardour, to which his accident had most probably been due, seemed in no sense to have been diminished by the mishap.

Of this one-eyed robin I have a strange tale to tell. One afternoon he was seen outside the kitchen door, at some distance from his territory, and in a very sorry plight, being scarcely able to fly. He shuffled along the paved court into the stable, and, when brought out, retreated beneath the kitchen stove. One of his legs was found to be badly injured; and as he would certainly have fallen an easy prey to the first passing cat, we decided to act the part of the good Samaritan. We dressed the bird's leg with oil, and resolved to keep him in the house all night. Having recovered a little, he seemed much alarmed at his unusual surroundings, and flew through the house from kitchen to parlour, where he rested on a curtain-rod above the window. He afterwards made his way back to the kitchen, where he finally settled on an empty jelly-mug on one of the top shelves. He seemed to find this a comfortable roosting-place, and remained there during the night. Next morning, when the door was opened, he went out, and a few minutes later was found *once* more in his old territory in the garden. We feared that we had seen the last of him, as he was still in too weak a state to be able to defend himself. To our great surprise, however, in the course of the evening he re-appeared at the kitchen door and voluntarily resumed his old perch on the jelly-mug. For about four weeks he continued to go out and in several times every day, returning at night to his favourite roosting-place in the kitchen. Sometimes, after performing his ablutions, he arrived with his plumage

in a very wet condition, and sat dressing his feathers until they had become quite dry again. He seemed to know all the members of the household (who, of course, paid him a good deal of attention), and to recognise them as benefactors; but on one occasion he showed much alarm when some workmen had occasion to pass through the kitchen, and did not recover his composure until they had taken their departure. After the third week we noticed that he was becoming weak and listless, and inclined to remain longer on his perch than formerly. One day he went out as usual, but did not return; and next morning we found on the walk, near his favourite corner of the garden, a few feathers and two legs, one of the latter showing unmistakably, by its peculiarly deformed condition, that it had once belonged to our little friend.

BLUE TITMOUSE (*Parus cæruleus*, Linn.).

In a recess at the head of our avenue a letter-box is fixed, which is not much used except in summer. This box was a favourite nesting-place of the blue-tit; and on account of the attention it received from message-boys, who once or twice tampered with the lock and fastenings of the box, we had its mouth closed by a metal drop-slide. Sometimes the boys prop up the slide with a little piece of twig, which we generally discover and remove before the birds have been able to build their nest inside the box. On one occasion, however, the slide had been allowed to remain open, a nest was built, and the young birds were hatched and fully fledged before their existence became known to us. The little birds were extremely pretty in their fresh bright plumage. I placed the nest and young birds in a biscuit-box, in one end of which a round hole had been cut; and the box was fastened to the garden wall, quite near where the nest had been built, but out of sight of the message-boys. In a few minutes the parent birds entered the garden in search of their young family, whose chirping in reply to the parental call was no doubt audible. The birds seemed at first to be somewhat perplexed by the box, but after examining it for a moment or two, they discovered the hole and entered. I watched, with much amusement, their frequent visits to the box, and the rapidity with which they went in and out at the narrow opening. In a couple of days the young birds had taken their flight.

Sometimes we attach a few pieces of fat to a string, and fasten it to nails in the wall, so as to stretch it across an angle of the back-court. The titmice are very fond of fat, and often visit the suspended pieces. Seizing one of them by their feet, much after the manner of a parrot, they hang head downward and swing to and fro as they nibble away at the prized morsel. These acrobatic performances are highly amusing, and are repeated at frequent intervals until the supply of fat has been exhausted.

BLACKBIRD (*Turdus merula*, Linn.).

Although we should be sorry to miss the mellow note of this bird from the morning and evening chorus of feathered songsters, or dispense with its services in keeping worm and grub life within reasonable bounds, yet we cannot acquit it of the charge of being one of the most destructive of our garden visitors. Before the fruit has fairly ripened, it begins its career of depredation, which is maintained as long as there is anything left to be stolen. Apples, pears, plums, cherries, gooseberries, and strawberries, are all eagerly devoured wherever left unprotected by the net. Fully 90 per cent. of the stolen fruit is taken by the blackbird, and only a small quantity by the song-thrush, while the missel-thrush is a comparatively trifling depredator. Another source of annoyance, attributable to the blackbird, arises from its habit of digging for worms and grubs. On the Ayrshire coast, where the soil is sandy, we have to put a good deal of manure into the ground, especially at the roots of rose bushes and in the flower beds. The blackbird digs a hole into the ground until it reaches the manure, which it picks out and scatters in the course of its search for worms and larvæ. Any annuals or other small plants which stand in the way are torn up by the roots or picked to pieces. In one of our flower borders, most of the plants in a row of blue *Lobelia* were repeatedly torn out, and had to be replanted morning after morning.

Two or three summers ago I occasionally noticed a young hen blackbird feeding in one of the garden borders. As she seemed less timid than usual, I often used to feed her with crumbs, and sometimes dug up worms for her. As soon as she discovered that I could command an unfailing supply of worms, she became remarkably tame. Every forenoon she used to follow me to the potato-ground, and stand at a distance of two or three yards

while I dug worms, which she gobbled up with great relish. When satisfied, she hopped away to one of the borders, and stood in a somewhat drowsy attitude while the process of digestion went on. Occasionally, after she had retired in this way, I tried to tempt her with fresh worms, which she seemed scarcely able to resist; and once I induced her to eat so many that she could not swallow the last one—a pretty big one, by the way—fully half of which hung from her bill. Under this course of treatment she soon became very stout, and could be distinguished at a glance from any others of her kind. When the nesting-season came round, she disappeared for several months, but reappeared one day in the beginning of winter when the ground had become frozen. I was glad to see that she had not forgotten her former benefactor. She continued with me for a few weeks; but one day I missed her, and supposed that some cat had fared only too well at the expense of my favourite.

ROOK (*Corvus frugilegus*, Linn.).

There has been much controversy as to whether the rook should be regarded as a benefactor or otherwise, and probably a good deal may be said in support of either opinion. Occasionally in summer our garden is visited by these birds, and we were puzzled to account for their appearance there until one was detected rising from the gooseberry bushes with a green berry in his bill.

Three summers ago, when passing along the west end of Hamilton Drive, I saw a rook settle on a building nearly opposite the entrance to Queen Margaret College, and insert its head into a sparrow's nest built in a crevice of some ornamental masonry above a doorway. The bird withdrew its head from the nest, and flew to the trees on the other side of the drive, carrying something in its bill. I watched it settle, and from what I saw of its movements I had no doubt that it was eating, or, at least, mutilating, a young sparrow, which it had taken from the nest. Last summer, during the nesting season, I repeatedly noticed that the appearance of a rook gave rise to a great commotion among the birds which frequent the trees around our garden. Blackbirds, thrushes, missel-thrushes, and sparrows seemed greatly alarmed for the safety of their young, and united in raising a discordant clamour. At such times the missel-thrush seems especially aggressive, and

I have seen a rook pursued and fairly driven away by one of these courageous birds. I once saw a missel-thrush fly full tilt against a rook which was sitting on a branch, and attempt to dislodge it from its perch. We may, accordingly, infer that the rook is a habitual pilferer of the nests of the smaller birds, and that these birds regard him as one of their greatest enemies.

HOUSE SPARROW (*Passer domesticus*, Linn.).

Although it is probable that the house sparrow has been a common bird in Britain from very remote times, its excessive abundance in our own day is, no doubt, attributable to the changes which have gradually taken place in the face of the country. As this bird is much less plentiful in moorland and forest regions than in cultivated districts, we may infer that in prehistoric times, when places now resounding with the "busy hum of men" were wrapped in the solitude of the ancient Caledonian forest and spots now clothed with verdure were as yet but dreary stretches of moor and swamp, the sparrow can scarcely have found life so well worth living as at the present day. The country has flourished, and the sparrow has shared in its prosperity. As in the case of the starling, we may therefore believe that drainage, cultivation, greater abundance of food, a larger supply of suitable nesting-places, and the destruction of weasels, hawks, and other destroyers of game, have together had much influence in increasing the numbers of the sparrow and other small birds.

The fecundity of sparrows is enormous, and it is certain that numerous broods are produced in the course of a single season. Alike in earliest spring and latest autumn, we have seen the fledgelings, fresh from the nest, receiving their food-supplies from the parental bill.

Owing to the inconvenient abundance of sparrows in our garden, and their connection with certain misdemeanours to be afterwards narrated, I resolved, some years ago, to attempt to reduce their numbers. I found it useless to take down their unfinished nests, as the structure was again and again renewed, and if driven from one spot they immediately commenced to build in another. Their pertinacity in this respect was astonishing. From a large vine of *Clematis*, on our garden wall, an unsightly mass of grass and withered stems was removed at least half-a-dozen times, and as

often renewed. Immediately after one nest had been removed and openly cremated, it was aggravating to see the evicted owners commencing to erect another domicile on the site of their old one. I therefore allowed them to proceed with their nests and lay their eggs, and afterwards removed these just before the period of incubation. In this way between 60 and 70 eggs were destroyed in the course of a single season. Old nests, placed in crevices under slates on the roofs of out-houses, were cleared away, and the entrances effectually blocked with stone and lime. In such places the birds appear to use the same nest year after year, and, as in old and insanitary human dwellings, there are often far more actual inhabitants than the nominal proprietors. One such nest was found to be literally swarming with the worm-like larvæ of fleas. It need scarcely be said that in spite of all my efforts the number of sparrows was not perceptibly diminished.

It was amusing to notice that the sparrows soon came to recognise me as a mortal enemy, and my appearance in the garden was the signal for the immediate outburst of a noisy chorus of disapproval. They followed me from place to place and administered a severe scolding, but no other member of our family was similarly received.

The sparrow has been aptly described as a "ruffian in feathers," and anyone who studies his habits will soon be disposed to agree that his character is by no means free from moral taint. Throughout the whole year, but especially at the breeding season, the birds frequently quarrel among themselves. In a moment the quiet of the garden is broken by a noisy tumult. The sparrows flock together and surround the actual combatants, who are generally rival mates contending for the possession of the fair object of their devotion. Each bird seems to try to make more noise than the others; but it is not easy to determine whether such vocal performances are intended to be favourable or otherwise to the nuptial celebration, or whether they are merely party cries intended for the encouragement of one or other of the rival combatants. We fear they are not designed to restore law and order, as the sparrow's code of morals is too notoriously lax, and his love of mischief too deeply seated, for the existence of so praiseworthy a motive. To these "ruffians in feathers" a fight seems to possess as absorbing an interest as it has for the roughs

and loafers of our city pavement, and at the first indication of impending hostilities they crowd together with marvellous rapidity. While battles between rival males are of common occurrence among most birds during the breeding season, sparrow-fights must often arise from other causes than disappointed love, as I have seen a female bird receive a merciless pecking from the bills of her un gallant brethren.

It is in its relations with other birds, however, that the ruffianism of the sparrow is most apparent. At the breeding season it frequently engages in conflict with other species, and even the nests and eggs of the latter are often tampered with. These mischievous ways cannot be easily accounted for. We might, for example, suppose that the birds had incurred the displeasure of the sparrows by selecting, as the site of their nest, some bush which the latter had already determined to appropriate for a like purpose. If such were the case, however, the sparrows would surely adopt retributory measures at once, without waiting till the offending nest had been completed and the eggs laid. In the absence of any evidence to the contrary, we can only regard such doings as the outcome of that state of depravity which our Transatlantic friends term "pure cussedness."

A pair of chaffinches had built in an *Escallonia macrantha* bush in front of our house, and close to one of the windows. A few days after the nest was finished, and when several eggs had been laid, an unusual disturbance among the birds was heard. From the window a battle was seen to be in progress between the owners of the nest and some sparrows. The conflict may be described as a truly sanguinary one, for the wing of the mother chaffinch was wounded and bleeding. We afterwards examined the nest, and found that it had been much torn and all the eggs broken.

We have all heard of the sparrows which took possession of a swallow's nest, and were entombed alive by the lawful owners of the disputed domicile. Such theftuous occupation of the nests of other birds appears to be a common habit of sparrows, although retribution does not always so speedily overtake the offenders.

A blackbird had built in a yew bush in our garden, and, when the nest was almost finished, it was taken possession of by a pair of sparrows. They filled the nest-cavity with grass-stems, and

proceeded to erect their own dome on the firm foundation laid by the unsuspecting blackbird.

Some of the apple and pear-trees, which are trained along our garden wall, are favourite nesting-places for blackbirds and thrushes. After the nests have been completed and some eggs laid, they are frequently forsaken by the birds, probably, in many cases, through the latter having been captured by some cat in the course of her nocturnal wanderings. On such occasions, however, the cat usually springs on her prey, and the nest is either tilted to one side, or pulled out of shape, or shows other unmistakable signs of having been forcibly vacated by its tenant. On the other hand, the nest often remains apparently intact, but the eggs have little holes picked in them. For a long time I was unable to account for these holes in the eggs. They could scarcely have been caused by mice, as during the night time, when mice roam abroad, the parent bird always remains seated on her nest. From the destruction of the chaffinches' eggs already referred to, and other facts which have since come under my notice, I am inclined to believe that the holes are picked by sparrows. As it is improbable that the latter feed on the eggs of other birds, their destruction of these is apparently the result of wanton jealousy or malicious mischief.

At a meeting of the Society some years ago, it was stated that sparrows are in the habit of picking off the flowers of primroses, probably for the sake of the sweet deposit of nectar at the base of the corolla-tube. This had been repeatedly observed by several of the members who took part in the discussion, and it seems to be also practised by other birds of the finch tribe. In our garden much damage is caused to primroses, especially the rarer and more brightly-coloured varieties, by the flowers being picked off in this way; but while I have never seen sparrows engaged in this work of destruction, I have often observed chaffinches picking off the primrose-flowers. As it is only within recent years that the birds have shown a liking for such floral sweets, the habit is probably an acquired one, common to several members of the finch tribe, and practised in some districts by sparrows, and in others by chaffinches.

**List of Fungi, &c., observed at Kilmahew, Finlaystone,
and West Kilbride.** By Professor THOMAS KING and
D. A. BOYD.

[Read 27th February, 1894.]

ON 30th September and 14th October last, excursions of the Society were made to the estates of Kilmahew, near Cardross, Dumbartonshire, and Finlaystone, near Langbank, Renfrewshire. Owing to the advanced period of the season, it was resolved that attention should be specially directed to the cryptogamic flora of these localities; and lists of the Fungi observed were accordingly made, so far as the species could be identified by us. As both excursions took place on Saturday afternoons, there was not much time available for work before darkness set in. For the same reason, it was found impossible to include in the lists many species of Microfungi which can only be detected after careful and protracted search, or to devote attention to the Mosses and other cryptogams. A few species of Mosses were, however, noted at Kilmahew by Mr. Boyd, whose list is incorporated in this paper.

A large number of Fungi were also collected at West Kilbride, Ayrshire, by Mr. Boyd, and exhibited to the Society at a meeting held on 31st October. Many of these were examined by Professor King and Mr. William Stewart, and 44 species were satisfactorily determined.

On 4th November we visited West Kilbride, and spent about five hours in collecting Fungi. Through the kindness of Mr. Hugh R. G. Craufurd of Auchenames, the proprietor, and Mr. Nicol P. Brown, the tenant, we had obtained permission to examine the woods around Crosbie Castle. Unfortunately, however, we reached Crosbie too late in the afternoon to be able to explore more than a very small area of these woods, which appeared to be unusually rich in Fungi. During the afternoon about 100 species were found, including many of considerable rarity and interest.

The following List is restricted to species actually observed on the occasions referred to. Several of these are additions to the local flora, while others, although previously reported for one or two localities in Clydesdale, are by no means generally distributed:—

MUSCI.*

Dichodontium flavescens, Sm.	Pterygophyllum lucens, Sm.
Dicranella heteromalla, Hedw.	Thuidium tamariscinum, Hedw.
Dicranum scoparium, Linn.	Thamnum alopecurum, Linn.
Didymodon rubellus, B. & S.	Brachythecium rutabulum,
Barbula muralis, Linn.	Linn.
B. unguiculata, Dill.	B. rivulare, B. & S.
B. rigidula, Dicks.	B. populeum, Hedw.
Ceratodon purpureus, Linn.	Eurhynchium myosuroides,
Grimmia apocarpa, Linn.	Linn.
G. pulvinata, Dill.	E. striatum, Schreb.
Rhacomitrium heterostichum,	E. prælongum, Dill.
Hedw.	Rhynchostegium confertum,
Funaria hygrometrica, Linn.	Dicks.
Bryum capillare, Linn.	Rh. ruscifolium, Neck.
Mnium undulatum, Hedw.	Plagiothecium denticulatum,
M. hornum, Linn.	Linn.
M. punctatum, Hedw.	P. undulatum, Linn.
Atrichum undulatum, Linn.	Hypnum cupressiforme, Linn.
Pogonatum aloides, Hedw.	Hylocomium squarrosum, Linn.
Polytrichum formosum, Hedw.	

HEPATICÆ.

Marchantia polymorpha, Linn.	Plagiochila asplenioides, Linn.
Lophocolea bidentata, Linn.	Pellia epiphylla, Linn.
Trichocolea tomentella, Ehrh.	

FUNGI.

- Agaricus (Amanita) muscarius, Linn.—Finlaystone.
 A. (Lepiota) carcharias, Pers.—Kilbride Glen.
 A. (L.) granulatus, Batsch.—Common in all three localities.

* The species of Mosses and Hepatics included in the List were observed at Kilmahew. No record was preserved of the species seen in the other localities visited.

- A. (*Armillaria*) *melleus*, Fl. Dan.—Finlaystone, West Kilbride.
 A. (*Tricholoma*) *flavobrunneus*, Fr.—West Kilbride.
 A. (*T.*) *saponaceus*, Fr.—Kilmahew.
 A. (*Clitocybe*) *nebularis*, Batsch.—West Kilbride.
 A. (*Cl.*) *infundibuliformis*, Schæff.—West Kilbride.
 A. (*Cl.*) *fragrans*, Sow.—Finlaystone.
 A. (*Cl.*) *laccatus*, Scop.—Common in all three localities.
 A. (*Collybia*) *butyraceus*, Bull.—In all three localities.
 A. (*C.*) *velutipes*, Curt.—Tarbert Hill (West Kilbride).
 A. (*C.*) *conigenus*, Pers.—Kilbride Glen.
 A. (*Mycena*) *purus*, Pers.—West Kilbride.
 A. (*M.*) *rugosus*, Fr.—Kilmahew, Finlaystone.
 A. (*M.*) *galericulatus*, Scop.—Kilmahew, Finlaystone.
 A. (*M.*) *polygonum*, Bull.—Kilmahew.
 A. (*M.*) *alkalinus*, Fr.—Kilmahew, Finlaystone.
 A. (*M.*) *galopus*, Pers.—Crosbie.
 A. (*M.*) *pterigenus*, Fr.—Kilbride Glen.
 A. (*Omphalia*) *muralis*, Sow.—Finlaystone.
 A. (*O.*) *umbelliferus*, Linn.—Kilbride Glen.
 A. (*Pleurotus*) *corticatus*, Fr.—Finlaystone.
 A. (*P.*) *serotinus*, Schrad.—Crosbie.
 A. (*Pluteus*) *cervinus*, Schæff.—Kilmahew.
 A. (*Clitopilus*) *prunulus*, Scop.—Finlaystone.
 A. (*Nolanea*) *pisciodorus*, Ces.—Kilmahew, Finlaystone.
 A. (*Claudopus*) *variabilis*, Pers.—Amongst decaying hedge-
 cuttings; roadside at Meadowfoot Plantation (West
 Kilbride).
 A. (*Pholiota*) *spectabilis*, Fr.—Finlaystone.
 A. (*Ph.*) *flammans*, Fr.—Kilmahew.
 A. (*Ph.*) *marginatus*, Batsch.—Crosbie.
 A. (*Inocybe*) *obscurus*, Pers.—Finlaystone.
 A. (*I.*) *rimosus*, Bull.—Kilmahew, Finlaystone.
 A. (*I.*) *geophyllus*, Sow.—Kilmahew.
 A. (*Hebeloma*) *crustuliniformis*, Bull.—Kilmahew.
 A. (*Flammula*) *scambus*, Fr.—Finlaystone.
 A. (*Naucoria*) *semi-orbicularis*, Bull.—West Kilbride.
 A. (*Galera*) *tener*, Schæff.—Kilmahew.
 A. (*G.*) *hypnorum*, Batsch.—In all three localities.
 A. (*Crepidotus*) *mollis*, Schæff.—Finlaystone, West Kilbride.

- A. (C.) *calolepis*, Fr.—On dead trunks of *Fraxinus excelsior*;
Stairlie Meadow (West Kilbride).
- A. (Psaliota) *arvensis*, Schæff.—Kilmahew.
- A. (Ps.) *campestris*, Linn.—Finlaystone.
- A. (Stropharia) *æruginosus*, Curt.—In all three localities.
- A. (S.) *stercorarius*, Fr.—West Kilbride.
- A. (Hypholoma) *sublateritius*, Schæff.—Kilmahew, Crosbie.
- A. (H.) *capnoides*, Fr.—Finlaystone.
- A. (H.) *fascicularis*, Huds.—Crosbie.
- A. (H.) *velutinus*, Pers.—Kilbride Glen.
- A. (Psilocybe) *semilanceatus*, Fr.—Finlaystone, Tarbert Hill.
- A. (Ps.) *spadiceus*, Fr.—Kilmahew, Kilbride Glen.
- Coprinus atramentarius* (Bull.) Fr.—Kilbride Glen.
- C. micaceus* (Bull.) Fr.—West Kilbride.
- Cortinarius* (*Myxaciium*) *elatior*, Fr.—Crosbie.
- C.* (*Dermocybe*) *cinnamomeus*, Fr.—Crosbie.
- C.* (*Telamonia*) *iliopodius* (Bull.) Fr.—Kilmahew.
- Paxillus involutus* (Batsch) Fr.—Kilmahew.
- Hygrophorus hypothejus*, Fr.—Meadowfoot Plantation.
- H. pratensis* (Pers.) Fr.—Kilmahew, Tarbert Hill.
- H. virgineus* (Wulf.) Fr.—In all three localities.
- H. coccineus* (Schæff.) Fr.—Finlaystone.
- H. calytræformis*, Berk.—Crosbie Castle.
- H. chlorophanus*, Fr.—West Kilbride.
- H. psittacinus* (Schæff.) Fr.—Kilmahew, Tarbert Hill.
- Lactarius turpis* (Weinm.) Fr.—Finlaystone.
- L. blennius*, Fr.—West Kilbride.
- L. vellereus*, Fr.—Finlaystone, West Kilbride.
- L. deliciosus* (Linn.) Fr.—Kilmahew.
- L. quietus*, Fr.—Kilmahew.
- L. rufus* (Scop.) Fr.—West Kilbride.
- L. glyciosmus*, Fr.—Kilmahew.
- L. mitissimus*, Fr.—Crosbie.
- L. subdulcis* (Bull.) Fr.—Finlaystone, Crosbie.
- Russula nigricans* (Bull.) Fr.—Kilmahew, Crosbie.
- R. delica*, Fr.—Crosbie.
- R. fellea*, Fr.—Kilmahew, Crosbie.
- R. emetica* (Harz.) Fr.—Kilmahew, Finlaystone.
- R. ochroleuca* (Pers.) Fr.—In all three localities.

- R. fragilis* (Pers.) Fr.—Kilmahew, Crosbie.
R. alutacea, Fr.—Kilmahew.
Cantharellus cibarius, Fr.—Crosbie.
Nyctalis parasitica (Bull.) Fr.—Crosbie.
Panus stipticus (Bull.) Fr.—Kilbride Glen.
Boletus luteus, Linn.—Kilmahew.
B. edulis, Bull.—Finlaystone.
Fistulina hepatica (Huds.) Fr.—Kilmahew.
Polyporus brumalis (Pers.) Fr.—Crosbie.
P. squamosus (Huds.) Fr.—Crosbie.
P. intybaceus, Fr.—Finlaystone.
P. cæsius (Schrad.) Fr.—Crosbie.
P. annosus, Fr.—In all three localities.
P. radiatus (Sow.) Fr.—Finlaystone.
P. versicolor (Linn.) Fr.—In all three localities.
P. abietinus (Dicks.) Fr.—Finlaystone, West Kilbride.
P. vaporarius (Pers.) Fr.—In all three localities.
Trametes mollis (Sommerf.) Fr.—Crosbie.*
Merulius tremellosus, Schrad.—Crosbie.
Solenia ochracea, Hoffm.—West Kilbride.
Hydnum repandum, Linn.—Kilbride Glen.
H. rufescens, Pers.—Kilmahew, Finlaystone.
Radulum orbiculare, Fr.—Crosbie.*
Phlebia contorta, Fr.—Crosbie.†
Grandinia granulosa (Pers.) Fr.—In all three localities.
Odontia fimbriata (Pers.) Fr.—Finlaystone, Crosbie.
Kneiffia setigera, Fr.—Crosbie.
Thelephora laciniata (Pers.) Fr.—Crosbie.†
Stereum purpureum, Pers.—Crosbie.
S. hirsutum, Fr.—In all three localities.
S. sanguinolentum, Fr.—Finlaystone, Crosbie.
S. rugosum (Pers.) Fr.—Common in all three localities.
Corticium lividum, Pers.—Finlaystone.
C. incarnatum, Fr.—Tarbert Hill.
Cyphella cernua (Schum.).—In crevices of bark of *Sambucus nigra*; Tarbert Hill.
Clavaria muscoides, Linn.—Tarbert Hill.

* Verified by Rev. Dr. Stevenson. † Verified by Mr. C. B. Plowright.

- C. rugosa*, Bull.—In all three localities.
C. inæqualis, Fl. Dan.—Kilbride Glen.
Calocera viscosa (Pers.) Fr.—In all three localities.
Typhula erythropus (Bolt.) Fr.—Finlaystone.
Pistillaria puberula, Berk.—Finlaystone.
Tremella foliacea, Pers.—Kilmahew.
T. mesenterica, Retz.—Finlaystone, West Kilbride.
T. albida, Huds.—Finlaystone, West Kilbride.
T. tubercularia, Berk.—Kilmahew.
Exidia glandulosa (Bull.) Fr.—Crosbie.
Hirneola auricula-Judæ, Berk.—Kilbride Glen.
Næmatelia encephala (Willd.) Fr.—Crosbie.
Dacrymyces deliquescens (Bull.) Dub.—In all three localities.
D. stillatus, Nees.—Common in all three localities.
Phallus impudicus, Linn.—Finlaystone.
Lycoperdon gemmatum, Fr.—Tarbert Hill.
Scleroderma vulgare, Fr.—Kilmahew, Finlaystone.
Tubulina cylindrica, Bull. (*Licea fragiformis*, Nees).—Kilbride Glen.
Arcyria punicea, Pers.—Finlaystone.
Trichia chrysosperma, Bull.—Finlaystone, West Kilbride.
Mucor (*Spinellus*) *fusiger*, Link.—On rotten agarics; Kilmahew.
Urocystis anemones (Pers.) Winter.—On *Ranunculus repens*; Kilbride Glen.
Protomyces macrosporus, Unger.—On *Ægopodium Podagraria*; common in all three localities.
Puccinia menthæ, Pers.—On *Mentha arvensis*; West Kilbride.
P. poarum, Niels., as *Æcidium compositarum*, Mart., var. *tussilaginis*, Pers.—On *Tussilago Farfara*; Finlaystone.
P. oblongata (Link) Winter, as *Trichobasis oblongata*, Berk.—On *Luzula maxima*; Kilmahew.
P. chrysosplenii, Grev.—On *Chrysosplenium oppositifolium*; Kilbride Glen.
Phragmidium violaceum (Schultz) Winter.—On *Rubus fruticosus*; Tarbert Hill.
Melampsora farinosa (Pers.) Schröt., as *Lecythea caprearum*, Berk.—On *Salix Caprea*; Finlaystone.
M. vacciniorum (Link) Winter, as *Uredo vacciniorum*, Link.—On *Vaccinium Myrtillus*; Kilmahew.

- Helvella crispa*, Fr.—On the ground in woods; Kilmahew, Finlaystone.
- Leotia lubrica*, Pers.—On the ground in woods; Kilmahew, Finlaystone, West Kilbride.
- Leptoglossum viride* (Pers.) Phil.—On the ground in a wood; Kilbride Glen.
- Geoglossum hirsutum*, Pers.—On old pasture; Tarbert Hill.
- Peziza* (*Humaria*) *granulata*, Bull.—On cow-dung; Finlaystone.
- Hymenoscypha* (*Trichoscypha*) *coronata* (Bull.) Phil.—On dead herbaceous stems; Kilbride Glen.
- Helotium citrinum* (Hedw.) Fr.—On fallen branches; Tarbert Hill, &c.
- Mollisia* (*Niptera*) *cinerea* (Batsch) Karst.—On rotten stumps, &c.; Kilmahew, Finlaystone, West Kilbride.
- Lachnea* (*Scutellinia*) *scutellata* (Linn.) Gill.—On rotten stump; Crosbie.
- Lachnella* (*Dasyscypha*) *calycina* (Schum.) var. *Trevelyani*, Cooke.—On dead branches of *Larix europæa*; Kilmahew.
- L.* (*D.*) *nivea* (Hedw.) Phil.—On rotten wood; Crosbie.
- Ombrophila sarcoides* (Jacq.) Karst.—On decaying trunks, &c.; in all three localities.
- Encœlia furfuracea* (Fr.) Karst.—On dead branch of *Alnus glutinosa*; Crosbie.
- Trochila craterium*, Fr.—On dead leaf of *Hedera Helix*; Kilmahew.
- T. lauro-cerasi* (Desm.) Fr.—On fallen leaves of *Prunus Lauro-cerasus*; Kilmahew.
- Stegia ilicis*, Fr.—On fallen leaves of *Ilex Aquifolium*; in all three localities.
- Lophodermium pinastri* (Schrad.) Chev.—On fallen leaves of *Pinus sylvestris*; Kilmahew.
- Cordyceps militaris* (Linn.) Link.—On dead moth-pupa amongst moss; Kilbride Glen.
- C. ophioglossoides*, Tul.—On *Elaphomyces variegatus*; Crosbie.
- Nectria cinnabarina* (Tode) Fr.—On dead branches; Kilmahew, Finlaystone.
- Xylaria hypoxylon* (Linn.) Grev.—On dead stumps; in all three localities.

- Phyllachora podagrariæ* (Roth) Karst.—On *Egopodium Podagraria*; Cardross, Meadowfoot.
- Ph. junci* (Fr.) Fekl.—On *Juncus communis*; Finlaystone.
- Stigmatea robertiani*, Fr.—On *Geranium Robertianum*; Kilbride Glen.
- Rhytisma acerinum* (Pers.) Fr.—On leaves of *Acer Pseudoplatanus*; Kilmahew, Finlaystone.
- Diatrype stigma* (Hoffm.) Fr.—On dead branches of *Cratægus Oxyacantha*, &c.; Kilmahew, Tarbert Hill, &c.
- D. disciformis* (Hoffm.) Fr.—On dead branches of *Fagus sylvatica*; Tarbert Hill.
- Elaphomyces variegatus*, Vitt.—On a dry shady bank; Crosbie.
- Ceuthospora phacidioides*, Grev.—On fallen leaves of *Ilex Aquifolium*; Crosbie.
- Thyrsidium botryosporum*, Mont.—On fallen trunk of *Fagus sylvatica*; Crosbie.
- Asterosporium Hoffmannii*, Kze.—On dead branches of *Fagus sylvatica*; Tarbert Hill.
- Oospora ovalispora* (Berk.) Sacc. & Vogl.—On fallen trunk and decaying stumps of *Fagus sylvatica*; Crosbie.
- Ramularia urticæ*, Ces.—On living leaves of *Urtica dioica*; roadside near Meadowfoot.
- Sepedonium chrysospermum* (Bull.) Fr.—On rotten *Boleti*; Kilmahew.
- Tubercularia vulgaris*, Tode.—On dead branches; Kilmahew, Finlaystone.

On some Entomostraca from Castlemilk, near Rutherglen. By THOMAS SCOTT, F.L.S., Naturalist to the Fishery Board for Scotland.

[Read 28th November, 1893.]

THE little loch from which the Entomostraca now to be recorded were obtained is situated on the hillside above the Ancient and Royal Burgh of Rutherglen, on the estate of Castlemilk, and immediately below the mansion-house of that name. It is fed by a small stream which rises on the Cathkin Hills. The loch is apparently artificial, but judging from its appearance and surroundings, it seems to have been in existence for a considerable period. Whatever may have been its origin or the date of its formation, the loch evidently contains a fairly rich Entomostracan fauna. The material collected by Mr. James Steel, and which he kindly handed over to me for examination, was contained in a small bottle; but although the quantity was small, it has yielded no fewer than eighteen species representing fifteen genera, and comprising five species of Ostracoda, six of Copepoda, and seven of Cladocera. The following is a list of the species obtained:—

THE OSTRACODA.

The Ostracoda, whose outside covering so closely resembles in miniature the shell of the bivalve molluscan shell-fish, are found not only in the sea but more or less frequently in nearly all fresh waters, with the exception, perhaps, of streams and rivers that flow with a rapid current. Their favourite habitats are shallow weedy lakes, ponds, ditches, and such like localities. Some species occur almost everywhere, wherever such localities exist, while others appear to be somewhat erratic in their distribution, and are sometimes obtained in places that differ much in regard to the quality of the water. The particular grouping of species in each locality is, therefore, in itself a fairly interesting study.

The five species of Ostracoda obtained in the material from the loch at Castlemilk are—

Cypria ophthalmica (Jurine).

C. lævis (O. F. Müller).

Erpetocypris reptans (Baird).

Candona acuminata (Fischer).

Limnocythere inopinata (Baird).

With the exception of *Candona acuminata*, these are all moderately common and generally distributed species. *Candona acuminata*, which is comparatively rare, was added to the British fauna only a few years ago, and is fully described and figured in Brady and Norman's excellent *Monograph of the Marine and Fresh-Water Ostracoda of the North Atlantic and of North-Western Europe*. The occurrence of this *Candona* is interesting because of the apparent absence of more common and widely distributed species, e.g. *Candona candida*, &c.

THE COPEPODA.

The species of Copepoda obtained in the material are the following:—

Eurytemora clausii (Hoek).

Cyclops thomasi, Forbes.

C. signatus, Koch.

C. serrulatus, Fischer.

C. fimbriatus, Fischer.

Canthocamptus minutus (Müller).

Eurytemora clausii is of frequent occurrence in the material, and is a very interesting find. It has been recorded from various localities in England, and from the following places in Scotland:— (1) in the Forth, above Queensferry; (2) at the mouth of the Peffer Burn, near Aberlady; (3) in an old brick-field frequently overflowed by the sea, near Dunbar; (4) in pools at the mouth of the River Alness, Ross-shire—all on the East Coast; and (5) on the West Coast, at Cumbræ, Firth of Clyde. At all these places the water is more or less brackish, and I know of only one other record of its occurrence in Britain in a purely fresh-water locality, viz., at Higham Park, Essex, where it was obtained by Mr. D. J. Scourfield, London. Though the occurrence of *Eurytemora clausii* in fresh water is rare in Britain, it seems to be otherwise on the

Continent of Europe. Nordquist obtained it in fresh water in Finland, Dr. Poppe records it from North-West Germany, and De Guerne and Richard from Abbeville. The position of the little loch at Castlemilk is so far from the influence of anything like marine conditions that there can be no doubt as to the water there being perfectly fresh. The fact that this species can live under such varied conditions is of some importance in its bearing on the theory of evolution, and also suggests the question as to whether *Eurytemora clausii* was originally a purely marine or a purely fresh-water species.

Cyclops thomasi occurred sparingly in the material. There is some doubt as to its being specifically distinct from *C. bicuspidatus*, Claus. In Britain it is one of the rarer species of *Cyclops*.

The *Cyclops signatus* recorded here is the form with smooth anterior antennæ, and known as *C. tenuicornis*, Claus. This form is now regarded as the penultimate stage of *C. signatus*, Koch. *Cyclops thomasi* and *C. signatus* have both eighteen-jointed anterior antennæ.

Cyclops serrulatus, which has twelve-jointed anterior antennæ, is a very common and widely distributed species, not only in Britain, but also on the Continent of Europe and in North America.

Cyclops fimbriatus, the anterior antennæ of which are only eight-jointed, is a small but pretty and distinct species. It has a fairly wide distribution, and is recorded by various European and American authors.

Canthocamptus minutus is a comparatively small species, but is not the smallest of the fresh-water Copepoda. It usually frequents the vegetation at the sides and bottom of the water. Spirit-specimens of this and other fresh-water Harpacticidæ have the abdomen usually bent at right angles (or nearly so) to the body, and in this they differ from the Cyclopida.

THE CLADOCERA.

The British Cladocera are nearly all confined to fresh water. The only marine forms hitherto observed belong to three species, and include the well-known *Eradne nordmanni*, which may sometimes be obtained in great numbers with the surface tow-net, and

Podon polyphemoides and *P. intermedius*, which are also sometimes captured in the tow-net with the *Evadne*.

Some beautiful as well as grotesque forms are to be found among the Cladocera. What, for example, can be more beautiful than the delicate structure of *Leptodora* seen through its perfectly transparent covering, or than *Sida crystallina* as it moves gracefully through the water? or what can be more curious than the *Bythotrephes* with its enormously long postabdominal spine, or *Leptorhynchus* with its long strongly-curved beak, or *Holopedium* with its huge dorsal sack-like appendage? And how amusing it is to watch the ungainly movements of *Ilyocryptus* as it struggles to surmount the difficulties in its way—but the pleasures of the study of Natural History are endless.

The species of Cladocera observed in the Castlemilk material are, as previously stated, seven in number, the names of which are—

Bosmina longirostris (Müller).

Ilyocryptus sordidus (Lievin).

Acroperus harpæ, Baird.

Alona quadrangularis (Müller).

Pleuroxus uncinatus, Baird.

Leydigia quadrangularis (Leydig).

Chydorus sphaericus (Müller).

Ilyocryptus has been obtained in several localities in Scotland. I have records of its occurrence in Loch Morar, Inverness-shire; in a little loch in the Island of Mull; in Loch Leven, Kinross-shire; and in Lochend Loch, Edinburgh.

Leydigia appears to be the rarest in Scotland of the seven species from Castlemilk. The only other Scotch record I have for this species is Lochgelly Loch, Fifeshire.

Pleuroxus uncinatus is also a somewhat scarce species, though it is sometimes moderately common where it does occur.

Bosmina longirostris, *Acroperus harpæ*, *Alona quadrangularis*, and *Chydorus sphaericus*, are all more or less common throughout Scotland.

While the material from Castlemilk Loch, as collected by Mr. Steel, has yielded so large a number of species, it is almost certain that if there had been time to have made a more thorough examination of the loch the number of species would have been considerably increased.

In Memoriam.—ROBERT TURNER.

By the death of Mr. Turner, who passed away on Tuesday, 20th March, 1894, after a prolonged illness, the Society has lost one of its most esteemed members.

Robert Turner was born at Wide Close, Strathaven, on Friday, 29th December, 1848. His father, James Turner, and also his grandfather, were carriers between Strathaven and Glasgow. He was an only son, and had one sister who died in childhood of typhoid fever. At an early age he was sent to Crosshill Parish School, Strathaven, where he received his education; but his aptitude for private study rendered his progress in knowledge much more rapid than is usual among country lads of his years and circumstances. This is apparent from his having taught, when only fifteen years old, a rural school at Drumclog. In those days there was no house provided for the use of the teacher, who was accustomed to lodge with the farmers in turn—a circumstance which gained for Mr. Turner many lasting friendships throughout the district. It was not his desire, however, to follow the teaching profession, for in a few years he left it and entered the Custom-House in Glasgow, where he remained for about twenty-eight years. He had attained the position of Assistant-Registrar of Shipping, but failing health compelled him to resign, and it was his intention to retire to his native village, where he had lately purchased a house. His illness, however, made so rapid progress that he only survived the purchase a few months, and never was able to remove from his residence in Westbank Terrace, Hillhead, Glasgow.

The studious habits which marked his earlier years were continued all through life. He was a wide reader, and possessed many and varied accomplishments, while his information on numerous subjects was extensive and reliable. As a linguist, he had not only a good knowledge of ancient classical literature, but was able to read and speak fluently several modern languages, including French and German. It was chiefly in the pursuit of

natural science, however, that his talents found free and congenial scope. He had a critical knowledge of the flowering-plants of the British Isles, and had visited many parts of the country, from Orkney and Shetland in the north, to the Channel Islands in the south, for the purpose of collecting specimens. He was also interested in various departments of cryptogamic botany, especially mycology, and devoted a good deal of attention to the life-history of the Uredineæ, Peronosporæ, and other groups of parasitic microfungi. He was, moreover, an accomplished geologist; and some years ago, during the absence through illness of the lecturer on geology in Anderson's College, Glasgow, the class was carried on successfully by Mr. Turner for several months until the close of the session.

In pursuit of his favourite studies, Mr. Turner had long been a member of several scientific societies. In 1877, his name appears in the list of members of the Glasgow Society of Field Naturalists. On 29th April, 1879, when that institution was merged in the Natural History Society of Glasgow, he became a member of the latter. Since then he has taken a very prominent share in all departments of the Society's work, and how greatly his services in that respect were appreciated has been attested by the frequency of his appointment as an office-bearer. In 1880, and again in 1883, he was elected a member of council; in 1884, a vice-president; in 1887, a member of council; and in 1889, a vice-president—all these appointments being respectively for the full term of three years.

In 1883 he acted as Summer Secretary of the Society. The popularity of his appointment was at once shown by a largely-increased interest in the excursions and meetings, the attendance at which numbered more than double the average of previous sessions. Any who accompanied him to these excursions will remember how greatly the zest of such pleasant country rambles was due to his genial and humorous presence, his keen and intelligent enthusiasm as a botanist, and his readiness at all times to impart information or render assistance. Under his flowing pen, the reports on excursions, as embodied in the minutes and published in the local newspapers, became vivid pictures of field and woodland scenery, of which an example may be given. An excursion to Vaut and Castlecary Glens, which took place on

Saturday, 20th May, 1883, is thus referred to by him:—"The ramble through the glens was a pleasant one, as the party were following in the fresh footsteps of the spring, under trees but newly leaved, among green banks enchased with primrose gold or anemone silver, while larks were singing and soaring overhead, cuckoos calling, and swift swallows darting about. The little celandine still lingered in shady places. The bird-cherry was abundant by the burnside, each bush covered with snowy masses of its beautiful racemes. There was profusion of sweet-cicely, wood-violets, wood-sorrel, wild hyacinths, and red champions. The tuberous comfrey and the wood starwort—both rare plants south of the Tweed—were plentiful here. The mountain-speedwell and the wood-loosestrife were also found. In a damp shady part of Castlecary Glen were found a good many plants of the beautiful and curious Herb-Paris, and several of those gathered had five leaves in each whorl instead of the usual four. The delicate oak-fern, and the bright green beech one, were growing about the same place. The adder's-tongue was got in plenty in a field along the railway between Vaut and Castlecary Glens. In another place the shepherd's-club was seen just above ground, and was easily recognised owing to the great withered stalks of last season still remaining. Various leaf-fungi were noticed on the leaves of the violet, dog-mercury, lady's-mantle, &c."

As a member of the committee appointed to edit the *Proceedings and Transactions* and other publications of the Society, he also rendered important and useful services. These extended over a period of about nine years, and were continued even after the state of his health prevented his attendance at the meetings.

He frequently contributed to the business of the meetings by exhibiting specimens, reading papers, or taking part in the discussion of scientific topics. On such occasions, his remarks were listened to with perhaps more general interest and closer attention than were those of any of his contemporaries in the Society. His first appearance as an exhibitor was on 28th October, 1879, when he submitted a specimen of *Potamogeton Zizii*, Roth, then recently discovered in Cauldshiels Loch, near Melrose, by his friend the late Mr. A. Brotherston.

In 1880 he became a member of the Cryptogamic Society of Scotland. During the autumn of that year, the Society held its

sixth annual conference at Glasgow. Several excursions took place in connection with the conference, and a public exhibition was held in the Coal Exchange Buildings, West Regent Street, at which a very large and interesting collection of fungi and other cryptogamic plants was submitted. The entire arrangements were entrusted to a local committee, with Mr. Turner as secretary, and their success was very largely due to his enthusiasm and energy. Since 1880 he held the appointment of Local Secretary of the Society.

In 1886 he became a prominent member of the Andersonian Naturalists' Society; and was afterwards elected vice-president two years in succession, and president the following two years in succession, the date of the last appointment being 8th April, 1891. He also acted as editor of the *Annals* of the Society. He was a member of the Geological Society of Glasgow, and took an active interest in the local Pen and Pencil Club.

As an author, his papers are notable for their vigorous style and lucid mode of expression. He was perhaps more deeply interested in the biological than in the systematic side of botany; for although he had devoted much attention to the latter, and had formed an extensive herbarium of British plants, he seemed in later years to derive more pleasure from studying the life-history of parasitic and other forms of vegetation than in collecting specimens or recording localities. Owing to the keenness of his sympathies, he was greatly impressed with the beautiful and marvellous in nature. This feeling, which is characteristic alike of the poet and the naturalist, often found expression in his writings. To acute and accurate powers of observation were added a faculty of lucid explanation, and a strongly poetic instinct; these enabled him to present scientific facts in a fresh and attractive form, which never failed to awaken and retain the interest of all who listened to him.

The following is a list of the papers read by him before the various scientific societies with which he was connected:—

Natural History Society of Glasgow—

23rd December, 1879—"Vegetable Parasites and Saprophytes."

11th May, 1880—"The Fertilisation of Plants."

22nd June, 1880—"The British Ferns."

- 31st August, 1880—"Fungi."
 23rd May, 1882—"The Flora of the Edinburgh District."
 29th August, 1882—"Spring Rambles in Sussex."
 30th January, 1883—"The Heterœcism of the Uredines." (Published in the Society's *Proceedings*, vol. v., pp. 293-301.)
 12th June, 1883—"Dr. Robert Morison, a Botanist of Restoration Times."
 30th October, 1883—"The Green Colour of Plants."
 29th January, 1884—"The Mistletoe." (Published in the Society's *Transactions*, 2nd Series, vol. i., pp. 101-116.)
 27th January, 1885—"Thomas Hopkirk of Dalbeth: a sketch of his Life and Botanical Work." (Published in the Society's *Transactions*, 2nd Series, vol. i., pp. 196-262.)
 30th March, 1886—"Pollen."
 24th March, 1888—"The Cadzow Herd of White Cattle." (Published in the Society's *Transactions*, 2nd Series, vol. ii., pp. 222-244.)
 29th May, 1888—"Diatoms."
 28th August, 1888—"The Colours of Flowers."

Andersonian Naturalists' Society—

- 8th November, 1888—"Fossils and Fossilisation."
 10th January, 1889—"Secular Procession of Life."
 3rd February, 1890—"Land Making and Unmaking."
 1st October, 1890—"The Uredineæ and Ustilagineæ."
 2nd December, 1891—"Trees," with illustrations by lime light.
 ——— "Lanarkshire Rambles." (Published in the Society's *Annals* (1893), pp. 1-17.)
 ——— "The Moss-like *Tillandsia*." (Published in the Society's *Annals*, pp. 127-131.)

Cryptogamic Society of Scotland—

- September, 1883—"Heterœcism of Leaf-fungi."

Four illustrated papers, entitled "Vegetable Villains," were communicated by him to *Good Words* for 1883 (pp. 469, 588, 730, 787). One of these was introductory, two were on Fungi, and one on Phanerogamic Parasites and Saprophytes. To the same magazine for 1884 (p. 693), he also contributed an illustrated paper on "The Potato Disease."

In politics he was conservative ; and he was connected with the Park Church, which is ministered to by the Rev. Dr. Donald Macleod, editor of *Good Words*. But Mr. Turner was not the man to obtrude his views political or ecclesiastical ; his large-heartedness carried him above all petty differences and fruitless debates.

He was never married. He lived with his mother, who predeceased him by less than two years ; and when he died at the comparatively early age of forty-five, he left no near relations to mourn his loss, but many friends by whom he had been beloved. In accordance with an oft-expressed desire, his remains were laid beside those of his mother in the old graveyard which overlooks his native village.

In private life he was a pleasant companion as well as a valuable friend. He had much force of character, but was modest and courteous withal. To great conversational powers he added a keen sense of humour. In everything he was sincere and honourable, with a high ideal of right and duty, and he made his life a busy and useful one. Now that he has gone, his work remains to remind us of him ; but we, who have known him long and well, cannot fail to recall his genial presence, or to remember his sterling worth.

Jottings from my Note-Book. By DAVID ROBERTSON,
F.L.S., F.G.S.

SACCULINA CARCINI, Thompson.

[Read 27th December, 1892.]

This parasite infests the abdomen of the common shore crab (*Carcinus mænas*, Linn.), and is very plentiful in Row Bay, in 12 to 14 fathoms, where the bottom consists of black stinking mud. It is also not uncommon in some parts of the adjoining Gareloch, in 20 to 23 fathoms. On several occasions, when dredging in the yacht *Medusa*, particularly in Row Bay, a short distance above the anchorage of the old training ship, it was usual to bring up one or more specimens of *C. mænas* in each haul, and nearly every one was infested with the parasite. Captain Turbyne, of the *Medusa*, tells me that during several years' dredging in the Firth of Clyde and West of Scotland he has rarely seen the parasite unless at the two places referred to. Can it be that the foul state of the sea-bottom is favourable to the production of these parasites? We can scarcely say that these particular localities are the special home of the crab. The parasite could not, but the crab could, if so inclined, leave the place and go to another more congenial to its habits. It does not seem, however, to avail itself of this power, yet neither the parasite nor the host appears to suffer from the choice of locality, as both have the appearance of living under favourable circumstances. It is possible that the parasite may thrive best on a host which feeds on such unclean fare as is to be found in the localities referred to.

AMPHITHOE PODOCEROIDES, Rathke, AND PODOCERUS PULCHELLUS,
Milne Edwards.

[Read 27th March, 1893.]

Amphithoe podoceroïdes has long been known to me to inhabit tubes under stones and in the air-vessels of *Fucus nodosus*. There are generally two (a male and a female) in each tube under the stones, as well as in the air-vessels. The space occupied by the tube in the air-vessel is short, and has much of the appearance of a nest, being completely lined with a glutinous membrane. I have never found the young in these nest-cavities, but most likely they may occur there at some season of the year, where they can be under the protection of their parents, and remain well-sheltered from their enemies. That the amphipods do use these enclosures for shelter is evident from their unwillingness to leave their concealment when means are used to remove them; and when the irritation is withdrawn while they are half-out, they immediately dart back again. They even do so, if not greatly alarmed, when wholly outside the tube.

Lately I had an opportunity of examining some newly-gathered fronds of *Laminaria bulbosa*, which were brought under my notice by Mr. George Brebner, who is at present engaged at the Millport Marine Station in investigating the Algæ of the Firth of Clyde. On examining some abrasions on the stalks of the plant, I found that most of them contained the amphipod *Amphithoe podoceroïdes*, while others contained *Podocerus pulchellus*, the former species, however, being much more frequent. The hollows were sunk in the stalk to a depth corresponding with the thickness of the animals themselves when lying on their side. The excavations, which were mostly longer and sometimes broader than the animals, could not have afforded the latter a protection from their enemies, as they were quite exposed, being nearly level with the surface of the stalk, and easily seen. I have therefore no doubt that they were using the succulent plant as food. If such be the case, it may explain the irregular cutting of the air-vessels of *Fucus nodosus* inhabited by *Amphithoe podoceroïdes*, and most convenient it

would be if the walls of its tenement should supply the animal with food.

These two species may not be the only ones that use the plant in this way. I have found similar but more superficial and widely-spread furrows, both on the stems and the fronds, which were probably produced by others of the amphipod family. The scars of *Helcion pellucidum* are frequently met with on the stems of *Laminaria*, but their shape generally resembles the form of the shell.

Laminaria bulbosa has not come so much under my notice, as the stems are mostly free from algal parasites, whereas those of *Laminaria digitata* are often well-covered with various kinds of sea-weeds. I have never observed these furrows on the latter plant, which may not be so agreeable to the taste of the amphipods as are the stems of *Laminaria bulbosa*.

BUCCINUM UNDATUM, Linn.

[Read. 20th June, 1893.]

The egg-cases of this species may sometimes be found attached to stones at or near low water, and are not unfrequently cast ashore by the tide. They usually occur in masses or lumps about the size of a hen's egg, round on the top, with a flat base of attachment. Each of the cells composing the lump is a little larger than a full-sized garden-pea, and they very much resemble the combs formed by the wild bee (*Bombus muscorum*). At the shore it is not unusual to meet with two or three of these single lumps of cells attached together so as to form a still larger cluster, one of the lumps being generally larger than the shell of the adult animal itself.

The very large cluster under notice was taken in the trawl between Millport and Little Cumbrae, in 20 fathoms of water. When we compare the animal with the lumps of egg-cases, we may find it difficult to believe that more than two or three of these compound clusters can be the product of a single *Buccinum*; but when we come to twenty or thirty lumps clustered together, we are forced to conclude, in the absence of other proof, that each

cluster in the group has been produced by a different individual. This view appears the more likely from the fact that all the eggs in the large mass appear to be in the same state of development. Had the eggs been produced by one individual, we might reasonably have concluded, from their great amount, that they could only have been deposited at considerable intervals, and that their contents would consequently show different stages of development.

To account for such an association, it would appear that there must be some mutual impulse which leads the different individuals to deposit their eggs at or about the same time and in the same place. Their powerful sense of smell would no doubt enable them to come from greater or less distances and assemble at any particular point, either in search of prey or to deposit their ova.

The great sense of smell possessed by these animals is well-known to the fishermen, who capture them in large quantities for bait. They are taken by depositing some dead matter in creels or wicker pots, and dropping the latter down in fifteen or twenty fathoms of water on ground known to be frequented by the *Buccinum*. I have seen the wicker pots brought up full of these mollusks, and with many more hanging to the outside. When dredging over considerable stretches of the sea-bottom, it is only occasionally that one or two specimens of this shell are found in the dredge, showing that they are by no means abundant in any one place. It is therefore obvious that to congregate in sufficient numbers to fill the fishermen's creel, some of them must have come from considerable distances.

I may remark that the common *Buccinum undatum* of our district is much more a deep-water than a littoral species; and there are therefore few opportunities of observing these large masses of ova, or studying the habits of the animal in its natural haunts.

ANCEUS MAXILLARIS, Montagu.

[Read 22nd September, 1893.]

Some time ago I brought under the notice of this Society an instance of the occurrence of an associated group of isopods, con-

sisting of one male and two females. In that case the copartnership was somewhat doubtful, as were also their specific relations, but in the following instance there can be no such doubt.

Six females and one male of *Anceus maxillaris* were found enclosed in the small cavity between the hinging portions of the two valves of an old dead shell of *Pecten maximus*, dredged in 12 fathoms water, Firth of Clyde. With one exception, the females were full of ova. As there can be little doubt that they were living harmoniously and in apparent unity, it seems likely that this arrangement had been entered upon by common consent. Whether the male enticed the females into his retreat, or the latter selected their dwelling-place, or the meeting between the male and six females was only accidental, are problems which, although interesting, may be difficult to solve.

The male is robust and powerful in comparison to the female, while his pair of formidable mandibles are well-fitted to rule or defend those under his care.

The most remarkable stage in the life-history of *Anceus maxillaris* is referred to by Spence Bate and Westwood. In their *British Sessile-eyed Crustacea*, vol. ii., page 181, they state that powerful as the mandibles seem to be, they are useless in assisting to procure food, and that he is only provided with them in the adult state, as after that time both male and female change their oral organs with the final or adult moult, and then they appear to have neither mouth, stomach, nor alimentary canal. At this stage they complete the end of their existence by perpetuating their kind.

AGLAOPHENIA MYRIOPHYLLUM, Linn.

[Read 23rd February, 1894.]

The specimen exhibited to the Society was taken by a fisherman on his long line off Cumbrae in 12 fathoms, attached to a valve of *Pecten opercularis*. It is a handsome species at all stages of growth, and not likely to be mistaken for any other. Hincks, in his *British Hydrozoa*, vol. ii., p. 290, says that it attains a height of from 6 to 12 inches, and, in luxuriant specimens, 18 inches. It is a deep-water species and considered rare.

This specimen, which measures 26 inches, is remarkable for its great length, and its branching differs in some respects from the normal form. Hincks states that the ramification of *A. myriophyllum* is very slight and simple, seldom passing beyond a single division of the shoot which generally takes place not far from the base. In this case the first branch is far from the base, and it divides again into two long branches.

Although the species is rare, it is occasionally met with in the Firth of Clyde, and particularly off Fairland Point, Cumbræ, where it occurs on muddy-stony ground at a depth of from 20 to 23 fathoms. The specimens from the Clyde sea-area that have come under my notice frequently exceed 12 inches in length. According to Dr. Johnson, in his *British Hydrozoa*, the 18-inch specimens referred to above were taken by Landsborough at Lamlash.

The Cirripede *Scalpellum vulgare*, attached to a shoot on the right-hand side of the specimen above referred to, is frequently met with on the stems of *Antennularia ramosa*.

Reports on Excursions.

EGLINTON, 4th June, 1892.—A large patch of *Asarum europæum*, Linn., measuring 9 feet 6 inches in diameter, was observed in the policies near the gardens.

The following measurements of large trees were made:—

- I.—Great Maple (*Acer Pseudo-platanus*); girth 10 ft. 10 in. at 3 ft. 6 in.
- II.—Gean (*Prunus Avium*)—
 - (1) In "Tournament Holm," on river-side above Castle; girth 11 ft. 3 in. at 10 ft. Tree blown down.
 - (2) In corner of field, Millburn Park; girth 5 ft. 6½ in. at 4 ft. 6 in.
- III.—Crab (*Pyrus Malus*), on side of "Pyet Bog;" girth 7 ft. 4½ in. at 3 ft. Tree decaying.
- IV.—Thorn (*Cratægus Oxyacantha*), in field on right side of road from gas-works to Mains; girth 7 ft. 11 in. at 1 ft.
- V.—Hornbeam (*Carpinus Betulus*)—
 - (1) A tree which divides into three stems; girth 13 ft. 2½ in. at 1 ft.
 - (2) On road from Mains to Castle; girth 8 ft. 0½ in. at 1 ft.
- VI.—Beech (*Fagus sylvatica*)—
 - (1) At gate into "Bullock Park;" girth 17 ft. 7½ in. at 4 ft. 9 in., 33 ft. 6 in. at ground.
 - (2) West of Millburn Gates; girth 17 ft. 6 in. at 3 ft.
 - (3) Near Millburn Gates; girth 15 ft. 5½ in. at 3 ft.
 - (4) Near largest beech (No. 1); girth 13 ft. 10½ in. at 4 ft. 5 in.
 - (5) Near largest beech; girth 13 ft. 7 in. at 4 ft. 6 in.
- VII.—Larch (*Larix europæa*), the largest in policies, near charcoal-house; girth 9 ft. 6 in. at 3 ft. 6 in.
- VIII.—Silver Fir (*Abies pectinata*), only three or four trees of this kind in policies—
 - (1) Girth 11 ft. 1 in. at 5 ft., 12 ft. 7 in. at 2 ft.
 - (2) Girth 7 ft. at 4 ft.

IX.—Cedar (*Cedrus* sp.); girth 9 ft. 10 in. at 2 ft.

X.—Scots Fir (*Pinus sylvestris*)—

(1) Girth 10 ft. 11 in. at 3 ft. 7 in.

(2) North-east of Mains; girth 9 ft. 8 in. at 4 ft.

(3) On road from Mains to Castle; girth 9 ft. 5½ in. at 3 ft.

GARNKIRK, 7th June, 1892.—After examining part of the peat-moss near the railway station, the party proceeded by road to Chryston and Lenzie. Among the plants observed were *Berberis vulgaris*, Linn., *Vaccinium Oxycoccus*, Linn., *Andromeda polifolia*, Linn., *Solanum Dulcamara*, Linn., and *Alopecurus agrestis*, Linn.

HAWKHILL, 18th June, 1892.—Through the kind permission of Mr. John Scott of Hawkhill, C.B., access was obtained to the Glen by way of mansion-house and policies. The day was at first bright, but the sky soon became overcast, and rain fell heavily during the greater part of the afternoon. This interfered very much with the search for plants, and many additional species could have been noted if the weather had proved more favourable. The following is a list of some of the plants observed, those seen in flower or fruit having an asterisk prefixed to the generic name:—

Geranium sylvaticum, L.	Anœtangium compactum, Schl.
*G. lucidum, L.	Dichodontium pellucidum, L.
*Rubus saxatilis, L.	D. flavescens, Sm.
*Saxifraga hypnoides, L.	*Blindia acuta, Hedw.
*Sedum villosum, L.	*Grimmia apocarpa, L., var.
*S. anglicum, Huds.	rivularis, Brid.
Crepis paludosa, Mœnch.	Rhacomitrium lanuginosum,
*Carex pallescens, L.	Hedw.
*Avena pubescens, Huds.	*Ptychomitrium polyphyllum,
*Asplenium Trichomanes, L.	Dicks.
*Cystopteris fragilis, Bernh.	Amphoridium Mougeotii,
Lastræa Oreopteris, Presl.	B. & S.
Andreaea petrophila, Ehrh.	*Bartramia Halleriana, Hedw.
Gymnostomum rupestre,	Breutelia arcuata, Dicks.
Schwg.	*Zieria julacea, Schpr.

- Bryum filiforme, Dicks.
 Mnium serratum, Schrad.
 *Polytrichum formosum, Hedw.
 Fissidens adiantoides, Hedw.
 *Hedwigia ciliata, Dicks.
 *Isothecium myurum, Poll.
 Orthothecium intricatum,
 Hartm.
 *Plagiothecium pulchellum,
 Hedw.
 *P. undulatum, L.
 Hypnum cupressiforme, L., var.
 ericetorum, Bry. Eur.
 *H. molluscum, Hedw.
 H. stellatum, Schreb., var.
 protensum, Brid.
 *Uromyces alchemillæ (Pers.),
 as *Uredo intrusa*, Grev.
 *Puccinia lapsanæ (Schultz), as
Æcidium prenanthis, Pers.
 *P. poarum, Nielsen, as *Æci-*
dium tussilaginis, Pers.
 *P. festucae, Plow., as *Æcidium*
periclymeni, Schum.
 *P. caricis (Schum.), as *Æcidium*
urticæ, DC.
 *P. suaveolens (Pers.), as *Tri-*
chobasis suaveolens, Lév.
 *P. epilobii, DC.
 *Phragmidium fragariastrum, DC.,
 as *Uredo potentillæ*, DC.
 Sphærophoron coralloides, Pers.
 *Cladonia cervicornis, Schær.
 *C. pyxidata, Fr.
 Cladina rangiferina (Hffm.).
 *Stereocaulon coralloides, Fr.
 Usnea barbata (L.).
 Evernia prunastri (L.).
 *Ramalina fraxinea (L.).
 Cetraria aculeata (Schreb.).
 Peltigera canina (L.).
 P. rufescens (Hffm.).
 Parmelia olivacea (L.).
 P. physodes (L.).
 P. perlata (Schr.).
 P. scortea, Ach.
 P. fuliginosa (Dub.).
 *P. conspersa (Ehrh.).
 P. saxatilis (L.).
 P. omphalodes (L.).
 *Squamaria saxicola (Poll.).
 *Placodium murorum (Hffm.).
 *Lecanora atra (Huds.).
 *L. sulphurea (Hffm.).
 *L. parella (L.).
 *L. ferruginea (Huds.).
 Pertusaria dealbata (Ach.).
 *Lecidea decolorans, Flk.

CRAIGNETHAN CASTLE, 6th August, 1892.—During very fine weather, the afternoon was pleasantly spent in examining the castle (the Tillietudlem of Sir Walter Scott) and exploring the glen, where the following plants were noted:—*Hypericum hirsutum*, Linn., *Agrimonia Eupatoria*, Linn., *Conium maculatum*, Linn., *Leontodon hispidus*, Linn., *Campanula latifolia*, Linn., *Erythraea Centaurium*, Pers., *Solanum Dulcamara*, Linn., *Oriyanum vulgare*, Linn., *Calamintha Clinopodium*, Benth., *Melica*

uniflora, Retz., *Festuca pratensis*, Huds., *Bromus asper*, Linn. and *Agropyron caninum*, Beauv.

ASHGROVE AND KERELAW, 17th September, 1892.—The following were among the plants observed at this excursion:—

Potentilla Comarum, Nestl.—Ashgrove Loch.

Arum maculatum, Linn.—Kerelaw.

Hygrophorus conicus (Schæff).—Roadside near Stevenston.

Ustilago longissima (Sow.).—On *Glyceria fluitans*; near Ashgrove Loch.

Puccinia violæ (Schum.).—On *Viola tricolor*; Kerelaw.

P. rubigo-vera (DC.).—As *Trichobasis rubigo-vera*, Lév., on grasses; roadsides near Stevenston.

P. hieracii (Schum.).—On *Hypochaeris radicata*, &c.; roadsides.

P. centaureæ, Mart.—On *Centaurea nigra*; roadsides.

P. valantiæ (Pers.).—On *Galium saxatile*; near Ashgrove Loch.

Phragmidium subcorticatum (Schränk).—On roses; roadsides near Stevenston.

Colosporium sonchi (Pers.).—As *Uredo tussilaginis*, Pers., on *Tussilago Farfara*; roadsides near Stevenston.

C. euphrasiæ (Schum.).—As *Uredo rhinanthacearum*, DC., on *Rhinanthus Crista-galli*, *Bartsia Odontites*, and *Euphrasia officinalis*; roadsides.

Erysiphe Martii, Lév.—On *Trifolium medium*; roadside near Ashgrove Loch.

Peziza (Humaria) granulata, Bull.—On cow-dung; near Ashgrove Loch.

Lachnea (Scutellinia) scutellata (Linn.).—On a fallen trunk; Kerelaw.

Ascobolus furfuraceus, Pers.—On cow-dung; near Ashgrove Loch.

Rhytisma acerinum (Pers.).—On *Acer Pseudo-platanus*; Kerelaw.

BRISBANE, 24th September, 1892.—By the kind permission of Mr. C. T. Brisbane of Brisbane, access was obtained to this picturesquely wooded estate which is situated in the Noddsdale valley, about 1½ miles from Largs. Among the flowering-plants observed were *Viola odorata*, Linn., and *Stellaria nemorum*, Linn.,

the latter of which occurred in considerable abundance. The following species of Fungi were noticed :—

Agaricus (<i>Amanita</i>) <i>rubescens</i> , Pers.	<i>Cantharellus cibarius</i> , Fr.
A. (<i>Armillaria</i>) <i>melleus</i> , Fl. Dan.	<i>Boletus luteus</i> , Linn.
A. (<i>Clitocybe</i>) <i>fragrans</i> , Sow.	<i>B. scaber</i> , Fr.
A. (C.) <i>laccatus</i> , Scop.	<i>Polyporus adustus</i> , Willd.
A. (<i>Pholiota</i>) <i>squarrosus</i> , Müll.	<i>P. annosus</i> , Fr.
A. (<i>Inocybe</i>) <i>geophyllus</i> , Sow.	<i>Clavaria rugosa</i> , Bull.
A. (<i>Crepidotus</i>) <i>mollis</i> , Schæff.	<i>Calocera viscosa</i> (Pers.) Fr.
A. (<i>Hypholoma</i>) <i>fascicularis</i> , Huds.	<i>Peronospora nivea</i> , Unger.
<i>Coprinus atramentarius</i> (Bull.) Fr.	<i>Puccinia lapsanæ</i> (Schultz).
<i>C. micaceus</i> (Bull.) Fr.	<i>P. poarum</i> , Nielsen, as <i>Æcidium tussilaginis</i> , Pers.
<i>Cortinarius</i> (<i>Myxacium</i>) <i>elatior</i> , Fr.	<i>Coleosporium sonchi</i> (Pers.).
<i>Hygrophorus chlorophantus</i> , Fr.	<i>Podosphæra oxyacanthæ</i> (DC.) De Bary.
<i>Lactarius blennius</i> , Fr.	<i>Dialonectria sanguinea</i> (Fr.) Sacc.
<i>Russula nigricans</i> (Bull.) Fr.	<i>Xylaria hypoxylon</i> (Linn.) Grev.
<i>R. vesca</i> , Fr.	<i>Stigmatea robertiani</i> , Fr.
<i>R. fellea</i> , Fr.	<i>Septoria stachydis</i> , Rob.
<i>R. emetica</i> (Harz.) Fr.	<i>Oidium erysiphoides</i> , Fr.
	<i>Tubercularia vulgaris</i> , Tode.

ERSKINE, 25th February, 1893.—Through the kindness of Lord Blantyre, permission to visit his fine residential estate of Erskine was courteously granted to the Society. The party consisted of ten, three of whom were provided with photographic apparatus. The day was cold, but calm and pleasant, and a haze slightly obscured the view of the hills on the opposite side of the Clyde, but did not appreciably interfere with the photographing of the trees.

Among the trees measured were the following :—

- (1) Beech (*Fagus sylvatica*), west of mansion-house; measurement of narrowest circumference at average height of 3 ft., 11 ft.

- 6½ in. ; measurement straight round at 3 ft., 11 ft. 8 in.
This tree branches at 4 ft.
- (2) Beech near mansion-house, and on south-east side thereof ; girth at 3 ft., 14 ft. 8½ in. ; at 6 ft., 16 ft. 3½ in.
 - (3) Birch (*Betula alba*) east of mansion-house. This is a very graceful tree, with long pendulous branches. Girth at 3 ft., 7 ft. 2 in. ; at 5 ft. 10 in., 7 ft. 2 in.
 - (4) Scotch Pine (*Pinus sylvestris*), south-west of mansion-house ; girth at 6 ft. 3 in., 9 ft. 1½ in. This tree branches at 14 ft.
 - (5) Sycamore (*Acer Pseudo-platanus*) east of mansion-house. This is a tall fine tree with a splendid bole. Girth at 3 ft. 9 in., 16 ft. 4½ in. ; at 6 ft., 15 ft. 3½ in. ; at 7 ft. 10 in., 15 ft. 4 in. When previously measured on 3rd May, 1890, it girthed 15 ft. 3½ in. at about 6 ft., thus showing no apparent increase in three years.
 - (6) Sweet Chestnut (*Castanea sativa*) east of mansion-house ; girth at 4 ft. 3 in., 14 ft. 8½ in.
 - (7) *Araucaria* in garden, south-west of mansion-house. This is a beautiful tree, about 30 ft. high, and in good condition, the lower branches (with a very slight exception) being quite healthy. Girth at 2 ft., 4 ft. 2½ in. ; at 4 ft., 4 ft. 1½ in.
 - (8) Cedar of Lebanon (*Cedrus Libani*), in garden, south-west of mansion-house ; girth at 1½ ft., 9 ft. 1¾ in.
 - (9) Cedar of Lebanon south-east of house ; girth at ground, 9 ft. 3½ in. ; at 1 ft. 5 in., 9 ft. 2½ in. When previously measured on 3rd May, 1890, this tree measured 9 ft. 1 in., showing an increase of 1½ in. in three years.
 - (10) Walnut (*Juglans regia*) in garden, south of mansion-house ; girth at 2 ft. 7 in., 8 ft. 1½ in. ; at 3 ft., 7 ft. 9¼ in. ; at 4 ft. 6 in., 7 ft. 2½ in.

In an open part of the wood is the "heron-green," where a pair of herons sometimes build. These birds are frequently to be seen on the banks of the River Clyde near Erskine.

From Erskine policies the party proceeded to the "Witches' Oak," near the site of old Bargarran House. This tree measures 18 ft. 9 in. in girth at 1 ft. 3 in. from the ground. At 1½ ft. it divides into six stems, one of the stems again dividing about 2 ft. farther up into two, thus making seven stems altogether. Legend

says that the witches used to dance inside the circle formed by the seven stems.

Bargarran is notorious, not merely for a witches' tree, but for its association with trials in Scotland for witchcraft—that horrible superstition which forms so foul a stain on the ecclesiastical history of our country. The person who pretended to have been tormented was Christian Shaw, 11 years of age, daughter of John Shaw of Bargarran. Three men and four women were condemned to death as guilty of the crime of witchcraft, and six were burned on the Gallowgreen of Paisley on 10th June, 1697, one of the men having committed suicide in prison.

But more honourable associations than these are connected with Christian Shaw and Bargarran, for "having acquired a remarkable dexterity in spinning fine yarn, she conceived the idea of manufacturing it into thread. Lady Blantyre carried a parcel of the thread to Bath, and disposed of it advantageously to some manufacturers of lace, and this was probably the first thread made in Scotland that had crossed the Tweed." About this time, a friend of the family, being in Holland, learned some of the secrets of the thread manufacture which was then carried on to a great extent in that country. This knowledge he communicated on his return to his friends in Bargarran, and they were thus enabled to carry on the manufacture with greater success, until Bargarran thread became extensively known and bore a good price. Eventually the secrets of the trade were divulged to outsiders, and among others to a Mr. Pollock in Paisley, who thereby laid the foundation of the extensive trade with which the name and fortunes of that town are so closely associated.

The site of the old house of Bargarran is about three-eighths of a mile west from the present farm-house of that name. About the same distance to the south is a ridge covered by a wood, which is reputed to produce the best timber (chiefly ash) on the estate. The soil is thin, and the subsoil consists of broken rock. The ridge is evidently caused by two long east and west trap-dykes which cross the river at Rashielee and run out in the bedded trap near Barochan. But they are of much later date than this bedded trap, and apparently of miocene age, or contemporaneous with the great volcanic outflow which built up the plateau of which Ben More in Mull, Staffa, the Giant's Causeway, &c., are the sorely

worn remnants. The wood is called Craigend Wood—a curious instance of the way in which place-names become altered, or get changed from one locality to another. “Craig” means rock, and on part of the ridge the rock is exposed. The farm-house at the end of the ridge is called Craigend, meaning “rock-end.” It has been forgotten that “craig” means rock, and now the wood on the craig or rock is named Craigend Wood, after the farm. Of this process of name-changing, many other local examples might be given.

At North Barr a curious old sun-dial was seen, which bears the date 1679. This venerable time-measurer, on whose new dials the same sun that witnessed the battle of Drumclog, or that of Bothwell Brig, may have cast the first shadow, is placed in the centre of a large fruit garden, which, situated on the low alluvial land of the Clyde, and protected from the north by a high wall, produces a large quantity of the best fruit.

Having crossed the river at Erskine Ferry, the party proceeded to Dalmuir, and returned by rail from thence to the city.

MAULDSLIE, 11th March, 1893.—A previous excursion to Mauldslie took place on 18th August, 1891, when the four members who represented the Society on that occasion were so highly pleased with their visit that they resolved to go back again another day, and arrange to have some of the fine trees photographed. Accordingly, the permission of the proprietor, Sir William Hozier, Bart., having been most courteously granted, the present excursion was fixed. The forenoon was dull, windy, and very unpromising, especially for photographic purposes, which no doubt accounted for only one camera being brought forward. The rain, however, kept off, and although the wind was high in exposed places, comparative calm prevailed in the deep valley of the Clyde in which Mauldslie Castle is situated. The party, 17 in number, travelled by rail to Carluke Station, from which the castle is distant by road about three miles, but in a straight line rather less than two. About three-quarters of a mile from the station, the road reaches a height of 642 feet above sea-level, from which point a descent has to be made to 115 feet on the banks of the river; but the depth of the basin of the Clyde here is better

shown by stating that the summit of the Law of Mauldslic, 675 feet above sea-level, is only $1\frac{1}{16}$ miles distant from the river, where the latter flows at a height of 102 or 103 feet—a difference of fully 570 feet, or an average descent exceeding 1 in 10. The slope on the opposite side of the river is not so steep.

On the way down, it was noticed that the little burns had worn deep channels through the sand and gravel with which the lower part of the side of the valley is covered—relics, probably, of the glacial period with its attendant “drift.” At the bottom of the valley is a detached mound of similar origin, called the Haugh-hill or Ha’-hill, covering several acres, and rising about 60 or 70 feet above the surrounding ground. It is clad with trees, excepting a space at the top where there is an old burial-place containing the remains of (among others) the last two Earls of Hyndford, former proprietors of the estate.

Near this mound is one of the most remarkable trees in the policies, viz., a White Poplar (*Populus alba*) which rises to a height of probably 80 ft., and girths 15 ft. $4\frac{1}{2}$ in. at 3 ft. 6 in. on north side. On 15th August, 1891, the measurement at the same point was 15 ft. 4 in., showing an increase in girth of $\frac{1}{2}$ in. since that date. The spread of branches is as follows: 49 ft. 7 in. to east, 37 ft. to west, trunk 8 ft. = $9\frac{1}{4}$ ft. 7 in.

Nearer the castle is a still larger White Poplar, which measures 18 ft. $2\frac{1}{2}$ in. in girth at the narrowest part of the trunk (2 ft. 6 in. on north side, and 1 ft. 8 in. on south side). On 15th August, 1891, the girth at this point was 18 ft., and the increase since that date has therefore been $2\frac{1}{2}$ in. The first branch, which goes off at about 2 ft. from the ground, is 8 ft. $1\frac{1}{2}$ in. in girth just above its base, and shows an increase of $1\frac{1}{2}$ in. since formerly measured. Above this branch the main stem still maintains the very respectable dimensions of 17 ft. $1\frac{1}{2}$ in. in circumference, and also shows an increase in girth of $1\frac{1}{2}$ in. since measured in 1891. The spread of branches is as follows: 52 ft. to south, 42 ft. 6 in. to north, trunk 7 ft. 9 in. = 102 ft. 3 in. We have not seen any other Poplars equal to these, although there may be one still existing in Kippenross Park which about the year 1860 was reported to be 20 ft. in girth at the ground, and 12 ft. at 45 ft., with a spread of $9\frac{1}{4}$ ft.

Another notable tree, unapproached by any we have yet seen,

is a Gean (*Prunus Avium*) which girths 12 ft. 8 in. at 2 ft. 9 in., showing an increase of $\frac{1}{2}$ in. since formerly measured. The spread of branches is as follows: 33 ft. 6 in. to west, 29 ft. 3 in. to east, trunk 5 ft. 7 in. = 68 ft. 4 in. This tree must be a beautiful object when in blossom, and well worthy of a visit.

Measurements were also taken of the following trees:—

- (1) Elm (*Ulmus montana*) in park; girth 14 ft. 3 in. at 5 ft. 2 in., showing an increase of 2 inches since August, 1891; spread, 33 ft. to west, 44 ft. to east, trunk 8 ft. 9 in. = 85 ft. 9 in.
- (2) Elm near river; girth 13 ft. 2 in. at 4 ft. 3 in. (showing an increase of $\frac{1}{2}$ in. since date of former measurement), 14 ft. 11 in. at ground; spread, 50 ft. to south-west (towards river), 44 ft. to north-east, trunk 4 ft. 4 in. = 98 ft. 4 in.
- (3) Elm in park; girth 9 ft. 6 in. at 5 ft. 3 in., showing increase of 1 in. since date of former measurement.
- (4) Ash (*Fraxinus excelsior*) near river; girth 12 ft. 6 in. at 3 ft., 12 ft. 4 in. at 4 ft. 6 in. (showing increase of $\frac{1}{2}$ in. since former measurement), 12 ft. $2\frac{1}{2}$ in. at 5 ft. 6 in.
- (5) *Sequoia gigantea* near castle; girth 12 ft. $2\frac{1}{2}$ in. at ground, 10 ft. 9 in. at 1 foot, the latter measurement showing an increase of $6\frac{1}{2}$ in. since 15th August, 1891.
- (6) Horse-chestnut (*Æsculus Hippocastanum*) at front of castle; girth 10 ft. $2\frac{1}{2}$ in. at 2 ft. 6 in.
- (7) Beech (*Fagus sylvatica*) to left of road from castle to river; girth 14 ft. 2 in. at 2 ft. 3 in.

These trees, with Scotch Pines and various others which we had not time to visit, are worthy representatives of the old forest of Mauldslie, once almost co-extensive with the Parish of Carluke, and a royal demesne of our early kings down to the time of Robert Bruce by whom it was gradually broken up. After having been in the possession of several families since then, the estate was purchased in 1850 by Mr. James Hozier. The castle, built exactly a century ago, is an elegant structure situated at the verge of the undulating ground which stretches down to the river little more than a quarter of a mile away.

The ravines in this district are called "Gills" (e.g. Fiddler's Gill, Jock's Gill, Ram's Gill, Tod Burn Gill, Stewart's Gill, and Garrion Gill); and this—with such names as Haugh Hill, Garrion

Haugh, Rotten Burn, &c.—seems to indicate that the Norse invaders (who have left us relics of their presence in our names of Campsie Fells, Goatfell, Brodick, Ailsa, Cumbrae, Busbie, Lockerbie, &c.) had settled in *Avondale* and *Clydesdale*, as well as in *Nithsdale* and the Lake Country.

Near the base of the Ha'-hill, at the corner of the garden, on a spot once called *Abbeysteads*, is the site of the old church, the Forest Kirk, in which Wallace was in 1297 chosen Warden of Scotland. The name of *Carluke*, which seems to have been applied to the town or parish about the fourteenth century, is supposed to have been derived from the dedication of the church to St. Luke, but that view is somewhat doubtful. We may at least be certain that the monks of this now almost forgotten abbey carefully cultivated their clearing in Kirk Forest, and it is probable that the modern garden covers the site of the ancient one.

After visiting the garden and hot-houses, the party proceeded to the castle, where they were most hospitably entertained by the instructions of Sir William Hozier. They afterwards walked to Ayr Road Station, on the opposite side of the Clyde valley, and from thence returned by rail to the city.

DOUGALSTON AND BALDERNOCK, 25th March, 1893.—The day was a most charming one, bright and warm, with a very slight breeze at intervals, and, indeed, more suggestive of June than March. Thirty-seven members and friends were present, including three photographers.

Dougalston policies are situated within a mile of the town of Milngavie, and in that portion of the parish of East or New Kilpatrick which at one time formed part of Stirlingshire but has now been transferred to Dumbartonshire. The estate formerly belonged to a family of Grahams of the Montrose line; but it was sold in 1767 to John Glassford, an eminent Glasgow merchant of last century, after whom Glassford Street was named, and in whose mansion of Shawfield Prince Charlie held his court during his flying visit to our city in 1745. It may be of interest to mention that Mr. Glassford is described by Smollett in *Humphrey Clinker*, and that his tombstone may be seen and read from the street at the south-west corner of the Ramshorn (St. David's) Churchyard,

Glasgow. The estate was again sold about 22 years ago, when it was purchased by Robert Ker, merchant in Glasgow, father of the present proprietor Mr. T. R. Ker.

In his note kindly giving permission to visit the grounds, Mr. Ker stated that there are some good beech-trees near the entrance-lodge, but the best one is in the field immediately opposite the front of the house. This is really a fine tree, hardly excelled by any beech we have seen, girthing 15 ft. 6 in. at 6 ft. 8 in., and 16 ft. 11 in. at 4 ft., with a solid bole of 18 ft., about which height it divides into several large branches. One of the heaviest of these is supported by what may be described as a natural bracket or tie, about 18 inches in diameter, joining it to the base of a branch growing in the opposite direction. The tree is over 80 feet in height, and stands at an altitude of about 180 feet above sea-level, in good rich soil, exposed to all quarters, especially the south and south-west. In the *New Statistical Account of Scotland*, this tree is recorded as measuring 16 ft. at 3 ft. One of the beeches measured at the excursion to Eglinton on 4th June, 1892, was 17 ft. 7½ in. in girth at 4 ft. 9 in., but had not so solid a trunk. One at Stair House, measured last autumn, was found to girth 17 ft. 8½ in. at 4 ft. 3 in., and had more of the character of the Dougalston tree. None of these can of course be compared with the beeches at Newbattle and Belton in the Lothians.

Two of the beech-trees referred to, at the entrance-lodge, both measure 13 ft. 5 in., the one at 4 ft. 10 in., and the other at 4 ft. 8 in.

Near the house are two yew-trees, the one on the north being a male, and the other on the south a female. Both trees were in flower. The latter, which is the larger, measured 11 ft. 8 in. at the present surface of the ground, but this has been raised about 2½ ft. within the last four years by debris from the construction of an addition to the house. Formerly a little burn flowed between the house and the tree, and passed under the shadow of its branches, but the water is now carried in pipes and the hollow filled up. At the time mentioned, the last portion of the mansion built in 1707 by John Graham, and enlarged after 1767, was demolished. The present house was erected about 18 or 20 years ago.

In the grounds is an artificial loch, nearly half-a-mile in length, with two islets. It was formerly a little longer; but after it had become nearly choked up with vegetation, the late Mr. Ker caused the western portion to be cleaned out, an embankment formed, and the eastern end filled up. On one of the islets a pair of swans began about a fortnight or three weeks ago to build a nest. Swans have been kept on the loch for a number of years, but leave it every season, going down the burn which flows from the loch to the Allander, and from thence to the Kelvin. The pair referred to have returned for the last two or three seasons, but another pair, which two years ago built on the other islet, have not come back. At the side of the loch, the moss *Climacium dendroides*, W. & M., was found rather abundantly in fruit.

There is also a smaller pond, called the Lady Loch, on the burn which forms the mutual boundary of the parishes of New Kilpatrick and Baldernock, and now also of the counties of Dumbarton and Stirling. Here the kingfisher was observed. A pair of otters built here last year, and Mr. Ker tried to preserve them. They disappeared, however, about the new-year, and although he communicated with the farmers and others in the neighbourhood asking that the animals might not be killed, it has since been ascertained that one of them was shot.

In addition to the trees mentioned, a sweet chestnut and a birch were also measured. An elm, near the eastern extremity of the policies and not visited at this time, measured 13 ft. 4½ in. in girth on 23rd November, 1889. There were formerly many fine trees on this estate, but most of them were cut down prior to the last change of ownership. The present forester, who conducted the party to the various points of interest, stated that the roots of several large spruces and silver-firs had been dug up by him.

A walk through the gardens and greenhouses completed the record for Dougalston, from whence the party proceeded to the churchyard of Baldernock, or "the town on the stream at the knoll," as the Gaelic has been translated. The church, which was erected in 1795, is an old-fashioned building with two outside stairs. One of the tombstones, with skull, hour-glass, and cross-bones, bears date 1688. Here are two fine elms, one measuring

13 ft. 3 in. at 4 ft. 10 in., the other 12 ft. $6\frac{1}{4}$ in. at 3 ft. 6 in., and showing respectively an increase of 3 in. and $2\frac{1}{2}$ in. since measured on 24th March, 1888, exactly five years ago.

On walls in this locality were observed *Erophila vulgaris*, DC., in flower, and last year's stems of *Lepidium Smithii*, Hook., while early flowers of *Ranunculus Ficaria*, Linn., were seen both here and at Dougalston.

Some of the party returned hence to Milngavie, but the greater number proceeded to the "Auld Wives' Lifts" on Craigmaddie Moor.

In several places on the moor, the surface of the sandstone was observed to be beautifully smoothed and grooved, the striae pointing E. 5° S. magnetic. This indicates that the ice-sheet which caused them had come from the vast feeding-ground on the mountains round the head of Loch Lomond, passing down the loch-basin, up the Endrick-Blane valley, through the gap of the Lennox, moving eastward along the face of the Campsie Hills, and bringing with it those West Highland boulders which are found in almost every excavation made in this neighbourhood. Whether the "Lifts" are a result of the ice-sheet or not is a disputed point, as is also the question of their use as a sacrificial altar by the Celtic, or more probably pre-Celtic, inhabitants of this country. Legend affirms that they are Druidical, and that the name of the parish has been derived from Bal-druinich, "the Druids' town." It also attributes their origin, as is indicated by the popular name, to three auld wives or witches. These ancient dames, who represented the neighbouring parishes of Baldernock, Campsie, and Strathblane having entered into an athletic competition as to who should carry the largest stone, are said to have brought these here, planting two on the ground beside each other, and the third and largest on the top.* (Verily there were giants and giantesses in those days!) The stones are composed of the same rock as that of which the surrounding amphitheatre is formed—a white, silicious, pebbly sandstone. Farther to the north-west the pebbles are more abundant, and the rock becomes a conglomerate, more easily broken into gravel for use on paths, &c. No fragments of whin-

* The topmost stone measured, on March 24, 1888, 20 ft. long, 10 ft. 8 in. average width, and 7 ft. 5 in. high; and weighed about 120 tons.

stone have yet been found in it. These circumstances indicate that the river at whose mouth this formation has been deposited, in what is known to geologists as carboniferous limestone times, came from the north-west, probably from an extensive continent of which our Highlands and the older parts of the Hebrides are the much-wasted remnants, and that the trap hills of the Campsie and Kilpatrick ranges were not then exposed to the air.

On the way back to Milngavie, the party visited the ruins of the old castle of Craigmaddie, a tower of unknown antiquity, situated on a cliff ("the rock of the wolf"), and once the seat of the Galbraiths of Bathernock, the possessors of the surrounding barony seven centuries ago and earlier.

On the works at the new reservoir, the deep part of the puddle-trench was inspected. Owing to the rocks being much cracked, probably by the intrusion of the basalt among the sandstone and shale, water flows through them, and the trench had to be excavated to the enormous depth of 180 feet or thereby before an impervious bed of shale could be reached. This hollow is now being filled up with puddle composed of worked clay free from stones, so that no water may leak out of the reservoir.

REDLANDS AND WESTMOUNT, KELVINSIDE, 8th April, 1893.—At Redlands, the party were received by Mr. George Russell, an esteemed member of the Society, who has charge of the very valuable collection of exotics contained in the plant-houses there. Mr. Russell is well known as one of the most experienced orchid-growers in the West of Scotland, and frequent notices have appeared in the leading horticultural papers regarding the rarer and more interesting species so successfully cultivated by him.

On entering the grounds, much interest was taken in a pink-flowered Hawthorn. Sixty-two years ago this tree was growing in Cambridge Street, Glasgow, where the residence of the late Mr. William Mirrlees was situated. It was afterwards transplanted to the grounds adjoining his new house in Sauchiehall Street, where, in 1870, it had attained a height of 40 ft. During that year, the tree was once more transplanted and placed in its present position at Redlands, the residence of Mr. J. B. Mirrlees, where it continues to maintain a vigorous growth.

Amongst numerous interesting plants in the conservatory, the following were noted:—*Sparmannia africana*, *Rhododendron Veitchii*, *Dendrobium nobile*, with its varieties *nobilius* and *Cooksoni*; *D. Dalhousianum*, *D. fimbriatum* v. *oculatum*, *D. Brymerianum*, *D. Wardianum*, *D. crassinode*, *Cymbidium eburneum*, *C. Loweianum*, *Dicksonia squamosa*, and *Cibotium spectabile*.

In the cool orchid-house were observed *Odontoglossum crispum*, *O. Pescatorii*, *O. Rossii*, *O. Cervantesii*, *O. triumphans*, *O. luteum* v. *purpureum*, &c., and a beautiful specimen of *Trichomanes radicans* seemed to thrive admirably in this house. On the walls of a cold-frame were numerous fine plants of *Adiantum Capillus-Veneris* v. *magnificum*.

In the plant-stove, a large specimen of *Gloneria jasminiflora* was noticed, also numerous varieties of *Anthurium* (including *A. Veitchii* with leaves 3 ft. long and 15 in. wide), *Alocasia metallica*, *A. crystallina*, *Nepenthes Hookerii*, *N. intermedia*, *N. Veitchii*, *N. Rafflesiana*, &c. Mr. Russell's instructive remarks on the various plants were much appreciated.

The party then proceeded to Westmount, the residence of Mr. Hugh Steven, where some time was pleasantly spent in examining the contents of the fine range of plant-houses. Among the exotics observed were a specimen of *Monstera deliciosa* bearing three large fruits; *Anthurium Stevensi*, with a very brilliant spathe of large size; an exceptionally fine plant of *Odontoglossum Andersonianum* with 69 blooms; *O. Andersonianum* v. *guttatum*, a natural hybrid of great value; a magnificent specimen of *Dendrobium chrysotoxum* v. *superbum*, with 19 racemes and about 150 rich-yellow blossoms; *D. nobile* v. *album*; a large plant of *Cymbidium Loweianum* with 9 spikes of flowers; and many others of no less interest.

MAINS, 22nd April, 1893.—On their arrival at Milngavie railway station, the party were met by Mr. Ferguson, head-gardener at Mains, who kindly acted as their guide during the afternoon.

The estate of Mains has been in possession of the Douglas family for 500 years, and a portion of their old castle still exists. The modern mansion-house is erected on a portion of the estate which

was formerly known as Balvie, and was acquired by the father of Mr. A. C. Douglas, the present proprietor.

Near the entrance gate to the old castle, and on one side of the road, are several old beeches which formerly were part of an avenue leading to the castle. The kitchen (now converted into a dwelling-house for one of the employes on the estate) and some outhouses are now all that remain of this ancient habitation. By the roadside, in close proximity to the castle, are several very fine great maples (*Acer Pseudo-platanus*). Two of these were measured, and one (to the east) girthed 11 ft. 5½ in. at 4 ft. 8 in. on the side next the road, while the other (to the west) measured 10 ft. 11 in. at 5 ft. 11 in. Another tree of the same kind, on a hillock west of the old castle, girthed 14 ft. 10½ in. at 6 ft. on south side. The stump of a walnut (*Juglans regia*), blown down about four years ago, was pointed out by Mr. Ferguson. In the *New Statistical Account of Scotland*, this tree was reported to measure 11½ ft.

A Scots fir in the Mains Wood was found to measure 8 ft. 2 in. at 6 ft. 4 in. on north side. In the neighbourhood of the mansion-house, the largest beech, situated a short distance north of the house, girthed 12 ft. 8½ in. at 4 ft. 10 in. on west side; while a hornbeam measured 8 ft. 2 in. at 3 ft. 3 in.

DALZELL, 6th May, 1893.—The party, numbering over 20, travelled by rail to Motherwell, and proceeded from thence through the town to Dalzell, the residential estate of Lord Hamilton. On reaching the house they were met by Mr. Angus, gardener, who conducted them over the estate and pointed out the various features of interest.

The house, which attracted considerable attention, is picturesquely situated on the north bank of the Dalzell Glen. It was originally a peel-keep with walls of great thickness, and is supposed to have been built about the year 1450. Several additions have been made to it since that time, the most important of which date from 1650 and 1865. In front of the courtyard stands the cross of the old village of Dalzell. This village stood at one time on the bank of the glen in the neighbourhood of the mansion, but few traces of it now remain. To preserve the cross from injury, it was removed to its present position a number of years ago.

A short distance to the west of the house there is a remarkably fine oak (*Quercus Robur*), girthing 19 ft. 2 in. at 2 ft. 4 in., and 19 ft. at 3 ft. 6 in., both measurements being taken on the south side. The first branch leaves the main trunk at the height of 3 ft. 6 in. on south side.

The old terraced gardens on the banks of the glen, which contain a fine collection of herbaceous plants, were examined with much interest. The retaining walls were covered with a great variety of plants, conspicuous amongst which were *Pyrus japonica*, its bright scarlet flowers making a brilliant display; *Corydalis lutea*, *Arabis alpina*, *Epimedium alpinum*, *Linaria Cymbalaria*, and *Asplenium Trichomanes*. *Geranium nodosum* and *Asarum europæum* were also in flower here, while *Doronicum Pardaliches* was plentiful on the banks of the glen, and *Scolopendrium vulgare* on the rocks beside the waterfall. *Ranunculus auricomus* was observed in flower, near the bridge which crosses the burn below the house.

Having crossed the burn, the party ascended to the top of the bank, from which point the best view of the house and its beautiful surroundings is obtained. The Udder's Gill Wood was afterwards traversed, the road leading to the banks of the River Clyde and entering a fine avenue, composed, for the most part, of beeches and limes. These trees were planted in the year 1721; and it is interesting to know that there is still preserved the letter from the Hamilton of that day to his gardener, instructing him to plant the beeches and limes at the water-side. Several of the largest beeches were measured, and girthed respectively as follows:—(1) 11 ft. 11 in. at 5 ft. 9 in. on south; (2) 12 ft. 7 in. at 5 ft. on north; (3) 13 ft. 8½ in. at 4 ft. 8 in. on north.

A visit to the gardens was the next item on the programme, and here the willow-leaved box-tree (*Lycium barbarum*) was observed in flower. This shrub, which belongs to the Solanaceæ, is a native of Africa and Southern Europe. It was introduced to Britain in 1696, and has now become naturalised in Devonshire and various other parts of the country. Two black poplars, near the gardener's house, were measured, and girthed respectively (1) 12 ft. 6 in. at 5 ft. 3 in. on south, and (2) 12 ft. 2½ in. at 3 ft. 4 in. on south, to 4 ft. on north.

After a visit to the old churchyard of Dalzell, the party once

more retraced their steps up the glen. By the side of the path, a number of yews with remarkably tall straight trunks were noted. The largest of these was measured and found to girth 7 ft. 9½ in. at 5 ft. 6 in. on south-west side.

On the lawn, near the house, the adder's-tongue (*Ophioglossum vulgatum*) occurred plentifully; and a form of *Saxifraga granulata* with double flowers was found on the grassy banks which slope towards the burn.

Mr. Hardy, sub-factor, in granting permission to visit the estate, had also made arrangements for admitting the party to Dalzell House. The majority took advantage of this privilege, and were much interested in the collections of armour, &c., which are very extensive. From the battlements of the old tower, a fine view to the south is obtainable, and the prospect looking down the avenue to the west is also very fine.

The weather throughout the afternoon was clear and bright, adding much to the enjoyment of the Society's visit to this extensive and beautiful estate.

Mr. Peter Ewing acted as conductor.

BOTANIC GARDENS, 9th May, 1893.—Among the trees examined was a yew, grown from a cutting taken from Queen Mary's famous tree at Crookston Castle by the late Mr. James Spreull of Linthouse, formerly City Chamberlain of Glasgow. The cutting was rooted by Mr. Spreull, and retained at Linthouse until 1817, when, on the establishment of the old Botanic Gardens between Sauchiehall Street and Kent Road, it was presented by him to that institution, along with a letter narrating the facts above mentioned. This letter, together with copies of the Glasgow newspapers of the day, a list of the directors of the Botanic Institute, and an engraved plate containing particulars of the history of the tree and date of its transplanting, was enclosed in a metal box and deposited at some depth under the tree. There was also presented, at the same time, an enlarged cast of the "Crookston dollar," struck during the reign of Queen Mary, and bearing on its surface a representation of what is supposed to be the yew-tree, with the figure of a small land-tortoise. These relics were removed in 1841, when the Botanic Gardens were transferred to their present site,

and the box, with its contents, was replaced under the tree, where it now remains.

A large specimen of a fossil tree of the coal formation, presented by the late Mr. Matthew Montgomerie of Kelvinside, was also inspected.

Several timber trees were observed in the Gardens, including oak, birch, beech, hornbeam, and a fine specimen of the weeping ash (*Fraxinus excelsior pendula*) presented to the institution about seventy years ago by Mr. Robert Austin, nurseryman, Glasgow.

The attention of the party was directed to many interesting exotics which are successfully cultivated in the grounds or plant-houses. These included *Grevillea rosmarinifolia*, remarkable for its apetalous flowers; *Leptospermum bullatum*, a pretty myrtaceous plant, and a native of Australia; *Prostanthera lasianthos*, a free-flowering shrubby labiate; and *Acacia melanoxydon*, with curious leaf-like phyllodes and true leaves, the former being distinguishable by having their edges placed in a vertical direction. A result of the singular position of these organs is that trees possessing them afford but little shade, and do not intercept the light to such an extent as is the case with ordinary foliage. Another exotic of considerable botanical interest is the Japanese maiden-hair tree (*Salisburia adiantifolia*). Its straight trunk sometimes attains a height of from 60 to 80 feet, and is crowned with a pyramidal head of deciduous leaves. These are fan-shaped, leathery, notched, and have numerous closely-set forking veins much resembling those of ferns. A male plant of *Ceratozamia mexicana* in flower afforded a good opportunity for observing the peculiar form of its inflorescence. This is cone-shaped, and studded with scales which are provided with two little teeth at their points, and with numerous anthers on their under surface. The mango (*Mangifera indica*) is esteemed the most delicious of Indian fruits. Its seeds not unfrequently possess more than one embryo, and consequently present some curious deviations from the ordinary conditions of germination. Honey berry (*Meliococca bijuga*), and several showy bromeliads with large and handsomely-coloured bracts, were also noticed.

Several plants of considerable economic importance were examined with interest. *Bahmeria nivea*, one of the Urticaceæ with leaves destitute of stinging hairs, is remarkable for yielding

the Rhea fibre, from which is manufactured the beautiful fabric known as "grass cloth," rivalling the best French cambric in softness and fineness of texture. The maté (*Ilex paraguensis*) occupies a place in the domestic economy of South America similar to that of Indian or Chinese tea in our own country. The ebony-stripped tree-fern (*Cyathea medullaris*) contains in the centre of its trunk a soft pulpy medullary substance, which bears some resemblance to sago and is similarly used as a food-product in Australia. The New Zealand flax (*Phormium tenax*) was found by Cook, when he first landed in New Zealand, to be in common use among the natives for making various articles of clothing, string, nets, &c. *Guaiacum officinale* is notable as yielding a hard and heavy wood of a greenish-brown colour, known to turners as "lignum-vitæ," and used by them for manufacturing blocks and pulleys, as well as for various other purposes where hardness is essential and weight not an objection. *Cola acuminata*, a native of tropical Africa, yields the kola-nut of commerce. In Western Africa the trees grow mostly in the vicinity of the coast, and an extensive trade in these nuts is carried on with the natives of the interior. The practice of eating kola extends as far as Fezzan and Tripoli. A small portion of one of these seeds is chewed before each meal, and is supposed to promote digestion, as well as to improve the flavour of anything eaten after it, and even to render half-putrid water drinkable.

The hawthorn, lilac, and broom were observed in blossom, their period of flowering being fully three weeks earlier than it was last year. The following plants were observed in bloom in the herbaceous ground:—*Anemone alpina*, *Trollius europæus*, *T. asiaticus*, *Aquilegia vulgaris*, *Stellaria Holostea*, *S. nemorum*, *Lychnis diurna*, *Geranium phœum*, *G. sylvaticum*, *Lathyrus macrorrhizus*, *Orobus repens*, *Geum rivale*, *Potentilla Salisburgensis*, *Alchemilla alpina*, *A. vulgaris*, *Meum Athamanticum*, *Myrrhis odorata*, *Cherophyllum aromaticum*, *Ægopodium major*, *Astrantia major*, *Dondia Epipactis*, *Valeriana pyrenaica*, *V. dioica*, *Asperula odorata*, *Gnaphalium leontopodium*, *Doronicum Clusii*, *D. Pardalanches*, *Centaurea montana*, *Erica herbacea*, *Armeria alpina*, *Primula vulgaris*, *Vinca major*, *V. minor*, *Phlox canadensis*, *Ph. frondosa*, *Polemonium cœruleum*, *Achusa sempervirens*, *Symphytum tuberosum*, *S. officinale*, *Pulmonaria officinalis*,

Myosotis sylvatica, *Lamium maculatum*, *Polygonum Bistorta*, *Rheum rhabdanthicum*, *Oxyria reniformis*, *Euphorbia Cyparissias*, *Polygonatum vulgare*, *Allium ursinum*, *Scilla nutans*, *Ornithogalum umbellatum*, *Tulipa sylvestris*, *Juncus balticus*, *Luzula campestris*, *L. pilosa*, *L. albida*, *Carex binervis*, *C. muricata*, *C. sylvatica*, *C. stricta*, *C. fœtida*, *C. salina*, *C. strigosa*, *C. pallescens*, *C. atrata*, *C. glauca*, *Festuca ovina*, *Nardus stricta*, *Poa pratensis*, *Melica uniflora*, *Sesleria cœrulea*, *Milium effusum*, *Alopecurus pratensis*, *A. nigricans*, and *Anthoxanthum odoratum*.

EDINBARNET, 20th May, 1893.—Permission to visit the estate having been kindly granted by the proprietor, Mr. Walter Mackenzie, this excursion was arranged jointly with the Old Kilpatrick Natural History and Antiquarian Society, a few members of which joined the party on arrival at Dalmuir Station.

After passing through the villages of Hardgate and Faifley, the party proceeded to the outcrops of sandstone rock inscribed with cup and ring markings, which are situated on sloping ground near the public road at Edinbarnet. These archaic sculpturings, which cover a considerable surface of the rock, are now acknowledged to be among the finest examples in the West of Scotland. Since the Society's last visit to this locality in 1890, several additional groups of markings have been discovered, and the series has been found to be much more extensive than was at first suspected.

Some of the cups and rings more recently exposed still bear the marks of the tools with which they were cut. The inscribed rocks are now surrounded with a stone wall; but it seems probable that the markings will run great risk of being injured, if not altogether obliterated, by the feet of the many visitors to this interesting spot.

Having returned to the public road, the party shortly afterwards entered the policies of Edinbarnet, which, although not very extensive, are possessed of many attractive features. Numerous shrubs were in flower, among which were noted *Berberis vulgaris*, *B. Darwinii*, *Azalea pontica*, *Weigelia rosea*, and various bright-flowered species of *Rhododendron*. The most remarkable tree was a Rowan (*Pyrus Aucuparia*), in the House Park, north-

east of the house, which girthed 11 ft. 4 in. at 2 ft. 6 in. on south side. At a height of about 3 ft. from the ground, this tree divides into three large branches, the girth of the largest being 6 ft. 2 in. at 1 ft. above its base. This is a very fine Rowan, and by far the largest yet observed at any of the Society's excursions. Among other trees measured were the following:—

- (1) Holly (*Ilex Aquifolium*) in House Park, south of house and close to the avenue; girth 9 ft. at 1 ft. 8 in. from ground.
- (2) Holly in House Park, east of house; girth 5 ft. 4 in. at 2 ft. 5 in. from ground on north side.
- (3) Beech (*Fagus sylvatica*); girth 12 ft. 2¼ in. at 3 ft. on north side.
- (4) Wych Elm (*Ulmus montana*); girth 14 ft. 6 in. at 2 ft. on north side.
- (5) Ash (*Fraxinus excelsior*) north of old offices; girth 12 ft. 4½ in. at 3 ft., 11 ft. 6½ in. at 5 ft. 6 in.

The gardens and conservatory were afterwards visited. In the latter, the plants which attracted most attention were some fine specimens of *Passiflora* and *Taxonia*. The long graceful stems of these, which hung from the roof, and their abundant flowers, had together a very fine effect.

The party returned by way of Duntocher to Kilbowie Station, and from thence by rail to the city.

Owing to the absence through illness of Rev. Alexander Whyte, M.A., B.D., B.Sc., F.L.S., Mr. L. Watt acted as conductor.

GARELOCHHEAD, 3rd June, 1893.—Owing to the necessity of leaving the city earlier than usual, the attendance at this excursion was comparatively small, only 13 being present, including two from Greenock and two from Airdrie. Mr. L. Watt acted as conductor.

Passing through the little village, the party went round the head of the loch and proceeded a short distance down the western shore. Here a number of the usual shore plants were found, the most noteworthy being *Scirpus rufus*, Wahlb.

Turning northwards, the route lay along the Arrochar road to the forester's house, near which, at a height of 200 feet above sea-level, ice markings were observed on the exposed portions of the

rock. The finer striæ have been almost obliterated by the weathering of the rock, but the general direction is nearly due north and south, magnetic, pointing almost straight down the Gareloch. They indicate that, in the Ice Age, the glacier which came down the upper part of Loch Long, and was joined nearly opposite this point by that from Loch Goil, was unable to find sufficient accommodation in the lower part of Loch Long, and was forced to cross the col (which is only some 50-60 feet higher than where these markings were seen) and pass over to the Gareloch. The "spit" at Row, which forms the mouth of the loch, and from which the village and parish take their name (*Rudha* = *ru*, a point), is probably the terminal moraine—re-assorted by the tide—of the latest stage of this combined glacier. The Gareloch itself possesses too small a feeding-ground to have produced a large independent glacier. The valley, into which the party now descended, is the only one of any importance opening into the loch. The stream is, omitting the windings, very little over three miles in length from its source on Bein-a-Mhanaich—pronounced "Vannach"—(2,328 ft.) to the head of the Gareloch.

On the heathy moor on the side of the valley were found a few plants of the heart-leaved twayblade (*Listera cordata*), and of *Habenaria albida*, *H. bifolia*, and *H. conopsea*, as well as the following species of sedge:—*Carex binervis*, *C. echinata*, *C. flava*, *C. fulva*, *C. glauca*, *C. pallescens*, *C. panicea*, *C. pulicaris*, and *C. pilulifera*. As showing the early nature of the season, it may be noted that both species of heath (*Erica tetralix* and *E. cinerea*) were found in flower.

On reaching the burn the party proceeded up its bed as far as their time would allow. It has worn a channel down a considerable depth through the slaty rocks. In some places the sides are almost perpendicular, in others gently sloping, but very seldom is the gradient gentle. Here and there they are devoid of vegetation, where a landslip has brought down a mass of debris; but in general they are covered with mosses, ferns, grass, bushes, trees, &c., forming a succession of beautiful scenes. When the stream is high, it must be difficult to get along the foot of the ravine, but, in consequence of the protracted drought, the water was very low, and it almost required the exercise of some ingenuity to get one's feet wet.

Near the turning-point in the excursion a fall was noticed which must be very fine when the stream is swollen after heavy rain; but, in the condition in which it was now seen, the water-worn gateway, up which some of the more adventurous members of the party clambered, was more impressive than the fall of water.

Among the plants observed along the banks of the stream were the tutsan (*Hypericum Androsæmum*), wood crane's-bill (*Geranium sylvaticum*), avens (*Geum intermedium*), stone bramble (*Rubus saxatilis*), starry saxifrage (*Saxifraga stellaris*), yellow mountain saxifrage (*S. aizoides*), hawkweed (*Hieracium murorum* and *H. sparsifolium*), mountain melic-grass (*Melica nutans*), filmy fern (*Hymenophyllum unilaterale*), and the mosses *Splachnum ampullaceum* and *Neckera complanata*.

On the way back to Garelochhead, part of the new West Highland Railway was traversed. The line, which is expected to be ready for traffic next year, will open up a part of the country now almost inaccessible, and bring Lochaber so near us that we shall be able to enjoy a Saturday-to-Monday sojourn at Ben Nevis, or even have a look at it during a single day's excursion, while possibly Ben Vorlich may be attempted on a Saturday afternoon.

A small specimen of the scenery to be witnessed along the line was apparent from the bridge by which our burn is crossed. From it we look down on the tiny thread of water apparently over 100 feet below us, while, to the south, the waters of the loch, almost surrounded by tree-clad heights, gleam in the sunshine. Beyond are the silver line of the Clyde, and in the background the hills above Greenock, dimly seen through the smoke from that town.

Two of the party did not go up the valley, but proceeded down the side of the loch, and took several photographs. Rejoining the others at Garelochhead, they reported that they had seen some fine trees, which induced a deputation to go on to Mambeg to measure two ash trees. The larger and more northerly is on the west side of the road, and girths 14 ft. 8 in. at 4 ft. 9 in. on east side. The other is on the east side of the road, a little nearer Mambeg Pier, and girths 14 ft. 5½ in. at 4 ft. 6 in. on west side.

STEPS, 6th June, 1893.—Unfortunately for the success of this evening excursion, the weather proved very unfavourable. The attendance was therefore very small, and little botanical work could be accomplished. Permission to visit the estate of Cardowan had been kindly granted by Mr. Jeffrey, the proprietor; and accompanied by the gardener, Mr. Reid, the party inspected the gardens and grounds. The only noteworthy plant discovered was the fungus *Agaricus (Volvaria) speciosus*, Fr., not previously recorded for the Clydesdale district. Owing to the continuous rainfall, an intended visit to Johnstone Loch had to be abandoned, and the party proceeded to Garnkirk Station, returning from thence by rail to the city.

GARSCUBE, 13th June, 1893.—Thirteen members of the Society attended this evening excursion, and were favoured with beautiful weather. Mr. John Fleming, who acted as conductor, stated that a pair of otters had frequented the River Kelvin within the Garscube policies, and that kingfishers were also occasionally seen there. A visit was made to the gardens, which are of an antique description, and contain an old sun-dial of curiously complicated design. The wall is covered with numerous varieties of ivy, of which as many as 70 have been known to grow here. During the previous night, a fine specimen of *Cereus grandiflorus*, one of the nocturnal-flowering cacti, had come into bloom, and the party had therefore a favourable opportunity of examining its handsome yellow-white blossoms. Numerous beautifully-formed trees were observed in the policies, and measurements were taken of the following:—

- (1) Wych Elm (*Ulmus montana*) west of house; girth 11 ft. 4½ in. at 3 ft. 2 in. on west.
- (2) Wych Elm north of house; girth 12 ft. 9 in. at 5 ft. 4 in. on north.
- (3) Black Poplar (*Populus nigra*) on river-bank north-east of house; girth 11 ft. 11 in. at 4 ft. 4 in. on side farthest from river.
- (4) Black Poplar on river-bank, farther up than last-mentioned tree; girth 10 ft. 10½ in. at 4 ft. 5 in. on side farthest from river.

LITTLE CUMBRAE, 17th June, 1893.—This excursion was arranged jointly with the Geological Society of Glasgow. Some of the party left town in the morning, and travelled *vid* Fairlie and Millport; but the majority found it more convenient to leave in the afternoon, crossing from Millport to Little Cumbrae in rowing-boats, and landing near the castle. Those who formed the second party had scarcely sufficient time at their disposal for exploring the island; but a number of plants were gathered, of which the following have been noted:—*Glaucium flavum*, Crantz., *Corydalis claviculata*, DC., *Sagina apetala*, Linn., *Radiola linoides*, Gmel., *Geranium sanguineum*, Linn., *Agrimonia Eupatoria*, Linn., *Sedum anglicum*, Huds., *Eupatorium Cannabinum*, Linn., *Samolus Valerandi*, Linn., *Solanum Dulcamara*, Linn., *Lycopus europæus*, Linn., *Scutellaria galericulata*, Linn., *Asplenium marinum*, Linn.

On the cliffs, near the south end of the island, a nest of the peregrine falcon, containing two young birds, was observed by Mr. James Steel.

There are only two rock-masses on the Little Cumbrae, viz., Trap and Sandstone. On the east shore, south of the castle, the sandstone is found outcropping under a thin bed of ash. This separates it from the overlying trap, which has indurated it very much; and it is found to be penetrated by numerous thin joints, which glitter in the sunshine. If continued, it would pass over the trap on which the castle is built; but as the sandstone is never found *above* the trap on the opposite shore at Fairlie and Portincross, a hitch has probably occurred. This hitch is not visible, as the spot where it occurs is covered with gravel or water. The trap is bedded, marking successive flows of lava, and dips to the north-east in the same direction as the sandstone. It is rudely columnar, and in many places very amygdaloidal; the cavities are sometimes empty, and occasionally lengthened out, or with a few crystals, but oftener filled with calcite (which is the prevailing mineral), showing that the trap contains much lime. In the cavities there are also deposits of quartz, which is often beautifully white, and is sometimes banded; it is frequently hollow in the centre, and bristling with quartz crystals. The quartz also fills cracks in the trap. At Gull Point, the southern extremity of the island, the rather scarce mineral Heulandite is common, and occurs

mostly in cracks in the trap. Cluthalite (now termed Analcite) is frequently found, especially in cavities at the south end of the island. A few white Stilbites are sometimes obtained, while Chalcedony and horizontally banded Agates are rarely found. The present dip of the trap-flows is not to be taken as the original. There are many instances of intense glaciation, beautifully seen on the west side of the little island, near the split boulder where the castle stands, and there the striæ, as sharp as on the day when they were made, run parallel with the shore.

At various places the raised beaches are very well marked, being sometimes as sharply defined as on the day when they were laid down. In Forsyth's *Beauties of Scotland*, there are said to be seven caves on the island—we saw four, from 20 to 60 feet in length—hollowed out by the action of the sea, when the land stood lower, or the sea higher than at present. One small boulder of Arran granite was seen on the west side, where it lay on a raised beach. At Shauniwilly Point, the northern extremity of the island, there are two large cairns of stones which are said to have been raised over Norwegian warriors after the Battle of Largs. They were opened about sixty years ago, and found to contain remains of armour, swords, &c. Below the armour, in the same cairns, were discovered some urns of a much more ancient date. There appear to be one or two cairns which have not been opened, and probably a shell-mound not far from them.

The weather was exceedingly fine, and the attendance (including members of the Geological Society) numbered over 30.

Mr. James Steel acted as conductor for the Natural History Society.

WOODSIDE (Paisley), 27th June, 1893.—On the evening of 27th June, the Society visited Woodside, the residence of Mr. Archibald Coats, who had kindly granted permission of access. The party were met at the gate by Mr. Hogg, gardener, and conducted through the extensive range of plant-houses and beautiful fernery for which Woodside is famed. Conspicuous among the many rare and interesting exotics are the filmy-ferns, notably *Trichomanes reniformis*, *T. radicans*, and *T. demissa*, together with several species of *Todea*, all of which are grown to perfection in a special house set apart for their exclusive cultivation.

After inspecting the houses, considerable attention was bestowed upon the collection of hardy plants in the wild rock-garden, the nature of which may best be understood from the names of some of the genera represented in the collection. Among the plants successfully cultivated are species of *Polygonum*, *Gaultheria*, *Erica*, *Rhododendron*, *Azalea*, *Andromeda*, *Menziesia*, *Kalmia*, *Saxifraga*, *Helianthemum*, *Gentiana*, *Linaria*, *Alyssum*, *Hutchinsia*, *Arabis*, *Erinus*, *Trillium*, *Orchis*, *Villarsia*, &c.

Owing to a steady downpour of rain, many were no doubt deterred from leaving the city; and the attendance was consequently very small, the Society being represented by three members from Glasgow, who were joined at Paisley by four friends.

PITCON GLEN, 1st July, 1893.—This excursion, which was numerously attended, took place during very fine weather. On their arrival at Kilbirnie Station, the party proceeded to the churchyard, where they inspected the interesting monument erected in 1594 by Captain Thomas Crawford of Jordanhill, for himself and his wife. Captain Crawford died in January, 1603, and was interred close to the inscribed wall of the monument. He is designed thereon as "Thomas Cravfvr of Iordanhill sext son to Lavrence Cravfvr of Kilbirny." It may be interesting to note that Hugh Crawford of Kilbirnie, eldest brother of Captain Thomas Crawford of Jordanhill, fought in the battle of Langside (13th May, 1568) on the side of Queen Mary. Through the windows of the old church a glimpse was obtained of the elaborate oak carvings with which the Crawford gallery (or "laird's laft") and other parts of the interior of the building are decorated, and which were executed early last century by command of John, first Viscount Garnock.

On leaving the neighbourhood of the church, with its memorials of the Crawfurds, the party next visited the former seat of that ancient family. The ruined Castle of Kilbirnie (locally known as "The Place") is situated on rising ground a short distance west of the town. It consists of two distinct portions, which were built at different periods. The most ancient is in the form of a square tower of considerable height, with massive walls and few windows, while the absence of gun-ports shows that its erection

must have taken place prior to the invention of fire-arms. The other and much more modern portion is placed adjacent and at right angles to the old building. It was erected in 1627 by John Crawford of Kilbirnie, and extensively repaired about the year 1756 by George, third Viscount Garnock (who had also succeeded to the Earldoms of Crawford and Lindsay). During the progress of these repairs, however, the house was accidentally set on fire and burned to the ground.

On the left side of the approach to the castle a large patch of *Senecio saracenicus* was seen, measuring five feet in height, but not yet in flower.

At the entrance to Pitcon Glen, the stream has cut into a thick bed of boulder clay for a distance of from 50 to 60 feet, but a considerable portion still remains to be penetrated. The bed of the stream contains many limestone boulders, but, as there are no outcrops of limestone, either here or further up the burn, these blocks must have come from a limestone outcrop situated more than a mile to the north. Near this spot there is a numerous fleet of boulders, mostly derived from the hill porphyrites, one of which is the largest carried block in the district.

As the party proceeded down the glen, it was observed at one place that the ash beds beneath the Hourat limestone were exposed on the north side of the glen, the top portion of the section being dull red, and the bottom greyish or greenish in colour. Near this, in another section, the ash contains a few volcanic bombs, and, still further down, the stream has cut its channel through the Hourat limestone, forming a beautiful fantastically-sculptured gorge, in which the full thickness of the limestone bed—about 20 feet—can be seen. Here, too, are many limestone caves *in embryo*, from one of which a run of very fine water issues.

The limestone is suddenly cut off by a 27-fathom hitch, which brings down the clayband to this level. Near the junction of the Gowkhouse and Pitcon Burns, a favourable opportunity occurred for inspecting the clayband ironstone seam ($13\frac{1}{2}$ inches thick), which is embedded between thick seams of black shale.

After emerging from the glen, the party ascended to Swinlees Quarry, where the Hourat post of limestone was worked about fifty years ago. The rock shows a somewhat weather-beaten face, on which many fossils are to be seen, especially *Lithodendron*,

Heterophyllia, *Cyathophyllum*, *Alveolites*, &c. This quarry also contains a very fine grained shale, in which are embedded an immense number of Foraminifera and other microscopic organisms in a beautiful state of preservation. Towards the south-west side of the quarry a line of fissure occurs, in which has been deposited a quantity of Barite, both in a massive banded state and occasionally in the form of crystals. Some Carbonate of Copper was also seen along with the Barite in this fissure. On the south-west side of the quarry the limestone is suddenly cut off by a hitch.

Caerwinning Hill, situated close to this quarry, was afterwards ascended for the purpose of inspecting the fortification of pre-historic date which here covers two acres on the hill-top. The ramparts, which on the west side are in three rings, have been much destroyed by the materials being taken for use in building fences. On its east side it is defended by the steep face of the hill, while over the north-east brow a line of rampart is seen to run. The only tradition known to exist is that the Scottish army encamped on the spot prior to the battle of Largs. The hill occupies a commanding situation, with a view of nearly the whole of the Garnock valley, including the towns of Beith, Kilbirnie, Dalry, and Kilwinning. There is a copper mine here which was worked about fifty years ago.

From the old fort, the party enjoyed a pleasant walk, between fertile and fragrant fields, to Dalry, where a patch of *Glyceria aquatica* was examined in what is perhaps its only Ayrshire station.

POLLOK, 4th July, 1893.—On arriving at Pollokshaws railway station, the party were met by Mr. John Boyd, forester to Sir John Maxwell, Bart., and conducted towards the mansion-house by way of Knowehead lodge and the new approach on the right bank of the River Cart. After examining several large wych-elm and other trees, they were conducted through the gardens, which contain an interesting yew (*Taxus baccata*) grown from a cutting taken from Queen Mary's famous tree at Crookston. Some specimens of green hellebore (*Helleborus viridis*) were observed behind the gardens, and an odd-looking beech (*Fagus sylvatica*), with remarkably contorted branches, which grew so near the ground

as to leave the tree very little free bole. A visit was afterwards made to the nursery of young trees, which contains many native and foreign species. Before leaving the grounds, an ash (*Fraxinus excelsior*) was measured and found to girth 11 ft. $10\frac{3}{4}$ in. at 4 ft. 3 in.

BALMAHA, 5th July, 1893.—The following plants were noted at this excursion :—

Nasturtium palustre, DC., *Rubus saxatilis*, Linn., *Lobelia Dortmanna*, Linn., *Scutellaria galericulata*, Linn., *S. minor*, Linn., *Lysimachia vulgaris*, Linn., *Polygonum minus*, Huds., *Eleocharis acicularis*, Sm., and *Carex vesicaria*, Linn.

TROON, 5th August, 1893.—This excursion was arranged jointly with the Geological Society of Glasgow. The party, numbering about 20, arrived at the town about 3.45, and proceeded northwards along the shore in the direction of Irvine. On waste ground, near the town, some interesting ballast plants were observed; and various raised beaches, which were finely seen, were afterwards pointed out by Mr. John Smith, Kilwinning.

In the sandhills, near Irvine, attention was drawn to some very interesting geological and archæological remains. Beds of marine shells, including various arctic species, are raised above sea-level, and extend to the banks of the River Irvine, which has cut through a portion of the deposit. About a hundred species have been gathered by Mr. Smith, and by Mr. Downs, Irvine; and the latter gentleman last winter discovered the remains of a whale in the neighbourhood of these shell-beds.

It is also evident that pre-historic man has had a settlement near this place, as flint implements, beads, fragments of pottery, &c., have been found in considerable numbers. A few of these relics were picked up by several members of the party.

But perhaps the most interesting of these remains was a structure discovered by Mr. Downs during the present year. It is wholly covered by sand, but lies immediately under the surface, and consists of a circular structure, about two feet in diameter and two feet in height, formed of water-worn stones ranging in dimensions from the size of the fist to about double that size, the

summit being hollowed out into a basin-like form. This hollow, when first laid bare, contained fragments of burnt bones, but no indications of fire were noticed on the stones themselves. The sand was removed by Messrs. Downs and Smith, and the structure exposed for inspection; but the sand was afterwards carefully replaced, so as to leave the spot as little noticeable as possible. This precaution has always been attended to when showing the structure to visitors. It is conjectured that the rude building may have been a primitive fire-place of some kind.

Some of the party remained in the neighbourhood of the shore, where numerous flowering-plants and fungi were noted.

The weather was clear, dry, and bright, rendering the excursion a very enjoyable one.

The following is a list of the more interesting plants observed.

Flowering-Plants (Reported by Professor Thomas King and Richard M'Kay):—

<i>Papaver dubium</i> , Linn.	<i>Filago minima</i> , Fr.
<i>Diplotaxis muralis</i> , DC.	<i>Jasione montana</i> , Linn.
<i>Lepidium Draba</i> , Linn.	<i>Campanula rapunculoides</i> , Linn.
<i>Cakile maritima</i> , Scop.	<i>Gentiana campestris</i> , Linn.
<i>Lychnis alba</i> , Mill.	<i>Lycopsis arvensis</i> , Linn.
<i>Sagina maritima</i> , Don.	<i>Convolvulus arvensis</i> , Linn.
<i>Erodium cicutarium</i> , L'Hérit.	<i>Salsola Kali</i> , Linn.
<i>Melilotus officinalis</i> , Linn.	<i>Polygonum Roberti</i> , Loisel.
<i>Trifolium arvense</i> , Linn.	<i>Fagopyrum esculentum</i> , Mœnch.
<i>Anthyllis Vulneraria</i> , Linn.	<i>Salix repens</i> , Linn.
<i>Ornithopus perpusillus</i> , Linn.	<i>Ammophila arundinacea</i> , Host.
<i>Conium maculatum</i> , Linn.	<i>Agropyron junceum</i> , Beauv.
<i>Daucus Carota</i> , Linn.	

The Moss *Dicranella cerviculata*, Hedw., in fruit, was found by Mr. D. A. Boyd on a moist sandy flat between Troon and Barrassie.

Fungi (Reported by Professor King):—

- Agaricus (Amanita) phalloides*, Fr.—A single specimen of the white variety was found growing on the sand above tide-mark, on the shore west of Barrassie Railway Station.
- A. (*Psalliota*) *campestris*, Linn.—Shore pastures near Gailes.

Hygrophorus chlorophanus, Fr.—Sandy ground between Troon and Barrassie.

H. conicus (Scop.).—Sandy pastures between Barrassie and Gales.

Marasmius orades (Bolt.).—Sandy pastures between Barrassie and Irvine.

Lycoperdon pyriforme, Schæff.—Sandy pastures between Barrassie and Irvine.

Microfungi (Reported by D. A. Boyd):—

Tilletia decipiens (Pers.).—In ovaries of *Agrostis vulgaris*, producing the so-called “var. *pumila*”; very abundant on sandy pastures from Barrassie to Irvine.

Entyloma matricariæ, Trail.—On *Matricaria inodora*; Irvine.

Uromyces polygoni (Pers.).—Uredospores and teleospores on *Polygonum aviculare* and *P. Roberti*; Troon to Irvine.

Puccinia galii (Pers.).—Ured. and tel. on *Galium verum*; Troon to Irvine.

P. violæ (Schum.).—Ured. and tel. on *Viola sylvatica*; Troon to Irvine.

P. poarum, Nielsen.—Æcidiospores on *Tussilago Farfara*; Troon, &c.

P. centaureæ (Mart.).—Tel. on *Centaurea nigra*; Troon, &c.

Melampsora lini (Pers.).—Ured. on *Linum catharticum*; near Gales.

Coleosporium sonchi (Pers.).—Ured. on *Tussilago Farfara*; Troon, &c.

C. euphrasiæ (Schum.).—Ured. on *Euphrasia officinalis*; Barrassie, &c.

Peronospora urticae, Lib.—On *Urtica urens*; between Troon Railway Station and the shore. Not previously recorded for Clyde district.

The Lichen *Cetraria aculeata* (Schreb.) was found in abundance on sandy ground near the shore at Barrassie.

MILTON-LOCKHART, 19th August, 1893.—Access was obtained to this estate by the kind permission of Mr. Paterson, the present tenant. A small party journeyed by rail to Carluke, where, on arrival, they were met by the forester, who accompanied them

during the afternoon. After a walk of about two miles, the beautiful policies of Milton-Lockhart were entered. Here a considerable number of fungi were observed, the most noteworthy species being *Agaricus (Lepiota) cristatus*, A. & S.; *A. (Clitocybe) infundibuliformis*, Schæff., var. *membranaceus*, Fl. Dan., and *Boletus laricinus*, Berk. Some time was spent in a search for fungi in the Willow Gill, but only a few common species were seen. A Fir (*Pinus sylvestris*) was measured and found to girth 7 ft. 10 in. at 5 ft.

Continuing the route in the direction of the mansion-house, an Oak on "Mount Pisgah" was measured and found to girth 10 ft. 2½ in. at 4 ft. 10 in. The view from this part of the grounds is particularly extensive, and commands a wide prospect of the Clyde valley. The mansion-house occupies a fine site on the high ground, its position having been selected by Sir Walter Scott, whose son-in-law and biographer (Mr. John Gibson Lockhart) was a half-brother of Mr. William Lockhart, by whom the estate was purchased in 1828.

The gardens were next visited, and many interesting plants were observed in flower. The walls, almost completely covered with roses, Virginian-creeper (*Ampelopsis*), and *Clematis*, formed an attractive frame-work to the bright-coloured masses of flowers in the borders.

Measurements were taken of many trees observed in the policies, including two English Elms (*Ulmus campestris*) reckoned among the largest specimens of their kind seen at any of the Society's excursions. One of these (on the terrace north of the house) girthed 10 ft. 5 in. at 5 ft. 4 in. on north side; while the other (which was situated on Mill-hill) measured 14 ft. 1½ in. at 5 ft. 4 in. on north-west side. Measurements of the following trees were also taken:—

- Horse-chestnut (south-west of House); girth 8 ft. 8 in. at 2 ft. 11 in. on south.
- Common Lime (south-west of House); girth 11 ft. 9 in. at 4 ft. 9 in. on south.
- Large-leaved Lime (eastern tree); girth 11 feet 8½ in. at 3 ft. 5 in. on south.
- Large-leaved Lime (western tree); girth 9 ft. 0½ in. at 4 ft. 8 in. on south,

Robinia pseudo-acacia (near gate-house), 6 ft. 1 in. at 2 ft. 5 in. on south.

The *Robinia* is notable as the finest specimen hitherto observed at any of the Society's excursions.

The party left the grounds by the principal approach, which passes along a handsome bridge across the River Clyde. It is in the ribbed style of the old Bothwell Bridge, with arched gateway, at watch-towers at the northern end.

The road was now followed to Crossford; and a halt was made on the way to measure a fine Oak on the north side of the road, which girthed 14 ft. 8½ in. at 5 ft. on lower side. Passing through the village of Crossford, the way was continued to Tillietudlem Station, from which the party returned to the city.

No detailed record was kept of the plants observed during the excursion, but among the species noted were *Hypericum dubium*, Leers; *Epilobium angustifolium*, Linn; *Senecio viscosus*, Linn; and *Solanum Dulcamara*, Linn.

The weather was very fine, and the excursion was therefore much enjoyed.

MURDOSTOUN, 2nd September, 1893.—This excursion took place during fine weather, and was attended by a party numbering fourteen. Permission to visit the estate was kindly granted to the Society by the proprietor, Mr. R. K. Stewart, whose father, the late Lord-Provost Stewart, was associated with the introduction to Glasgow of the Loch Katrine water-supply.

Mr. Wilson, gardener, was in waiting at Newmains railway station, and conducted the party to the various places of interest on the estate. After leaving the station and passing along the Edinburgh and Ayr road to Bonkle (which has a very pretty situation, and may fairly be described as a model village), the route lay along a road to the left for about a mile until the policies of Murdostoun were entered near the gamekeeper's house. The melancholy-thistle (*Cnicus heterophyllus*) was plentiful in the policies, and many common fungi were observed in the woods, the only noteworthy species being *Agaricus (Lepiota) cristatus*, A. & S.

The policies contain many fine trees, but none of very large size. The following are some of the measurements taken:—

- (1) Great Maple (*Acer Pseudo-platanus*) known as "Cromwell's Tree" (now, unfortunately, in a state of decay, and bearing many large specimens of *Polyporus squamosus*); girth 14 ft. 8 in. at 3 ft. 8 in. on east side.
- (2) Great Maple, east of mansion-house; girth 11 ft. 2 in. at 3 ft. 5 in. on west side.
- (3) Beech (*Fagus sylvatica*) in close proximity to last-mentioned tree; girth 11 ft. 10½ in. at 5 ft. 6 in. on north-west side.
- (4) Beech at side of approach, and east of mansion-house; girth 11 ft. 7 in. at 5 ft. 3 in. on east side.

After walking through the glen and visiting the gardens, the party retraced their steps to Newmains, where the small bindweed (*Convolvulus arvensis*) was observed in flower on the railway-bank near the station.

KILMAHEW, 30th September, 1893.—See page 61.

BLAIRQUHOSH, 7th October, 1893.—This excursion was attended by a numerous party, including several members of the West of Scotland Ramblers' Alliance. Proceeding by rail to Milngavie, and thence by road, the route lay past the print-works and across Clober Moor. Having reached the road to Carbeth-Guthrie, the party then proceeded past Craigallion to Carbeth Farm. From this point, a disused country road was followed to Arklehaven, where the moor was entered for the purpose of visiting the standing stones of Dungoyach.

The group consists of five stones arranged in a row, each about six feet apart. Four of them are composed of West-Highland grit, and the fifth of a chocolate-coloured sandstone. They commemorate the Battle of Mocetauc (the ancient name of Mugdock), which was fought between the Picts and the Angles about 1,000 years ago.

Skirting the shoulder of the Hill of Dungoyach, and passing the farm-steading of that name, the party crossed the Blane Valley Railway and emerged on the road from Glasgow to Aberfoyle at

a point a short distance west of Blairquhosh. Here they were met by Mr. Campbell Murray, factor on the Duntreath estate, who accompanied them to the large trees which are quite a feature of this locality.

The first one visited was an Oak, immediately below Mr. Murray's house. The village smithy formerly stood beneath the spreading branches of this oak. It is a fine tree, and in a vigorous condition, and was found to measure 12 ft. 10 in. at 4 ft. 7 in. on south side, the spread of the branches being 82 ft. 9 in.

The next oak visited was the famous "Meikle Tree," which stands on the opposite side of the road, a short distance east of the former one. It is locally known as the "Trysting-tree," and is mentioned in a charter dated 1493, where it is termed the "Meikle tree of Blairquhosh." It measured 16 ft. 9 in. at 3 ft. 5 in., and 17 ft. 1½ in. at 5 ft. 2 in. It is still in a healthy condition, and every care is taken by Mr. Murray to prevent its sustaining any injury. The spread of its branches, from north to south, measured 80 feet.

A Beech near Duntreath, on the north side of the highway, was afterwards visited. It measured 14 ft. 11 in. at 6 ft., on the side next the road.

Darkness prevented a visit to other fine trees. An Ash within the policies near Duntreath House was found to girth 10 ft. at 5 ft. 4 in. on the side facing the approach.

A return was now made to the city, the majority taking train from Strathblane, and a small party preferring to walk back to Milngavie. The weather was of the most delightful description, and the afternoon's walk through fine hill and woodland scenery was much enjoyed.

FINLAYSTONE, 14th October, 1893.—See page 61.

BLYTHSWOOD, 31st March, 1894.—The party, numbering 15 members and friends, were met by Mr. Methven, gardener, who pointed out the various objects of interest. Owing to the early period of the season, vegetation had made very little progress; but a good deal of attention was devoted to the Conifere, of which there is here a considerable variety. In one of the plant-houses

were some seedlings of the famous Fortingal Yew, which is reputed to be the veteran of European vegetation. Among the other noteworthy objects were numerous large trees, including an *Amelanchier* in the gardens, a very fine Beech in front of the mansion-house, and an *Acer Pseudo-platanus* measuring 13 ft. 9 in. in circumference at 5 ft. 4 in.

ARDGOWAN, 21st April, 1894.—The party, numbering 30, were met at the entrance-lodge by Mr. Lunt, head gardener, who accompanied them during the afternoon. A visit was first made to the gardens, vineries, and greenhouses, which are extensive and kept in fine order. In the *Azalea*-house were some beautiful specimens in abundant flower. By the roadside leading from the garden to the old castle, *Valeriana pyrenaica*, Linn., was observed in bloom. The following were among the trees measured:—

- (1) Great Maple below the old castle ; girth 15 ft. 5½ in.
- (2) Great Maple in the field in front of mansion-house ; girth 13 ft. 4½ in. at 4 ft. 4 in.
- (3) Ash on lawn near old castle ; girth 13 ft. 2 in. at 2 ft. 4 in. on south.
- (4) Evergreen Oak on lawn ; girth 4 ft. 9 in. at 3 ft. 10 in.
- (5) Spanish chestnut in the field in front of mansion-house ; girth 11 ft. 0½ in. at 4 ft. 10 in.
- (6) Spanish chestnut in same field ; girth 12½ ft. 5½ in. at 5 ft. 4 in.

Time did not permit a visit to the heronry, but some interesting information regarding it was communicated by the gamekeeper. At present the herons build only in the wood near the shore. Formerly they also nested on some trees near the home-farm, but most of these trees were blown down during the storm on 28th December, 1879, which is memorable for its destruction of the Tay Bridge. This year the nests number nine or ten, and the young have already been hatched.

On a roadside ditch, between Ardgowan and Gourrock, the fresh-water alga *Batrachospermum moniliforme* was observed.

Proceedings of the Society.

SUMMER SESSION, 1892.

24TH MAY, 1892.

Mr. William Stewart, Vice-President, in the chair.

Mr. Richard M'Kay reported that an excursion had been made to Darnley Glen on 21st inst. The day was fine, and the excursion was much enjoyed by the members present, but no additions were made to the list of plants known to occur in the locality.

An exhibition of microscopic objects took place at the close of the meeting.

21ST JUNE, 1892.

Mr. Peter Ewing in the chair.

Mr. John Renwick reported on an excursion to Eglinton, which took place on 4th inst., and submitted particulars of the measurements of several large trees. (See page 85.)

Professor Thomas King reported on an excursion to Garnkirk and Lenzie, which took place on the evening of 7th inst. (See page 86.)

At the close of the meeting, several microscopic objects were exhibited by Mr. Richard M'Kay and others.

9TH AUGUST, 1892.

Professor Thomas King in the chair.

Mr. Richard M'Kay reported on recent excursions to Bonnybridge, Gartcosh, and Balmaha.

The Chairman reported on an excursion to Craignethan Castle, which took place on 6th inst. (See page 87.)

Mr. Johnston Shearer exhibited specimens of *Nasturtium sylvestre*, R. Br., gathered on the roadside between the town and railway station of Lochwinnoch. He also submitted plants of *Linaria minor*, Desf., which he had found growing plentifully on both sides of the railway at Howwood,

6TH SEPTEMBER, 1892.

Mr. William Stewart, Vice-President, in the chair.

Mr. Thomas Steel, Melbourne, a former member of the Society, exhibited an extensive series of lantern views illustrating the scenery of Australia and islands of the South Pacific, together with photographs of natives belonging to the various aboriginal tribes by which these islands were peopled. He also showed a large number of zoological and botanical specimens from the same region, and various objects connected with the religion, ceremonies, and social life of the native tribes. These were all explained in a very interesting manner.

WINTER SESSION, 1892-93.

27TH SEPTEMBER, 1892.

Mr. R. S. Wishart, M.A., Vice-President, in the chair.

Mr. Frank L. Grant, M.A., 298 St. Vincent Street, was elected an Ordinary Member.

Mr. Richard McKay reported on an excursion made on 17th inst. to Ashgrove Loch and Kerelaw, near Stevenston, and submitted a list of some of the plants observed in these localities. (See page 88.)

Professor Thomas King reported on an excursion to Brisbane, near Largs, which took place on 24th inst., and submitted a list of the Fungi observed in that district. (See page 88.)

Professor King also gave an interesting account of the excursions in connection with the Conference of the Cryptogamic Society of Scotland, recently held at Aberfoyle under the presidentship of Colonel J. S. Stirling of Gargunnoch.

The Chairman exhibited specimens of the following plants from the neighbourhood of Bridge of Earn, Perthshire:—*Corydalis lutea*, DC., *Malva sylvestris*, Linn., *M. rotundifolia*, Linn., *Rosa arvensis*, Huds., *Cornus sanguinea*, Linn., *Scrophularia vernalis*, Linn., *Stachys Betonica*, Benth., *Allium vineale*, Linn., *Deschampsia cæspitosa*, Beauv. (viviparous form), and *Glyceria aquatica*, Sm. (viviparous form).

Mr Johnston Shearer showed specimens of *Vicia tetrasperma*, Mœnch, and *Anagallis cærulea*, Schreb., from Giffnock Quarries.

Professor King submitted specimens of Fungi from the neighbourhood of Loch Ard and Gartmore, which he stated had been gathered at excursions of the Cryptogamic Society of Scotland. These included *Agaricus maculatus*, A. and S., *A. hystrix*, Fr., *Cortinarius armillatus*, Fr., *Hygrophorus calyptreiformis*, B. and Br., *Boletus variegatus*, Sw., *B. luridus*, Schæff., *Polyporus perennis*, Fr., *P. sulphureus*, Fr., *Thelephora luciniata*, Pers., *Chlorosplenium æruginosum*, Fl. Dan., *Peziza leucoloma*, Hedw., and *P. majalis*, Fr. He stated that Mr. William Phillips, F.L.S., had reported the last-mentioned species to be new to Britain. Specimens were also exhibited of the lichen *Sphærophoron compressum*, Ach., with apothecia, from Loch Ard; *Agaricus squarrosus*, Müll., *Polyporus adustus*, Willd., and other Fungi, from Largs; and *Hydnum auriscalpium*, Linn., from West Kilbride.

Mr. D. A. Boyd submitted various Uredineæ from West Kilbride, including *Puccinia campanulæ*, Carm., *P. chrysosplenii*, Grev., *Phragmidium rubi-idæi* (Pers.), and *Melampsora hypericorum* (DC.) in its uredospore condition (= *Uredo hypericorum*, DC.).

Mr. Richard M'Kay showed a series of microscopical specimens illustrating the teleutospores of *Uromyces*, *Puccinia*, *Triphragmium*, and *Phragmidium*, four genera of Uredineæ.

Mr Boyd submitted a paper entitled "Notes on the Habits of some Common Birds." (See page 50.)

THE FORTY-FIRST ANNUAL GENERAL MEETING.

25TH OCTOBER, 1892.

Mr. R. S. Wishart, M.A., Vice-President, in the chair.

Mr. John Cairns, Jun., read the

REPORT OF THE COUNCIL.

Membership.—The names of 1 Corresponding and 6 Ordinary Members have been added to the Roll during the past year, the present membership being as follows:—

Honorary, - - - - -	16
Corresponding, - - - - -	43
Ordinary, - - - - -	259
Total Membership, - - - - -	318

Associates.—Two resignations have taken place during the past year, the number of Associates now being 20.

Obituary.—The obituary record is unusually heavy, and contains the names of some much-esteemed members whose loss is deeply regretted. These include Messrs. Robert Bullen, John Crosby, James Dairon, F.G.S., Robert Douglas, Rev. James Fordyce, Thomas Spark Hadaway, and John Lang. Mr. Bullen was born in 1834, at Lathom Park, near Ormskirk, where his father held the appointment of gardener to the Earl of Lathom. After receiving a practical training at home, he was sent to Knowsley, the seat of the Earl of Derby, where he made a study of orchids and stove and greenhouse plants. From thence he was transferred to Messrs. Rollison's famous nursery at Tooting, and afterwards held several other appointments, the last being with Mr. James Veitch at Chelsea. After engaging for a short time in business on his own account, he was, in 1868, appointed Curator of the Royal Botanic Gardens, Glasgow, and continued to hold that office until his death, which took place, very suddenly, on the morning of 4th inst. While under his care, the collection of plants had greatly increased, and the houses were entirely rebuilt and considerably extended. During the recent crisis in the history of the gardens, and until they were acquired by the City Corporation, he had to face difficulties arising from a reduced staff and restricted outlay; but his personal efforts were largely instrumental in preserving the collections in a satisfactory state. He enjoyed the thorough confidence and respect of the directors; his wide experience and extensive knowledge were greatly appreciated; and his genial character was much esteemed by a wide circle of friends. Besides being a member of the Natural History Society of Glasgow, he was also a Fellow of the Royal Horticultural Society, a Fellow of the Botanical Society of Edinburgh, and a member of the Cryptogamic Society of Scotland. Many papers on horticulture, etc., were communicated to our own and the other societies with which he was connected. He is survived by a widow and family, with whom much sympathy is felt in their sudden bereavement.—Mr. Dairon was one of the most eminent of local geologists, and was a leading authority on the Graptolites and other fossils of the Silurian strata. He was also a former Vice-President of this Society, and

took an active interest in its affairs.—Mr. Lang was a microscopist of recognised ability, and a member of the Society's Microscopical Committee.

Meetings and Excursions.—Eight Meetings were held during the Winter Session, reports of which were regularly supplied to the local newspapers.

In consequence of the smallness of attendance at the summer meetings, it was resolved, on the recommendation of the Summer Committee, that these meetings should be held monthly, instead of fortnightly as in previous years, and that, on alternate Tuesday evenings, excursions should be made to localities in the immediate neighbourhood of the city.

Sixteen Excursions were made as follows ;—21st May, Darnley Glen ; 4th June, Eglinton ; 7th June, Garnkirk and Lenzie ; 18th June, Hawkhill Glen ; 2nd July, Roman Wall near Bonnybridge ; 5th July, Gartcosh ; 9th July, Balmaha ; 6th August, Craignethan Castle ; 20th August, Cardross ; 23rd August, Botanic Gardens ; 3rd September, Gourrock ; 10th September, Botanic Gardens ; 17th September, Ashgrove and Kerelaw ; 24th September, Brisbane Woods ; 1st October, Johnstone Castle ; and 15th October, Mugdock Woods.

Council.—The Council regret to report that Mr. James Steel, who for three years has discharged the duties of Secretary, has been obliged through pressure of business engagements to demit office ; also that Mr. James J. F. X. King, F.E.S., who for many years acted as Librarian, has tendered his resignation. It is fitting that the Society should place upon record an acknowledgment of its sense of indebtedness to these gentlemen for the valuable and laborious services rendered by them during their respective terms of office.

Since Mr. King's resignation, the duties of Librarian have been kindly undertaken by Mr. James Mitchell ; and the Council would express grateful thanks to him for his services in the rearrangement of the Library—a work involving much sacrifice of time and labour.

Library Committee.—As formerly announced to the Society, an agreement has been entered into with the Committee of the Mitchell Library, under which the latter has taken over the valuable collection of Transactions of other Societies and Scientific

Journals obtained in exchange for our Society's Proceedings and Transactions. As these will, under certain conditions, be made available for being borrowed by members, they will be more accessible than formerly for purposes of reference; while a considerable saving will be effected in the expenditure of the Society, and a large amount of library space made available for other purposes. Cordial thanks are due to the Library Committee for the very satisfactory results accomplished through their labours.

Thanks are also due to the following donors of books:—

(1) To various members of the Society, for a copy of Dr. M. C. Cooke's recently published work on British Desmids, with coloured plates, purchased by their voluntary subscriptions. As this is the most recent work on the British Desmidiæ, the Council trust that its acquisition will have the effect of stimulating local research in a very interesting department of cryptogamic botany which has hitherto been almost neglected by the Society.

(2) To the Committee for the Exploration of the Marine Flora of the West of Scotland, for 25 copies of the *Hand-List of the Algæ of the Clyde Sea Area*, by Mr. E. A. L. Batters, LL.B., B.A., F.L.S., with Map, presented by the Committee.

Publishing Committee.—During the past year, Vol. III., Part 2, of the *Proceedings and Transactions*, containing most of the papers read during Session 1889-90, has been distributed to the members. The printing of Vol. III., Part 3, has been almost completed, and the whole of the remaining manuscript is now in the hands of the printer.

Microscopical Committee.—The Council regret that owing to the removal of Mr. C. O. Sonntag from Glasgow to Edinburgh, the Society is deprived of his services as an energetic and useful member of this Committee. During last session, on the recommendation of Mr. Sonntag, six lamps and other apparatus were purchased, with the view of providing more adequately for the exhibition of microscopic objects at the meetings of the Society. The lamps have already proved of much benefit to exhibitors; and as they are kept ready for immediate use whenever required, it is hoped that the knowledge of this fact will lead to a larger amount of interesting microscopic material being brought forward for exhibition at the winter meetings.

British Association.—The Society continues to be enrolled on

the Corresponding List of the British Association. Mr. D. Corse Glen, C.E., F.G.S., kindly consented to act as representative of the Society at the Edinburgh Conference of Delegates, but was unfortunately prevented by illness from attending.

With the view of aiding the work of the Committee appointed to investigate the causes which have led to the disappearance of native plants from their habitats, a Report was submitted by the Society, containing information regarding many instances of the total or partial disappearance of plants from localities in the West of Scotland. This report, which formed the basis of the Committee's work for the past year, was read to Section D of the British Association, and discussed at a Conference of Delegates held on 4th August. Thanks are due to the gentlemen who furnished the information on which the report was based, as well as to Professor Thomas King, who kindly received the information for transmission to the Committee of the British Association.

The Treasurer (Mr. John Renwick) submitted an audited Statement of Accounts for the year ending 31st August, showing a balance of £53 5s. 8d. at the credit of the Society, exclusive of (1) £100 invested on Debenture, (2) £15 10s. on Deposit Receipt, and (3) the value of books and other property insured for £300.

The Librarian (Mr. James Mitchell) reported on the state of the library, circulation of books, and distribution of the Society's *Proceedings and Transactions*.

The Reports were all unanimously approved and adopted.

The Society then proceeded to fill up the vacancies in the Council. Professor Edward E. Prince, B.A., F.L.S., was elected a Vice-President; Mr. John Cairns, Jun., a Secretary; Mr. James Mitchell, Librarian; and Messrs. D. Corse Glen, C.E., F.G.S., Alexander Hill, Duncan Mackenzie, and James Steel, Members of Council.

Messrs. Thomas G. Bishop and W. A. Dobie were appointed Auditors for the ensuing year.

The Secretary (Mr. Cairns) read a report on the business at the recent Conference of Delegates from Corresponding Societies of the British Association, so far as relating to biological subjects.

The Librarian made some remarks on the importance of improving the library by adding some of the most recent works on the various departments of Natural History, and he suggested that

members of the Society should communicate with him from time to time regarding the books most urgently required.

Professor Thomas King reported on excursions made to Johnstone Castle on 1st inst., and Mugdock on 15th inst.

Mr. Henry M'Culloch exhibited an American Bittern (*Botaurus lentiginosus*, Mont.) recently captured on board s.s. *California* when crossing the Atlantic.

Mr. John Smith, Corresponding Member, submitted specimens of *Reseda alba*, Linn., *Medicago falcata*, Linn., and *Melilotus officinalis*, Linn., all gathered by him in the neighbourhood of Kilwinning. It was stated that the last-mentioned species had been found in remarkable luxuriance, one plant measuring about 8 feet in height.

Professor King showed specimens of *Tamus communis*, Linn., and numerous other plants from Wolverton, Buckinghamshire.

Mr. George Russell exhibited a male specimen of *Catasetum tridentatum*, Hook., in fine bloom, and stated that this orchid, which is a native of Demerara, seldom produces its flowers in Britain. He read the account of this plant given by Darwin in his work on the Fertilization of Orchids, and drew attention to the remarkable arrangement of the pollen-masses.

Mr. Peter Ewing exhibited specimens of *Ceterach officinarum*, Willd., from Orchardtown Tower, Kirkcudbrightshire; *Woodsia ilvensis*, R. Br., from the neighbourhood of Moffat, where it is reported to be now becoming very rare; and, for comparison with the latter plant, *Woodsia hyperborea*, R. Br., from the neighbourhood of Killin.

Mr. John Smith, Corresponding Member, submitted a paper on the occurrence of the Clouded-yellow Butterfly (*Cobias edusa*, Fab.) in Ayrshire (see page 35).

29TH NOVEMBER, 1892.

Mr. R. S. Wishart, M.A., Vice-President, in the chair.

Mr. D. A. Boyd referred to the loss which the Society had sustained through the death of Mr. D. Corse Glen, C.E., F.G.S. He moved, and it was unanimously agreed, that a memorial notice of Mr. Glen should be recorded in the minutes, and that the Secretary should be directed to express to Mr. Glen's family

the cordial sympathy of the members of the Society with them in their bereavement.

In Memoriam—DAVID CORSE GLEN, C.E., F.G.S.

Mr. Glen was born sixty-nine years ago at Hawkhead near Paisley, and received his early education in Paisley and Glasgow. On leaving school, he was apprenticed with the late Mr. Randolph, and was also for a short time in the service of the late Mr. Napier. Having completed his apprenticeship, he was entrusted with the management of engineering works at Airdrie and Dunfermline, and afterwards removed to Glasgow, where he commenced business as a partner of the firm of Glen & Ross, with which he was connected until his retirement a few years ago. Although a very energetic and successful business man, most of his leisure hours were devoted to scientific pursuits, for which he had a keen taste. While possessing an extensive knowledge of natural history in its various departments, his attention was chiefly directed to geology, and he had attained considerable eminence as a mineralogist. He had also accumulated a large collection of British and American geological specimens, the mineralogical section of which was considered one of the finest private collections in Scotland; an extensive library of books, especially works relating to natural history and archæology; and a very fine collection of coins and medals. Portions of these collections were placed on view at the Exhibition held two years ago in the east end of Glasgow, where he acted as a juror. For more than thirty years he was an active member of the Geological Society of Glasgow, and on several occasions was appointed a vice-president and member of council. Numerous papers were read by him to that Society, and published in its *Transactions*. In 1870 he was elected a member of the Natural History Society of Glasgow. During the period of his membership he took an active interest in the affairs of the Society, frequently contributed to the business of the meetings, and was on several occasions elected a member of council—the last such appointment being made by the unanimous vote of the Society only a month ago. He was also a Fellow of the Geological Society of London, and a member of the British Association, Archæological Society of Glasgow, and Institute of Engineers and Shipbuilders. For many years he was a regular attender at the

meetings of the British Association, where he frequently acted as the representative of the Geological and Natural History Societies of Glasgow. Although devoting much time to his numerous scientific connections, Mr. Glen was also a public-spirited citizen, who took an active interest in many local institutions, such as the Trades' House, Hutchesons' Hospital, Anderson's College, &c. Of a genial and kindly disposition, he was much esteemed by a wide circle of friends, by whom he will be greatly missed. His death took place on 13th inst., after an illness of several months' duration. Mr. Glen was twice married, and is survived by a family.

Mr. Samuel James Pope Thearle, Brooklands Avenue, Uddingston, was elected an Ordinary Member.

The Secretary (Mr. John Cairns, Jun.) reported that the vacancies in the Council occasioned by the appointment of Professor Prince as a Vice-President, and by the decease of Mr. D. Corse Glen, had been filled by the appointment of Messrs. J. Bruce Hunter and W. A. Dobie—the Council for the present Session being as follows:—President, Professor F. O. Bower, D.Sc., F.R.S., F.R.S.E., F.L.S.; Vice-Presidents, William Stewart, R. S. Wishart, M.A., Professor Edward E. Prince, B.A., F.L.S.; Secretaries, D. A. Boyd, John Cairns, Jun.; Treasurer, John Renwick; Librarian, James Mitchell; Members of Council, Peter Ewing, Johnston Shearer, Christopher Sherry, Joseph Sommerville, Robert Edgar, M.A., Robert Grierson, Duncan M'Laren, J. Bruce Hunter, Alexander Hill, Duncan Mackenzie, James Steel, and W. A. Dobie.

Mr. W. A. Dobie exhibited a specimen of the Porcupine Ant-eater (*Echidna hystrix*, Cuv.), and gave an account of the character and affinities of the Monotremata, to which that remarkable mammal belongs.

Professor Edward E. Prince, B.A., F.L.S., Vice-President, exhibited a specimen of *Tornaria*, the free-swimming larva of *Balanoglossus*, a curious worm-like animal, which shows great resemblance to the *Bipinnaria* stage of the star-fish. The larva is very small, and frequents the surface-waters, but has been captured only on rare occasions in the British seas. The specimen under notice was obtained in St. Andrews Bay by Professor

W. C. McIntosh, M.D., F.R.S., Corresponding Member. By its possession of pre-oral and post-oral bands of cilia, an aquiferous system, and other features, this animal shows affinities with the Echinodermata; but the form of the adult, the presence of a fleshy proboscis, and various other anatomical peculiarities, recall the worm. *Balanoglossus* is therefore regarded as an intermediate form of great interest, and it constitutes the type of a special group (Enteropneusta) which has been established for its reception.

Mr. Peter Ewing showed specimens of the following plants:—

Cardamine pratensis, Linn.—A remarkable form from Killin, showing petaloid calyx, corolla, stamens, and pistil.

Sagina procumbens, Linn., var. *spinosa*, Gibs.—Moffat (Mr. J. T. Johnstone).

Rubus Idæus, Linn., var. *Leesii* (Bab).—Moffat.

Hieracium reticulatum, Lindb.—Killin.

Epilobium montanum, Linn., var. *minus*.—Moffat.

Polygonum Persicaria, Linn., var. *glandulosum*.—Moffat.

P. lapathifolium, Linn., var. *incanum*.—Moffat.

Carex rupestris, All.—Killin.

Poa alpina, Linn.—Killin.

v. *lapponum*, Læst.—Forfarshire.

v. *alpestris*, Anders.—Killin.

v. *australis*, Anders.—Killin.

Mr. D. A. Boyd submitted specimens of *Schizophyllum commune*, Fr., from the neighbourhood of West Kilbride.

Professor James Dunlop, M.D., read a paper on the habits and anatomical structure of the Porbeagle Shark (*Lamna cornubica*, Cuv.), of which two large specimens (male and female) were captured in Loch Long on 9th or 10th October last. They were caught in a hake-net off Ardentinny, in 30 to 40 fathoms water, and were dead when the net was drawn. The female (which seemed to have died hard, and had excoriations about the gill-openings, probably produced in its violent efforts to free its head from the large meshes of the strong entangling net) measured from point of snout to the tail about 8 ft. 10 in.; circumference about 4 ft. 10 in.; dorsal fin 17 inches in height; upper lobe of tail 25 inches, lower lobe 17 inches; colour black on the back

and fins, lighter on the sides, and white below; skin a little rough when rubbed against the grain. The male was smaller than the female by fully 12 to 15 inches. The sex was clearly and very readily made out by the distinctive characters of the anal or pelvic fin. In the female this fin is square-shaped and without any appendages; from a point above, which may be termed the *mons veneris*, to the lower edge of the double fin, the length is nearly 10 inches; breadth of lower border $7\frac{1}{2}$ inches; on the inner side of the two equal divisions of the anal fin, at a point about 2 inches above the margin, there is felt to be a slight bony prominence, which has a distinct relation to a jointed spine in each clasper fin in the male. The anal fin of the male is much smaller than that of the female, but at a point where the fin proper terminates there is a strong bony appendage with a joint admitting considerable lateral motion. This appendage (which may be described as an accessory copulatory organ) is fully 10 inches in length, and about $4\frac{1}{2}$ inches in circumference at its rounded part; one side is entirely smooth down to its tapering point, but on its other surface are grooves and spaces which are more marked towards the joint than at the base; about $2\frac{1}{2}$ to 3 inches from the tip there is a joint of an ordinary hinge character, and, when this joint is somewhat flexed, there is projected from a joint within the fold a sharp-pointed spinous process which lies horizontal to the line of the clasper appendage, its function evidently being for purposes of clasping.

The snout of the Porbeagle Shark resembles that of the hog, hence the name "hog-hound" by which it is sometimes known. It follows its prey by sense of smell as well as by sight. Its olfactory nerves are very highly developed, and all over the snout, and even beyond the eyes, are numerous little openings from which a reddish gelatinous fluid was expressed. The eye is a very striking object of vision, and can be projected outwards beyond the line of the orbit, thus increasing its range of vision. There is a distinct and somewhat broad rim of bone in the sclerotic coat, to which powerful muscles are attached. This rim of bone seems to serve also as a protecting shutter against obstacles when the fish is running at a high rate of speed. By some naturalists the Porbeagle is said to have no spiracles. A small wire was passed into a minute and easily overlooked open-

ing lying in a fold between the eye and the first bronchial slit, and along a tortuous sinus, till it was found, on dissection, to enter a pharangeal pouch. Both male and female specimens had spiracles.*

This species of shark is said to be a wanderer, having its chief location in the Bay of Gasgony, the coast of Spain, and the Mediterranean. The natives of Southern Italy, especially the Neapolitans, use the flesh of this and other species of sharks as food. The Porbeagle has been recognised for many years as a visitor to our southern coasts, such as the coast of Hastings, Brighton, and Cornwall. It has also been found on the east coast, in the Firth of Forth, and as far north as Caithness. Mr. W. Anderson Smith states that one was taken off Glen Sannox, Arran, in 1879, and since then two have been captured off Blairmore, while in 1890 one was caught in Loch Fyne. Mr. Thomas Muir, Ardentenny, a very intelligent fisherman, in whose hake-net the two Loch Long sharks were caught, states that during the last fifteen years this species of shark has been a frequent visitor to the waters of Loch Long, seldom a winter passing without one or more being caught in the hake-net. In one season five were captured. Although they appear to come to the Firth of Clyde following the shoals of herrings, they seem to frequent the deep waters of Loch Long, not only in the autumn but in the early months of the year, and that, too, at a time when there are no herrings in the Loch. According to Mr. Muir, their food seemed to be ground fish, such as dog-fish and hakes. In the two sharks under notice, the stomach of the male contained a considerable quantity of bones of large fish like hakes and haddocks, but neither herrings nor crustacea, while that of the female contained no food, and its contents had probably been emptied in dying in the net. So far as has yet been known, this species is innocent of the crime of attacking bathers, but its appearance and glare of eye are not reassuring, and much trust could not be put in its teeth were it compelled to act in self-defence.

* For further details on internal anatomy, &c., see Professor Dunlop's paper on "Loch Long Sharks (Porbeagle, *Lamna cornubica* of Cuvier)," in *The Glasgow Medical Journal*, Vol. xxxix., No. 1 (January, 1893), pp. 22-27.

The Porbeagle Shark seems to hunt for food in small packs of three or four—possibly the parents accompanied by their young, which may not amount in number to more than two. In the summer of 1889, a young shark of this species, nearly 3 feet in length, was caught in a net off Carradale. It had been accompanied by two large sharks which had escaped by tearing the nets. It appeared to have been about three or four months old, and had two rows of small teeth. Its age, if correctly guessed, would indicate that the Porbeagle Shark brings forth its young in May or June. According to Pennant, the female fish gives birth to two young ones annually, and the two-horned uterus contains quite space enough in each division for a young shark.

The paper was illustrated by means of preparations, diagrams, and a photograph of the Loch Long sharks.

Professor Prince read a paper on the Comparative Anatomy of the Organs of Hearing. He stated that in most diverse animals these organs conform to one type. In Cœlenterates (like the *Medusee*, Ctenophora, &c.) a simple sac with a lining of sensory cells and projecting hairs, and usually a central otolith, forms the auditory structure, which is either seated at the aboral pole, as in *Beroe* or *Cydippe*, or in a series around the margin of the bell, as in certain Discophora. In the Worms and Mollusks similar organs are present; in the latter these are usually situated near the pedal ganglion, but always innervated from the cerebral ganglia. The Crustacea and Insecta possess slightly different auditory structures, placed, as in the lobster, at the base of the antennulæ and open to the external water, or, as in *Mysis*, situated on the tail. In the locust, the hearing organ is a hollow drum with two tympanic membranes on the tibiæ of certain of the walking legs. In the Vertebrates, we find the lowest types (like *Myxine* and *Petromyzon*) having a pair of lymph-filled sacs with semicircular canals and an endolymphatic canal and sac; in higher Fishes—Sharks and Teleosteans—other parts are added, *e.g.*, three semicircular canals, ampullæ, and a trace of a lagena, which latter, in still higher types, forms the complex cochlea. Branchial elements come into connection with the ear in Birds and Mammals, the chain of ossicles being really derivatives from the mandibular and hyoid cartilages, the Eustachian tube and external opening representing the aborted visceral slit.

27TH DECEMBER, 1892.

Professor Thomas King in the chair.

Mr. D. A. Boyd referred to the great loss which Science had sustained in the death of Sir Richard Owen, K.C.B., D.C.L., LL.D., F.R.S., &c., one of the Honorary Members of the Society, which took place on 18th inst. It was unanimously agreed that the Society should place upon record an expression of its deep regret at the announcement of the decease of that eminent biologist.

Mr. George Lean, 15 Park Terrace, was elected an Ordinary Member.

Mr. Gilbert Buchanan, Appin Cottage, Ayr, was elected an Associate.

Mr. John Smith, Corresponding Member, exhibited specimens of *Trifolium striatum*, Linn., from the neighbourhood of the old castle of Greenan, near Ayr.

Mr. Henry R. Mathews, Jun., showed specimens of *Trifolium resupinatum*, Linn., from Prestwick.

The Chairman (Professor King) exhibited specimens of *Poinsettia pulcherrima*, Gr., a native of Mexico, which is much esteemed for decorative purposes on account of the brilliant red colour of its floral bracts. He also showed various Fungi from Cadder Wilderness, including *Agaricus serotinus*, Schrad., and *Polyporus radiatus*, Sow., and submitted a species of *Polyporus* from the West Indies, which last-mentioned specimen had been sent by Mr. John Kirsop for exhibition to the Society.

Mr. Robert Grierson read a paper, entitled "Some Facts concerning Rats," in which he referred to the great damage done by these animals in shops and warehouses, and showed pieces of lead pipe which had been gnawed through by them.

Mr. David Robertson, F.L.S., F.G.S., submitted some notes on the occurrence of *Sacculina carcini*, Thompson, in Row Bay and the Gareloch. (See page 79.)

Mr. D. A. Boyd submitted a list of Ustilagineæ observed by him in North Ayrshire (see page 24). Numerous examples of these parasitic Fungi, with microscopic preparations illustrating their spores, were exhibited by Mr. Richard M'Kay at the close of the meeting.

31ST JANUARY, 1893.

Professor F. O. Bower, D.Sc., F.R.S., F.R.S.E., F.L.S., President, in the chair.

By the kind permission of the Right Hon. Edward Marjoribanks, M.P., a fine specimen of the Tarpon or Giant Herring (*Megalops thrissoides*) was exhibited by Professor Edward E. Prince, B.A., F.L.S., who stated that the fish when captured weighed 84 lbs., and measured 5 ft. 2½ in. in length by 1 ft. 2½ in. in width. It has been known to attain still greater dimensions, as an example which weighed 112 lbs. is preserved in the University Museum at St. Andrews. The species frequents the shores of Florida and the Gulf of Mexico, and spawns a short distance from the land, but does not congregate in such numbers as the herring of our own seas. It affords capital sport for rod and line fishing, and requires even more careful manipulation than is necessary for landing the heaviest salmon. The scales of the Tarpon are very large, and show a strong metallic lustre. Its life-history and development do not seem to have yet been fully investigated.

Mr. Robert Dunlop exhibited a House Sparrow (*Passer domesticus*, Linn.) with three legs. The bird was full-sized and in ordinary plumage, and had been killed by a cat.

Mr. Duncan Mackenzie showed a skin of a Carpet Snake (*Morelia variegata*) from Queensland.

The Chairman (Professor Bower) exhibited an interesting series of plants collected in Norfolk and Cambridgeshire, and stated that most of the species were common on the mainland of Europe, but of rare occurrence in Britain. These included *Silene conica*, Linn., *Medicago sylvestris*, Fr., *M. minima*, Desr., *Peucedanum palustre*, Mönch, *Galium anglicum*, Huds., *Artemisia campestris*, Linn., *Scleranthus perennis*, Linn., *Salicornia radicans*, Sm., *Ruppia spiralis*, Hartm., *Apera Spica-venti*, Beauv., *Ammophila baltica*, Link, *Corynephorus canescens*, Beauv., *Festuca ambigua*, Le Gall, &c.

Mr. George Russell showed a series of specimens illustrating the remarkable polymorphism of *Odontoglossum crispum*. After pointing out the distinctive characteristics of the typical plant,

he drew attention to some very peculiar forms which were at one time described as separate species.

Mr. D. A. Boyd submitted specimens of various Microfungi from West Kilbride, including *Diatrype disciformis* (Hoffm.) Fr., *D. stigma* (Hoffm.) Fr., *Ramularia calcea* (Desm.) Ces., *R. urticae*, Ces., &c.

Mr. James Steel showed two Boomerangs from Australia, and described the manner in which the weapons are used by the native tribes. He also exhibited a Fijian Tarnoa or Kava-bowl, cut from a solid piece of wood.

Rev. Alexander Whyte, M.A., B.D., B.Sc., F.L.S., addressed the Society on "The Plant Cell, its Forms, Fusions, and Functions," and submitted a very fine series of lantern-slides showing the structure of various kinds of vegetable tissue.

Mr. D. A. Boyd submitted a paper describing some of the habits of the House Sparrow. (See page 57.)

28TH FEBRUARY, 1893.

Professor Edward E. Prince, B.A., F.L.S., Vice-President, in the chair.

Mr. John Renwick reported on an excursion to Erskine, which took place on 25th inst. (See page 89.)

Mr. James Steel exhibited an Ayrshire specimen of the Great Grey Shrike (*Lanius excubitor*, Linn.), a rare autumnal visitor. He also showed specimens of *Peripatus Leuckarti*, Sav., and other exotic Myriapods.

Professor Thomas King submitted specimens of the plasmodium of *Badhamia utricularis* (Bull.), a fungus recently gathered by him in the Cadder and Craigton Woods. The currents of protoplasm through the filaments were well seen in a portion shown under the microscope.

Mr. D. A. Boyd exhibited various Microfungi from West Kilbride, including *Propolis versicolor*, Fr., *Trochila craterium*, Fr., *Asteroma juncaginearum*, Rabh., *Septoria petroselini*, Lib., &c.

Mr. Richard M'Kay exhibited microscopically the beautiful spore-forms of *Asterosporium Hoffmannii*, Kze., and *Thyrsidium hedericolum*, Dur. & Mont. It was stated that the specimens from which the spores had been taken were gathered at West

Kilbride, and that these species had not been previously recorded for the West of Scotland.

The Chairman (Professor Prince) made some remarks on *Peripatus* and its affinities.

The Secretary (Mr. John Cairns, Jun.) read a Report on the Disappearance of Native Plants' from localities in the West of Scotland, which had been prepared by the Society for the Committee appointed by the British Association to investigate that subject. (See page 44.)

28TH MARCH, 1893.

Professor F. O. Bower, D.Sc., F.R.S., F.R.S.E., F.L.S., President, in the chair.

The following were elected Ordinary Members:—Mr. D. A. Archie, 8 Nithsdale Road, Pollokshields; Miss M. S. M. Beard, 14 Ruthven Street, Hillhead; Mr. Francis Martin, F.S.A.Scot., 207 Bath Street.

Mr. John Renwick reported on excursions made on 11th inst. to Mauldslie, and on 25th inst. to Dougalston and Baldernock. (See pp. 92, 95.)

On the motion of Mr. Renwick, it was unanimously agreed that the Society should offer its congratulation to Mr. John Young, F.G.S., one of the Life Members, on the occasion of his receiving the honorary degree of LL.D. from the University of Glasgow.

Mr. Henry M'Culloch exhibited a Starling (*Sturnus vulgaris*, Linn.), recently shot near Stirling, and remarkable for the pale colour of its plumage.

Mr. James Mitchell showed a nest of a Weaver-Bird from Old Calabar.

On behalf of Mr. John Kirsop, Mr. John Renwick exhibited a piece of wood completely riddled with the burrows of white ants. He stated that the wood had formed part of the beams of a house in Trinidad which had been greatly injured through the ravages of these destructive insects.

Professor Thomas King showed specimens of various flowering plants, including *Erophila vulgaris*, DC., and *Artemisia Absinthium*, Linn., both obtained at the Society's excursion on 25th

inst., and the common winter-cherry (*Physalis Alkekengi*), a native of Southern Europe which is frequently cultivated in this country.

Mr. D. A. Boyd showed abnormal flowers of *Matricaria Parthenium*, Linn., having the radial florets transformed into green leaves. He also showed specimens of various Lichens from West Kilbride, including *Lichina confinis* (Ach.), *L. pygmæa* (Lightf.), *Cladina rangiferina* (Linn.), *C. uncialis* (Linn.), *Physcia aquila* (Ach.), *Ph. parietina* (Linn.), &c.

Mr. James Mitchell submitted a series of photographs of some of the larger trees observed at the Society's recent excursions to Erskine and Mauldslie.

Mr. John Smith, Corresponding Member, communicated a paper on the boring habits of *Pholas crispata*, Linn. (See page 37.)

Mr. David Robertson, F.L.S., F.G.S., submitted a short paper on the habits of *Amphithoe podocerooides*, Rathke, and *Podocerus pulchellus*, M. Edw., two species of Amphipod Crustacea. (See page 80.)

25TH APRIL, 1893.

Mr. R. S. Wishart, M.A., Vice-President, in the chair.

Messrs. Robert D. Wilkie and Thomas B. Wilkie, 302 Langside Road, were elected Ordinary Members.

Mr. John Cairns, Jun., submitted a report on excursions made to Redlands and Westmount, Kelvinside, on 8th inst., and to Mains on 22nd inst. (See pp. 99, 100.)

Mr. David Robertson, F.L.S., F.G.S., exhibited a specimen of *Doris inconspicua*, A. & H., a Nudibranchiate Mollusk new to the Firth of Clyde, which had been found by him at Cumbrae under stones at low water. He stated that the animal, when alive and fully expanded, measured nearly half-an-inch in length. From its small size, it might readily be overlooked or taken for the young of other Dorididæ. It is closely allied to *Doris pusilla* and *D. sparsa*; but its tentacles are stout and have 16 laminæ, while those of *D. pusilla* are longer and more slender with 9 laminæ, and those of *D. sparsa* have 8 or 9 laminæ. The plumes of *D. inconspicua*, although not easily seen, also present some points of difference from those of the other two species named.

Mr. L. Watt exhibited specimens of the following species of *Hieracium* from the various localities named:—*H. anglicum*, Fr., *H. anglicum* var. *cerinthiforme*, Backh., *H. anglicum* var. *longibracteatum*, F. J. Hanb., and *H. senescens*, Backh., all from Ben Voirlich, Dumbartonshire; *H. murorum*, L. p.p., two forms; *H. crocatum*, Fr., from Lochgoilhead; *H. sparsifolium*, Lindb., from Dungoyne and Inveruglas; *H. angustatum*, Lindb., from the Kilpatrick Hills; *H. rubicandrum*, F. J. Hanb., from the Kilpatrick Hills, and Grey Mare's Tail (Dumfriesshire); *H. centripetale*, F. J. Hanb., from the Grey Mare's Tail; and *H. Sommerfeltii*, Lindb., from Bennachie, Aberdeenshire.

Mr. Watt also submitted specimens of *Juncus acutus*, Linn., from Devonshire.

Mr. Robert Grierson exhibited flowering plants of *Petasites albus*, Gærtn., from the neighbourhood of Kilsyth.

Mr. James Mitchell showed a Calabar Bean (*Physostigma venenosum*), and gave an account of the poisonous properties of that fruit, and its use as an ordeal by the native African tribes.

Mr. D. A. Boyd exhibited specimens of *Subularia aquatica*, Linn., from Loch Lairig-eala, Killin. He also showed a series of abnormal seedlings of *Acer Pseudo-platanus*, Linn., having the cotyledons wholly or partially cleft from apex to base.

Mr. C. Sherry exhibited an abnormal flower of *Calla aethiopica*, Willd., having two spathes developed opposite each other.

The following papers were submitted:—

“Notes on the Collembola and Thysanura of North Ayrshire.”
By Mr. D. A. Boyd.

“The Terrestrial Isopoda of North Ayrshire.” By Mr. D. A. Boyd.

“Notes on a Post-Tertiary Deposit at Largs.” By Mr. Thomas Scott, F.L.S., Corresponding Member.

“Vine-Culture in India.” By Mr. Johnston Shearer. (See page 49.)

Natural History Society of Glasgow.

ABSTRACT STATEMENT OF ACCOUNTS—SESSION 1891-92.

1891.—Sept. 1.		
To Balance in National Security Savings Bank, - - -	£38 0 0	
Less due to Treasurer, - - -	3 18 2½	
	£34 1 9½	
1892.—Aug. 31.		
To 206 Members' Annual Subscriptions @ 7s. 6d.,	77 5 0	
7 " " Entry-money @ 7s. 6d.,	2 12 6	
25 " " Arrears @ 7s. 6d.,	9 7 6	
19 Associates' Subscriptions @ 2s. 6d.,	2 7 6	
2 " " Arrears @ 2s. 6d.,	0 5 0	
Interest, - - - - -	5 14 8	
Proceedings, &c., sold, - - - - -	4 15 4	
Received for Reprints, - - - - -	2 2 0	
Subscriptions for Cooke's "Desmids," - - -	2 0 0	
	£140 11 3½	
1892.—Aug. 31.		
By Rent and Attendance, - - - - -		£9 1 0
" Postage, Stationery, &c., - - - - -		13 0 3½
" Printing Circulars, - - - - -		8 7 8
" Printing Proceedings, - - - - -		43 8 6
" Carriage on Proceedings and Exchanges, -		4 4 6
" Library—New Books, - - - - -		5 10 10
" " Insurance, 6s.; Stationery, &c., £1 10s. 1d.,		2 2 1
" " Boxes, - - - - -		1 1 6
" " Transferring Books to Mitchell Library,		0 9 3
" " Balance in National Security Sav- ings Bank, - - - - -	£50 0 0	
" Balance in Treasurer's hands, - - - - -	3 5 8	
		£140 11 3½

Life Members' Fund—

Invested in 5 per cent. Debentures of The Modern Per- manent Building and Investment Society, Melbourne,	£100 0 0
On Deposit Receipt on Clydesdale Bank,	15 10 0
	£115 10 0

GLASGOW, 14th October, 1892.—We have examined the Books for the year 1891-92, and have compared the Vouchers, and find them correct; the sum in the National Security Savings Bank being Fifty Pounds, and the Balance in the Treasurer's hands Three Pounds Five Shillings and Eightpence Sterling. We have also seen the Vouchers for the Capital Account, amounting to One Hundred and Fifteen Pounds Ten Shillings.

(Signed) THOS. G. BISHOP, }
W. A. DOBIE, } *Auditors.*

SUMMER SESSION, 1893.

23RD MAY, 1893.

Mr. R. S. Wishart, M.A., Vice-President, in the chair.

Mr. John Cairns, Jun., Secretary, submitted reports on recent excursions to Dalzell, Botanic Gardens, and Edinbarnet. (See pp. 101, 103, 106.)

Mr. Peter Ewing exhibited a large and interesting collection of British flowering-plants belonging to the natural order Ranunculaceæ, and pointed out the distinctive characteristics of the less common species.

Mr. L. Watt showed specimens of the following plants:—

Caltha palustris, Linn., var. *minor*, Syme.—Kilpatrick Hills, north side.

Barbarea stricta, Andrz.—Railway bank, Craigendoran.

Cochlearia anglica, Linn., var. *Hortii*, Syme.—Side of River Clyde, Dalmuir.

Erysimum cheiranthoides, Linn.—Railway bank, Cardross.

Potentilla norvegica, Linn.—Railway bank, Rutherglen.

Carex dioica, Linn.—Kilpatrick Hills.

C. Boenninghausenia, Weihe.—Loch at Culzean Castle.

Mr. D. A. Boyd exhibited specimens of Honesty (*Lunaria biennis*, DC.) bearing unripe seed-pods. These, when immature, are so thin as to be translucent, and enable the peculiar mode of placentation to be distinctly seen when the pod is held between the eye and the light.

He also showed an abnormal raceme of flowers of *Scilla nutans*, Sm., which illustrated the teratological condition known as phyllody. In this specimen the floral bracts were greatly developed, and partly transformed into green leaves.

Mr. Boyd also submitted specimens of *Cnicus arvensis*, Hoffm., having the lower surface of their leaves covered with the fragrant pale-yellow spermogonia of *Puccinia suaveolens* (Pers.) Winter. The fungus is common at this stage in early summer, and is remarkable for its powerful odour of honey, which, as Mr. Plowright has pointed out, very closely resembles the perfume

of the flowers of *Enothera biennis*, and probably exists for the purpose of attracting insect visitors.* Sowerby has recorded the fact that this species is visited by flies, and Mr. Boyd remarked that he had also found that flower-beetles (*Meligethes*) and other small insects frequented the spermogonia, to which they had probably been attracted by the scent, as well as by the saccharine matter contained in the spermatial mass. Ráthay reports having examined the wet foot-marks of flies which had flown to the window-pane after resting on the leaves of plants of *Euphorbia amygdaloides* affected with the spermogonia of *Endophyllum euphorbiæ*, and he found that they contained spermata of that fungus.† The spermata of various species of Uredineæ have been found to germinate when placed in a solution of sugar or honey. From these facts, it may be inferred that they exercise a reproductive function. They have been supposed by many botanists to be fertilizing bodies, but Mr. Plowright is inclined to regard the balance of evidence as opposed to the view that they are sexual organs. The supposition that they are conidia is more plausible, but repeated experimental cultures have failed to demonstrate its accuracy. The precise function of the spermata is therefore still involved in some doubt.‡

Professor Thomas King exhibited numerous specimens of flowering-plants from Buckinghamshire, including *Clematis Vitalba*, Linn., *Onobrychis sativa*, Lam., *Bryonia dioica*, Linn., *Tamus communis*, Linn., &c.

Mr. R. D. Wilkie showed specimens of *Carex limosa*, Linn., recently gathered by him at Kilmalcolm, and stated that the plant had not been previously recorded for Renfrewshire.

Messrs. James Mitchell and R. S. Wishart, M.A., submitted a series of photographic views taken at recent excursions of the Society.

Rev. A. S. Wilson, M.A., B.Sc., read a paper on "The Structure of Fossil Wood," in which an interesting account was given of the various groups into which fossil trees have been

* Plowright, "Mimicry in Fungi," *Grevillea*, vol. x., pp. 1-4. *Monograph of the British Uredineæ and Ustilagineæ*, p. 12.

† Ráthay, *Untersuchungen über die Spermogonien der Rostpilze*. Wien, 1882. Plowright, *Mon. Brit. Ured. & Ust.*, p. 11.

‡ See Plowright, *l.c.*, pp. 9-20.

arranged, with a description of numerous specimens recently examined by him.

20TH JUNE, 1893.

Mr. R. S. Wishart, M.A., Vice-President, in the chair.

Reports were submitted on recent excursions to Castlemilk, Garelochhead, Stepps, Garscube and Little Cumbrae. (See pp. 107, 110, 111.)

Mr. W. Craibe Angus showed a fine male specimen of the Golden Eagle (*Aquila chrysaetos*, Linn.), recently trapped in the neighbourhood of Auchinduich, Sutherlandshire, and lent by Mr. Henry Martin, West George Street, for exhibition to the Society. As the bird had been for three days a prisoner, and consequently for that time without food, its stomach when dissected was found to contain only a small portion of rabbit-fur. The bird nevertheless weighed 7 lb. 5½ oz., which is considerably over the average weight of the male Golden Eagle. It measured 33¼ in. from point of bill to tip of tail, and the extended wings measured 76 in. from tip to tip. Mr. Angus made some interesting remarks on the occurrence and habits of this fine species.

Mr. David Robertson, F.L.S., F.G.S., exhibited an unusually large cluster of the egg-cases of *Buccinum undatum*, Linn., taken by trawling at a depth of 20 fathoms between Millport and Little Cumbrae, and apparently formed by the simultaneous egg-deposits of a number of these mollusks. He also submitted a short paper on the habits of this species. (See page 81.)

Mr. J. Watson exhibited an interesting series of microscopic objects, including the larval form of the water-beetle *Dytiscus marginalis*, Linn., also specimens of the rotifer *Melicerta ringens*, and the infusorian *Stentor polymorphus*.

Mr. J. Bruce Hunter showed the fruit of *Phytelephas macrocarpa*, R. & P., commonly known as "vegetable ivory," and made some remarks on the habit of growth and commercial value of the tree. He also exhibited an abnormal specimen of *Plantago major*, Linn., which illustrated the teratological condition known as phyllody, the floral organs of the plant being transformed into green leaves.

Mr. D. A. Boyd submitted specimens of various plants affected with parasitic leaf-fungi, all which had been gathered by him at

West Kilbride. These included *Senecio Jacobæa*, Linn., bearing numerous clusters of the blackish teleutospores of *Puccinia glomerata*, Grev.; *Taraxacum officinale*, Web., affected with the æcidiospores, uredospores, and teleutospores of *Puccinia variabilis*, Grev.; and *Holcus mollis*, Linn., bearing parallel lines of the black spore-masses of *Tilletia striceformis* (Westd.) Winter.

Mr. L. Watt read a paper entitled "Notes on the *Utricularia*, or Bladderworts," in which reference was made to the occurrence of various species in localities in West of Scotland. The paper was illustrated with a series of specimens.

8TH AUGUST, 1893.

Mr. William Stewart, Vice-President, in the chair.

Mr. John Renwick referred to the loss which the Society had sustained by the death of Sir Michael Connal. It was unanimously resolved that a suitable memorial notice should be inserted in the minute-book, and that the Secretary should express to Lady Connal the warm sympathy of the members with her in the bereavement she has sustained.

In Memoriam—SIR MICHAEL CONNAL.

The family of Connal, from which Sir Michael was descended, had for a long period been closely connected with the county and town of Stirling. Until the close of the seventeenth century, the Connals were farmers in the western portion of the county, while, from about 1745 onwards, we find that representatives of the family occupied prominent positions in the ancient and royal burgh itself. Michael Connal, merchant and banker in Stirling, was for many years provost of the burgh. He died in 1812, and was succeeded as a banker in the town by his eldest son Patrick. The third son of the latter was Michael Connal of Parkhall, at one time in the Honourable East India Company's service, and the elder son of this Michael Connal was the subject of the present notice.

Michael Connal was born in August, 1817, in Miller Street, Glasgow, in a house (still standing) which was the town mansion of his uncle, Mr. William Connal, Lord Dean of Guild of Glasgow. On the return of his father from a visit to India, the family went

back to their country residence at Parkhall, where young Michael's early years were spent. Owing to financial losses, his father was obliged to sell his property and return to India, where he died in 1829. Young Michael was educated at a private school, and afterwards spent some years at Glasgow University, where his studies are said to have been marked with considerable ability. He was at first inclined to follow the legal profession, and intended to go to the Scottish Bar, but having received the offer of an opening in his uncle's office, he finally resolved to adopt a mercantile life. In 1845 he was admitted to partnership with his uncle, Mr. William Connal, and the firm then assumed the well-known name of William Connal & Company. In 1864 other changes took place, which resulted in the separation of the firm's pig-iron department from its general mercantile and colonial business. The latter continued to be carried on by Mr. Michael Connal and his partner, Mr. William Wilson, under the firm's old name. For many years the principal branch of the business has been sugar, and until about twelve years ago Mr. Connal was accustomed to go to Greenock every morning to attend the Sugar Exchange. His high reputation as a merchant, and his long and honourable business career, crowned with well-merited success, are too generally known to require more than a passing mention here.

But although deeply engrossed with the cares of a business life, he found plenty of time for other pursuits. While still a young man, his keen interest in charitable and philanthropical institutions was manifested in many ways, while his active benevolence became more widely extended with advancing years. It has, indeed, been said that there was scarcely a good institution in the city that he was not in some way or other connected with. It is notable, also, that he did not rest contented with supporting existing schemes, but was ready to inaugurate others wherever a need for them was apparent. Thus, in 1848, he founded the Spoutmouth Bible Institute, which had for its object the religious and intellectual improvement of young men, especially those in the poorer parts of the city. This institution possessed a reading-room, library, and savings'-bank; lectures on literary and scientific subjects were frequently given; and on Sunday evenings a bible-class was conducted, which for many years was under the personal superinten-

dence of Mr. Connal himself. Country excursions were often arranged, at which he was present and sought to inspire an interest in the pure and elevating pursuits of botanical science. The members of the institute frequently visited him at Parkhall, and such occasions must have helped to brighten many a clouded life. This institution was one of his most cherished schemes, and all through life he took an active interest in its welfare. Its practical success has repeatedly been demonstrated in the honourable career of many who had previously been brought under its influence.

When twelve years of age, the death of his father and loss of his early home were deeply felt by him, and his sorrow for his bereaved mother was very great. In 1858 he availed himself of an opportunity of re-purchasing Parkhall, restored the furniture and hangings as at the time when the property was sold by his father, and presented it to his mother.

Having a strong belief in the elevating power of education, he took a life-long interest in this subject, and was recognised as a leading authority on educational matters. In 1872 he was elected a member of the first School Board of Glasgow, and in 1877 was appointed chairman. He was twice re-elected to this position, which he occupied for a period of nine years. In 1885, on his retiral from the chairmanship of the Board, the honour of knighthood was conferred upon him in recognition of his valuable public services.

The local institutions with which he was connected are too numerous to be mentioned, but special reference may be made to a few of them. In 1856 he was elected director of Stirling's Library, and had been its vice-president since 1879. At the time of his death he was the oldest of the directors.

In 1809, the Glasgow Stirlingshire and Sons of the Rock Society was founded by seven young men, among whom was Mr. William Connal, uncle of Sir Michael. The latter was a member of the Society since 1834, and was very regular in his attendance at its business and social meetings.

He became a member of the Philosophical Society of Glasgow in 1848, was elected a member of its council in 1879, and acted as a vice-president from 1880 till 1883. He was also one of the originators of the Ethnological and Geographical Section, formed

in 1833, and one of its vice-presidents from that date until his death.

Among his varied scientific tastes, botany occupied the foremost place. He was present at the meeting held on 2nd July, 1851, at which the Natural History Society of Glasgow was instituted, and he was elected a member of the Society on 4th November following. At the time of his death he was the oldest Ordinary Member, and during the long period of his connection with the Society he took a warm interest in its prosperity.

He was also a member of the Glasgow Archæological Society from the date of its foundation in 1856, and was admitted to the Geological Society of Glasgow in 1866.

He was, moreover, a Justice of the Peace for the counties of Stirling and Dumbarton, and was for many years an elder in Free St. James's Church, Glasgow.

In 1864 he married Helen Catherine, daughter of Mr. William Leckie Ewing of Arngomery. One child was born of this union, but died in infancy.

Sir Michael Connal's temperament was essentially energetic, and he bore well the weight of advancing years. His death took place at his residence of Parkhall, Stirlingshire, on the morning of 6th July, after a short illness. By his decease, one of the most notable links between the past and present life of the city has been broken, and a blank created in its business, social, educational, and philanthropical circles, which will not readily be filled up. As a wise counsellor and generous benefactor, his name will continue to be held in grateful and affectionate remembrance in the community with which he was so long and so intimately connected.

Reports were submitted on recent excursions to Woodside, Paisley, on 27th June (see page 112); Pitcon Glen, Kilbirnie, on 1st July (p. 113); Pollok, on 4th July (p. 115); and Troon, on 5th August (p. 116).

Mr. Robert Dunlop exhibited a series of photographs of birds' nests with eggs. He also showed spores of cryptogamic plants from coal.

Professor Thomas King showed a large caterpillar, from New Zealand, having a parasitic fungus (apparently allied to *Cordyceps*) growing from its body.

Mr. John Renwick exhibited various plants from Ben Lawers, Glen Lyon, and Craig Madaidh, a mountain above that glen. These included a specimen of *Saxifraga oppositifolia*, Linn., remarkable for having been found in flower so late as 4th August.

Mr. D. A. Boyd exhibited fruiting specimens of various cryptogamic plants from Killin, Perthshire, including *Dicranum fuscescens*, Turn., *Encalypta streptocarpa*, Hedw., *Meesia uliginosa*, Hedw., *Neckera crispa*, Linn., *Baeomyces aeruginosus* (Scop.), *Cetraria aculeata* (Schreb.), and *Parmelia tristis* (Web.). He also showed barren specimens of *Habrodon Notarisii*, Schpr., from the same district.

Mr. Boyd also submitted specimens of *Urtica urens*, Linn., affected with *Peronospora urticae*, Lib., a parasitic fungus. These, he stated, had been gathered at Troon during the Society's recent excursion to that town. The fungus does not seem to have hitherto been recorded for the West of Scotland. Its presence may, however, be readily detected, as, owing to the action of the mycelium, the portions of the leaves affected with the parasite become much paler in colour than the surrounding tissue. Spore-bearing threads are produced abundantly on the lower surface of the pale spots.

Mr. Peter Ewing submitted a report on the state of alpine vegetation during the month of July, as observed by him on Ben Lawers, Meall Ghaordie, and Ben Laoigh.

Mr. Ewing also read a paper on "*Ranunculus Flammula*, Linn., and its Forms," which was illustrated with an extensive series of specimens.

Mr. John Renwick read a paper entitled "Notes on a Visit to Roxburghshire and Berwickshire," in which he made some remarks on the botany and geology of these districts, and described numerous large trees which had been measured last July. The finest of these were the following:—Near Jedburgh, (1) the celebrated Oak (*Quercus Robur*), known as the "Capon Tree," girthing 22 ft. 6 $\frac{3}{4}$ in. at 5 ft. 9 in. on north-east, and 3 ft. 9 in. on south-west; the trunk divides at 6 ft. into two, the northern part being the larger, and girthing 16 ft. 2 $\frac{1}{2}$ in. at base; spread of branches, 97 ft. 2 in.; leaves petioled, and fruit nearly all pedunculated. (2) An Alder (*Alnus glutinosa*), 12 ft. 9 in. at ground, dividing

into seven stems. (3) A Grey Willow (*Salix cinerea*), 8 ft. 2½ in. at 3 ft. 10 in.—Near Kelso railway station a Black Poplar (*Populus nigra*), 19 ft. 9 in. at 6 ft. 3 in.—In Newton Don grounds, (1) a Cedar of Lebanon (*Cedrus Libani*), 10 ft. 2½ in. at 4 ft. 3 in. (2) Two Birches (*Betula alba*), respectively 10 ft. 3 in. at 2 ft. 3 in. and 13 ft. at 1 ft. 7 in.—In Ancrum Park (1) an Elm (*Ulmus montana*), 18 ft. 1½ in. at 4 ft. 6 in. (2) A Common Lime (*Tilia europæa*), 17 ft. 3½ in. at 5 ft. (3) Two large-leaved Limes (*Tilia grandifolia*), respectively 19 ft. 0½ in. at 4 ft. 3 in. and 24 ft. at 4 ft. 6 in.

5TH SEPTEMBER, 1893.

Mr. William Stewart, Vice-President, in the chair.

Reports on recent excursions to Milton Lockhart and Murdostoun were submitted by Mr. John Cairns, Jun., Secretary. (See pp. 118, 120.)

Mr. A. B. Motherwell exhibited a fine specimen of the Gannet (*Sula bassana*, Briss.), recently captured by him at Kiidonan, Arran. He also showed specimens of *Carlina vulgaris*, Linn., from Struey Rocks, Arran.

Mr. Frank L. Grant, M.A., exhibited a series of Spiders from various localities in the West of Scotland, including the following species:—

Clubiona holosericea, De Geer. ♀—Corrie.

Amaurobius fenestralis, Str. ♂—Corrie and Dalry.

Textrix lycosina, Bl. ♂—Ailsa Craig.

Linyphia thoracica, Wid. ♀—Corrie.

Phyllonethis lineata, Clk. ♀—Corrie.

Erigone atra, Bl. ♀—Corrie.

E. dentipalpes, Wid. ♀—Corrie.

Meta meriana, Scop. ♂—Corrie.

Zilla x-notata, Clk. ♀—Corrie and Dalry.

Z. atrica, C. Koch.—Corrie and Stepps.

Epeira diademata, Clk. ♀ ♂—Corrie.

E. quadrata, Clk. ♀—Corrie.

Xysticus pini, Hahn. ♀—Ailsa Craig.

Tarentula pulverulenta, Clk. ♀—Corrie.

Lycosa annulata, Thor. ♀—Corrie.

L. riparia, C. L. Koch. ♀—Corrie.

L. monticola, C. L. Koch ♀—Corrie.

Mr. R. S. Wishart, M.A., Vice-President, submitted numerous specimens of flowering-plants from the neighbourhood of Croydon, Surrey. These included *Diplotaxis muralis*, DC., *Asperula cynanchica*, Linn., *Cnicus acaulis*, Hoffm., *Nepeta Cataria*, Linn., &c.

Mr. R. D. Wilkie showed an extensive series of flowering-plants from North-East Yorkshire, including *Nasturtium amphibium*, R. Br., *Cnicus eriophorus*, Hoffm., *Hottonia palustris*, Linn.; *Ballota nigra*, Linn., var. *alba* (Linn.); *Hippophae rhamnoides*, Linn., *Hydrocharis Morsus-rance*, Linn., *Polypogon monspeliensis*, Desf., &c.

Mr. D. A. Boyd exhibited a specimen of *Solanum nigrum*, Linn., from the sea-shore near Chapelton, West Kilbride. He also showed flowering branches of *Catalpa syringefolia*, H. K., from a garden at St. John's Wood, London. The tree is a native of North America, and is occasionally grown in this country.

Mr. John Renwick exhibited an abnormal flower of *Viola*, from the garden of Mr. Alexander Sweet, Cathcart, having three spurs instead of one at the base of the corolla.

Professor Thomas King submitted spores of *Tilletia decipiens* (Pers.) for examination under the microscope. He stated that the fungus occurs as a parasite in the ovaries of *Agrostis vulgaris*, With., and produces the dwarfed condition of that grass which was formerly described under the name of var. *pumila*.

Mr. Thomas Steel, Sydney, N.S.W., a former member of the Society, contributed a paper on "Cannibals and Cannibalism," in which he described some of the ways in which cannibalism is practised by savage tribes, and its effects on the races who indulge in it. He stated that his information had been derived from Maoris and Fijians who had themselves at one time been cannibals.

WINTER SESSION 1893-94.

26TH SEPTEMBER, 1893.

Mr. William Stewart, Vice-President, in the chair.

Mr. Daniel Dewar, Curator, Botanic Gardens, was elected an Ordinary Member.

Mr. John Cairns, Jun., reported on an excursion made on 16th inst. to Dungoyne, the extreme north-west peak of the

Campsie range of hills. The day was very fine, and the view from the summit was much enjoyed by the members present. The hill did not seem to be rich in vegetation, as no plants of any rarity were observed.

Mr. D. A. Boyd showed specimens, from Moffat and Duntocher, of "silk-button galls" produced on the under surface of oak-leaves by *Neuroterus numismatis* (Oliv.) Mayr, one of the Cynipidæ. These galls, which adhere closely to the leaf-surface, are round, depressed in the centre, and covered with silky-brown hairs.

Mr. Boyd also made some remarks on the characters and affinities of the Magnoliaceæ, and exhibited a specimen of the fructification of the Tulip-tree (*Liriodendron tulipifera*, Willd.), which has its carpels arranged in the form of a cone.

Mr. George Russell showed a fine specimen of *Oncidium carthagenense*, Willd., an exotic orchid with racemes of red-spotted flowers. In this species the pseudo-bulb is absent, but its place is supplied by the fleshy green leaves which store up abundant nutriment for the growing plant.

Professor Thomas King made some remarks on the conference of the Cryptogamic Society of Scotland held last week at Moffat. Numerous specimens of Fungi, gathered at excursions in connection with the conference, were also exhibited by him. Among these were *Agaricus* (*Amanita*) *vireus*, Fr., *A.* (*A.*) *mappa*, Fr., *A.* (*Tricholoma*) *sulphureus*, Bull., *Cantharellus infundibuliformis*, Scop., *Lentinus cochleatus*, Pers., *Polyporus perennis*, Linn., *Tremellodon gelatinosum*, Pers., *Craterellus cornucopioides*, Linn., *Peziza* (*Cochlearia*) *badia*, Pers., *Ustulina vulgaris*, Tul., and *Anthina flammea*, Fr.

Professor King also reported that *Lactarius fuliginosus*, Fr., and *Polyporus fragilis*, Fr., had since been gathered at Moffat by the Chairman (Mr. Stewart), these being additions to the list of nearly 200 species observed during the conference. In the course of some remarks on the various specimens, he stated that *Tremellodon gelatinosum* had already occurred in the South of Scotland, examples having been obtained during the conference of the Cryptogamic Society held at Dumfries in 1883. It was recently discovered in four localities near Moffat, and therefore seems to be widely distributed throughout Dumfriesshire, although it has not yet been detected in any other Scotch county.

Mr. David Robertson, F.L.S., F.G.S., communicated a short paper reporting the occurrence of *Anceus maxillaris*, Montagu, in an associated group of one male and six females. (See page 82.)

Mr. D. A. Boyd submitted a list of Microfungi collected in the Killin district.

THE FORTY-SECOND ANNUAL GENERAL MEETING.

31ST OCTOBER, 1893.

Mr. R. S. Wishart, M.A., Vice-President, in the chair.

The Secretary (Mr. D. A. Boyd) read the

REPORT OF THE COUNCIL.

Membership.—During the past year the names of 8 Ordinary Members have been added to the roll, the present membership being as follows:—

Honorary, - - - - -	14
Corresponding, - - - - -	42
Ordinary, - - - - -	238
	<hr/>
Total Membership, - - - - -	294

Associates.—During the year 1 Associate has been elected, the number on the roll being now 18.

Obituary.—The Obituary Record for the year contains the names of Sir Richard Owen, K.C.B., D.C.L., LL.D., F.R.S., &c., and Professor J. O. Westwood, M.A., F.L.S., F.E.S., Honorary Members; Rev. H. W. Crosskey, LL.D., F.G.S., Corresponding Member; Sir William Mackinnon, Bart., C.I.E., F.R.G.S., F.Z.S., and Mr. Duncan Macneill, Life Members; Sir Michael Connal, Mr. Alexander Dennistoun, F.Z.S., Mr. D. Corse Glen, C.E., F.G.S., Mr. R. R. Horne, Mr. John Rae, and Mr. William Walls, Ordinary Members; and Mr. J. H. Aitken, Associate.

Winter Session 1892-93.—8 meetings were held during the Session, at which numerous zoological and botanical specimens were exhibited, and papers read. Reports of the meetings were regularly supplied to the local newspapers.

Summer Session 1893.—4 meetings were held during the Summer Session; and these were much better attended than had been the case in recent years, while a marked improvement

was also noticeable in the amount and character of the material brought forward.

Excursions.—18 Excursions took place on Saturdays between 25th February and 14th October, 8 of these being arranged jointly with other Societies, while 8 Excursions were also made on Tuesday evenings to places in the neighbourhood of the city. The Council desire to acknowledge the important services rendered by the Summer Committee in arranging an unusually attractive programme of Excursions, and obtaining access to various private estates not previously visited by the Society. It is gratifying to report that the efforts of the Committee have been appreciated by the Society, and have resulted in a considerable improvement in the average attendance at the Excursions.

Council.—A vacancy in the Council, as elected last October, was filled up by the appointment of Mr. J. Bruce Hunter, while Mr. W. A. Dobie was appointed in room of the late Mr. D. Corse Glen.

Ten meetings of Council have been held since the date of last report.

Library.—In consequence of the Agreement recently entered into with the Committee of the Mitchell Library for transferring to that institution the Society's collection of Foreign Scientific Transactions and Journals, an entire rearrangement of the Library was rendered necessary. This has now been carried out by the Librarian, Mr. James Mitchell, to whom the Society is much indebted for his laborious efforts for the improvement of the Library. A new Catalogue is in course of preparation, and this, when completed, will supply a much-felt want. The work of the Library Committee during the past year has involved a sacrifice of much time and labour, and their services call for special acknowledgment. Under arrangement with Mr. F. Martin, Curator of the Philosophical Society's Rooms, books can now be borrowed or returned any day during office hours, and it is hoped that this improvement will lead to an increase in the circulation of the volumes. Numerous important purchases of works on natural history, travels, &c., have recently been made by the Committee, and these have been announced in the monthly billets, along with other additions made by gift or exchange. The thanks of the Society are due to Messrs. Peter Ewing,

E. M. Holmes, F.L.S., Richard M'Kay, and A. Somerville, B.Sc., F.L.S., for donations of books to the Library.

The collection of Scientific Transactions and Journals recently transferred to the Mitchell Library has now been made available for reference, and it is hoped that this privilege will be largely taken advantage of by the Society.

Proceedings and Transactions.—Vol. III. (New Series), Part 3, was published in November, thus bringing the issue down to the end of Session 1891-92. Vol. IV., Part 1, relating to Session 1892-93, is now in course of preparation.

British Association.—The Society continues to be enrolled on the Corresponding List of the British Association. On the occasion of the recent Conference of Delegates, held at Nottingham, it was found impossible to arrange for the Society being represented, but the Council trust that this difficulty will not again be experienced.

The Treasurer (Mr. John Renwick) submitted an audited Statement of Accounts for the year ending 31st August, which showed a balance of £32 9s. 2½d. at the credit of the Society, exclusive of (1) £100 invested on Debenture, (2) £15 10s. on Deposit Receipt, and (3) value of books and other property insured for £300.

The Librarian (Mr. James Mitchell) reported on the state of the library and the circulation of books.

The Reports were all unanimously approved and adopted.

The Society then proceeded to fill up the vacant offices in the Council, when Professor Thomas King was elected President; Messrs. Robert Kidston, F.R.S.E., F.G.S., and D. A. Boyd, Vice-Presidents; Messrs. R. S. Wishart, M.A., and John Cairns, Jun., Secretaries; Mr. John Renwick, Treasurer; Mr. James Mitchell, Librarian; and Messrs. W. A. Dobie, David Pearson, Robert D. Wilkie, William Stewart, Robert Dunlop, F. L. Grant, M.A., and J. Bruce Hunter, Members of Council—the Council being as follows: President, Professor Thomas King; Vice-Presidents, D. A. Boyd, Professor Edward E. Prince, B.A., F.L.S., Robert Kidston, F.R.S.E., F.G.S.; Secretaries, R. S. Wishart, M.A., John Cairns, Jun.; Treasurer, John Renwick; Librarian, James Mitchell; Members of Council, Robert Edgar, M.A., F. L. Grant, M.A., Robert Grierson, J. Bruce Hunter, Robert Dunlop, Alexander

Hill, Duncan Mackenzie, James Steel, W. A. Dobie, David Pearson, William Stewart, Robert D. Wilkie.

Messrs. Thomas G. Bishop and Johnston Shearer were appointed Auditors for the ensuing year.

On the motion of the President, a vote of thanks was awarded to retiring office-bearers, and particularly to Mr. D. A. Boyd, who had acted as Secretary for the last ten years.

Mr. Andrew J. Kirkpatrick, 179 West George Street, was elected a Life Member; Messrs. Thomas F. Glen, 14 Annfield Place, Dennistoun, and Robert Lang, Fullarton Place, Johnstone, were elected Ordinary Members.

Reports were submitted on the Society's recent excursions to Kilmahew (see page 61), Blairquhosh (p. 121), and Finlaystone (p. 61).

Mr. Frank L. Grant, M.A., exhibited red and black varieties of the Adder (*Pelias Berus*) from Arran; also, for comparison, a Ringed Snake (*Tropidonotus Natrix*), upon which he made some remarks. He also showed a skin cast by a Snake in the Kelvin-grove Museum, and drew attention to the fact that the process of casting is so complete as to include the divestiture of the thin outer covering of the eyes.

Mr. D. A. Boyd, Vice-President, showed specimens, gathered at Kilmahew, of oak-leaves bearing the galls known as "oak-spangles," which are produced by *Neuroterus lenticularis*, Adler. He also exhibited specimens of *Gaultheria Shallon*, a North American evergreen shrub which is frequently grown in this country; and ripe fruit of the wild strawberry gathered on 27th inst. at Hexham, Northumberland.

Professor Thomas King, President, exhibited ripe fruit of *Custanea sativa*, from Bute, and stated that the seed is seldom fully developed in Scotland, unless in very favourable seasons such as that of 1893. He also showed numerous fungi from West Kilbride, including *Agaricus (Lepiota) carcharias*, Pers., *A. (Mycena) pterigeus*, Fr., *Panus stipticus* (Bull.), *Leptoglossum viride* (Pers.), *Hymenoscypha (Trichoscypha) coronata* (Bull.), *Puccinia chrysosplenii*, Grev., &c.

Mr. Thomas B. Wilkie submitted specimens of *Aulacomnium androgynum*, Linn., from Cadder, which he stated was apparently an addition to the moss-flora of Clydesdale.

Lists of the Cryptogamic Plants observed at the excursions to Kilmahew and Finlaystone were submitted by Professor King and Mr. Boyd. (See page 61.)

28TH NOVEMBER, 1893.

Professor Thomas King, President, in the chair.

Lord Provost James Bell, 7 Marlborough Terrace, was elected a Life Member.

Mr. James Whitton, Superintendent of Parks, was elected an Ordinary Member.

Mr. Peter Blackstock, 37 Bouverie Street, Rutherglen, was elected an Associate.

Mr. James Steel showed a Grouse with abnormally marked plumage, the feathers on the breast being unusually light, and those on the back towards the tail unusually dark.

The Chairman exhibited specimens of the gum. leaves, and timber of the Kauri Pine (*Dammara australis*), and described the industry connected with the production of the gum. He also traced the development of its commercial value, and pointed out its position as an economic product in Europe up to the present time. Some interesting remarks with regard to the structure and economic importance of the timber were made by Mr. Joseph Sommerville.

Mr. R. S. Wishart, M.A., showed a collection of plants, chiefly Umbelliferae and Compositae, from Boulogne and Calais. The species, which were all rare or unknown in Scotland, included *Sison Amomum*, Linn., *Carum segetum*, Benth., *Dipsacus pilosus*, Linn., *Erigeron acre*, Linn., *Picris echioides*, Linn., and *Cnicus arvensis*, Hoffm., sub-sp. *setosus*, Breb.

Mr. Richard McKay exhibited microscopically a section of a bud of Horse-Chestnut (*Æsculus Hippocastanum*), and various other objects.

Mr. R. D. Wilkie made some remarks on the gemmæ produced by *Tetraphis pellucida*, Linn., *Webera annotina*, Hedw., and *Aulacomnium androgynum*, Linn., illustrative specimens of which were shown by him under the microscope.

The following communications were read:—

“Some Suggestions towards a better system of Local Scientific Research,” by Mr. D. A. Boyd.

“On some Entomostraca from Castlemilk, near Rutherglen,” by Mr. Thomas Scott, F.L.S., Corresponding Member (see page 69). This paper was illustrated by a series of specimens dredged by Mr. James Steel at Castlemilk.

26TH DECEMBER, 1893.

Professor Thomas King, President, in the chair.

The following were elected Ordinary Members:—Mr. George Bell Todd, M.B., C.M., Professor of Zoology in Anderson's College Medical School; Mr. James Rankin, B.Sc., Zoological Laboratory, Glasgow University; Mr. Thomas Robertson, 9 Westbank Quadrant.

Mr. D. A. Boyd exhibited specimens of *Trametes mollis* (Sommerf.) Fr., *Hydnum ochraceum*, Pers., and fully-developed green cups of *Chlorosplenium æruginosum* (Fl. Dan.) Tul., all which had been gathered by him at West Kilbride.

The Chairman showed specimens of *Bougainvillea spectabilis*, Juss., a showy South American shrub; also *Chroolepus aureus*, Linn., a fresh-water alga, from West Kilbride.

Mr. R. S. Wishart, M.A., submitted specimens of *Lolium temulentum*, Linn., a rare casual, which has occurred as a garden-weed at Stepps, near Glasgow.

Mr. G. A. Frank Knight, M.A., read a paper entitled “Some Remarks on the Land and Fresh-water Mollusca of Palestine” (see page 9), and exhibited a collection of illustrative specimens which he had gathered during a short visit to that country last summer.

Mr. D. A. Boyd submitted a paper entitled “Further Suggestions towards a better method of Local Scientific Research.”

30TH JANUARY, 1894.

Professor Thomas King, President, in the chair.

Mr. George M'Crie made some remarks on the method of establishing marine aquaria adapted for microscopic observations, and also on the use of the microscope in examining the organisms contained in the aquaria. Numerous illustrative specimens were exhibited by him.

Mr. Matthew Ballantine exhibited by lime-light a fine series of micro-photographs of botanical slides, illustrating the tissues of Vascular Cryptogams, Gymnosperms, and Angiosperms.

Rev. David Landsborough, Corresponding Member, showed a collection of twigs from trees and shrubs grown in Arran. Interesting details were submitted regarding the growth of each species.

Mr. Landsborough also read a paper on the various species of Gum-Tree (*Eucalyptus*) best adapted to the West of Scotland.

27TH FEBRUARY, 1894.

Professor Thomas King, President, in the chair.

Mr. L. Watt exhibited three forms of *Potamogeton polygonifolius*, Pour., from the Kilpatrick Hills, and specimens of *Zannichellia palustris*, Linn., from Dumbarton Common. He also showed several plants from the South of England, including *Inula Helenium*, Linn., *Chenopodium ficifolium*, Sm., *Eriophorum gracile*, Koch, *Spartina stricta*, Roth, and *S. Townsendi*, H. & J. Groves.

Mr. Watt also made some remarks on the various points of difference between *Carex irrigua*, Hoppe, and *C. limosa*, Linn., and exhibited illustrative specimens of these two sedges.

Mr. Robert Dunlop showed an interesting series of specimens, including a scorpion from Mount Lebanon; remains of a fresh-water crustacean (*Apus glacialis*) from Airdrie; and a fossil arctic willow, with other traces of plant life, from the boulder clay at Airdrie.

Mr. W. A. Dobie exhibited a specimen of a sea-spider (*Pycnogonum littorale*, O. F. Müll.), and made some remarks on the affinities, structure, and habits of the species.

Mr. David Robertson, F.L.S., F.G.S., showed an unusually large specimen of *Aglaophenia myriophyllum*, Linn., from the Firth of Clyde, and submitted some notes descriptive of this hydrozoon. (See page 83.)

Mr. Peter Ewing read a paper on *Alchemilla vulgaris*, Linn., and its allied forms, which he illustrated with a series of specimens. (See page 40.)

A paper on Fungi observed at West Kilbride was submitted by the Chairman (Professor King) and Mr. D. A. Boyd. (See page 61.)

27TH MARCH, 1894.

Professor Thomas King, President, in the chair.

The Chairman referred to the great loss which the Society had sustained through the death of Mr. Robert Turner. He moved and it was unanimously agreed that a memorial notice of the deceased should be prepared by the Secretary and read at next meeting of the Society.

Mr. Alexander Ross, 14 Otago Street, was elected an Ordinary Member.

Mr. John Grieve, M.A., M.D., F.R.S.E., F.L.S., exhibited specimens of Trepang, *Holothuria edulis*, Less. After describing the structural characteristics of this and allied species of Echinodermata, he made some remarks on the commercial value of Trepang as a food product. Various kinds are sold in the Canton market, and these differ greatly in price. The Kurok Trepang, from Borneo, sells at £9 7s. 6d. per picul of 133 lbs., while the small bald Trepang, from Leucoma, only fetches 7 dollars. In Mr. Savile Kent's beautiful book entitled *The Great Barrier Reef of Australia*, which was published several months ago, some interesting particulars are given regarding the mode of gathering and preparing this article of food, and also regarding its market value. The animals are collected at the two low tides (*i.e.* for eight or ten days of the lunar month), and are obtained by wading or diving in from two to five fathoms of water. They are boiled for twenty minutes, split longitudinally and gutted like herring, washed, and laid out in the sunshine to dry. When the moisture has about all evaporated, they are stacked in the smoke-house in tiers of wire-netting and smoked for twenty-four hours, the wood used being the red mangrove (*Rhizophora mucronata*). If properly cured, they should then have become as hard as stones, should rattle like walnuts in a bag, and should have all shrunk to the length of six inches or less, and become in appearance very like charred sausages. They are then ready for the market, and some of the best are packed in tin cases. The largest species collected

for food is the prickly red-fish, which measures from 4 to 5 feet in length when fully extended, and about 4 or 5 inches in diameter. 18 inches is the ordinary length of the black, red, and teat-fish, and they contract to about half that size. The following is the market price per ton obtained for the various kinds commonly in use:—prickly red-fish (*Stichopus variegatus*), £30 to £40; ordinary deep-water red-fish (*Actinopyga obesa*), £100 to £110; surf red-fish (*A. mauritiana*), £80; deep-water black-fish (*A. polymorpha*), runs to £110; ordinary black-fish, £80 to £90; black ordinary teat fish (*Holothuria mammifera*) runs up to £140 and £150; large lolly-fish (*H. vagabunda*), £35. These last have been obtained at a depth of 18 fathoms. All the species mentioned are employed in the preparation of soup, which is said to resemble turtle-soup, and may be obtained in Sydney restaurants.

Mr. D. A. Boyd, Vice-President, showed specimens of *Rhopoglyphus flicinus* (Fr.) Fckl., from West Kilbride.

Professor F. O. Bower, D.Sc., F.R.S., F.R.S.E., F.L.S., gave a demonstration on the Sporangia of Vascular Cryptogams and their development. In elucidation of the subject, a large series of lantern-slides were exhibited by lime-light.

Mr. Robert Dunlop submitted a number of photographic views of birds' nests, &c., which were exhibited by means of the lantern.

24TH APRIL, 1894.

Professor Thomas King, President, in the chair.

The Secretary (Mr. R. S. Wishart, M.A.) read a memorial notice of the late Mr. Robert Turner. (See page 73.)

The following were elected Ordinary Members:—Dr. Marcus Calder, 12 Union Street, Greenock; Miss Rachel Pirret, 9 Rosslyn Terrace, Kelvinside; Mr. William W. Thomson, Pomona Cottage, Stepps.

Reports on recent excursions to Blythswood and Ardgowan were respectively submitted by Messrs. R. D. Wilkie and John Cairns, Jun. (See pp. 122, 123.)

Mr. D. A. Boyd, Vice-President, exhibited specimens of *Uromyces scillarum* (Grev.) Winter, which occurs as a parasite on leaves of *Scilla nutans* in several localities near West Kilbride.

He also submitted fertile specimens of *Peltidea aphthosa* (Linn.) Ach., and *Peltigera horizontalis* (Linn.) Hoffm., from the neighbourhood of Largs.

The Chairman showed specimens of *Ralfsia verrucosa*, Aresch., from the sea-shore at Seamill.

Mr. R. S. Wishart, M.A., exhibited an interesting series of Grasses, including *Digitaria humifusa*, Pers., *Setaria verticillata*, Beauv., and *Glyceria plicata*, Fr., var. *pedicellata*, Towns., from Boulogne-sur-mer, with allied British species for comparison.

The following papers were submitted :—

“Notes on the Anatomy of a form of Cyclopean, with Remarks on the Significance of Cyclopeans.” By R. Broom, M.B., C.M., B.Sc., Hillgrove, New South Wales. (See page 31.)

“Meteorological Notes, and Remarks upon the Weather during the year 1893, with its General Effects upon Vegetation.” By Mr. James Whitton, Superintendent of Parks. (See page 16.)

“The Homologies of Flowering-Plants and Cryptogams.” By Rev. A. S. Wilson, M.A., B.Sc.

“The Peronosporæ of North Ayrshire.” By Mr. D. A. Boyd, Vice-President. (See page 28.)

Natural History Society of Glasgow.

ABSTRACT STATEMENT OF ACCOUNTS—SESSION 1892-93.

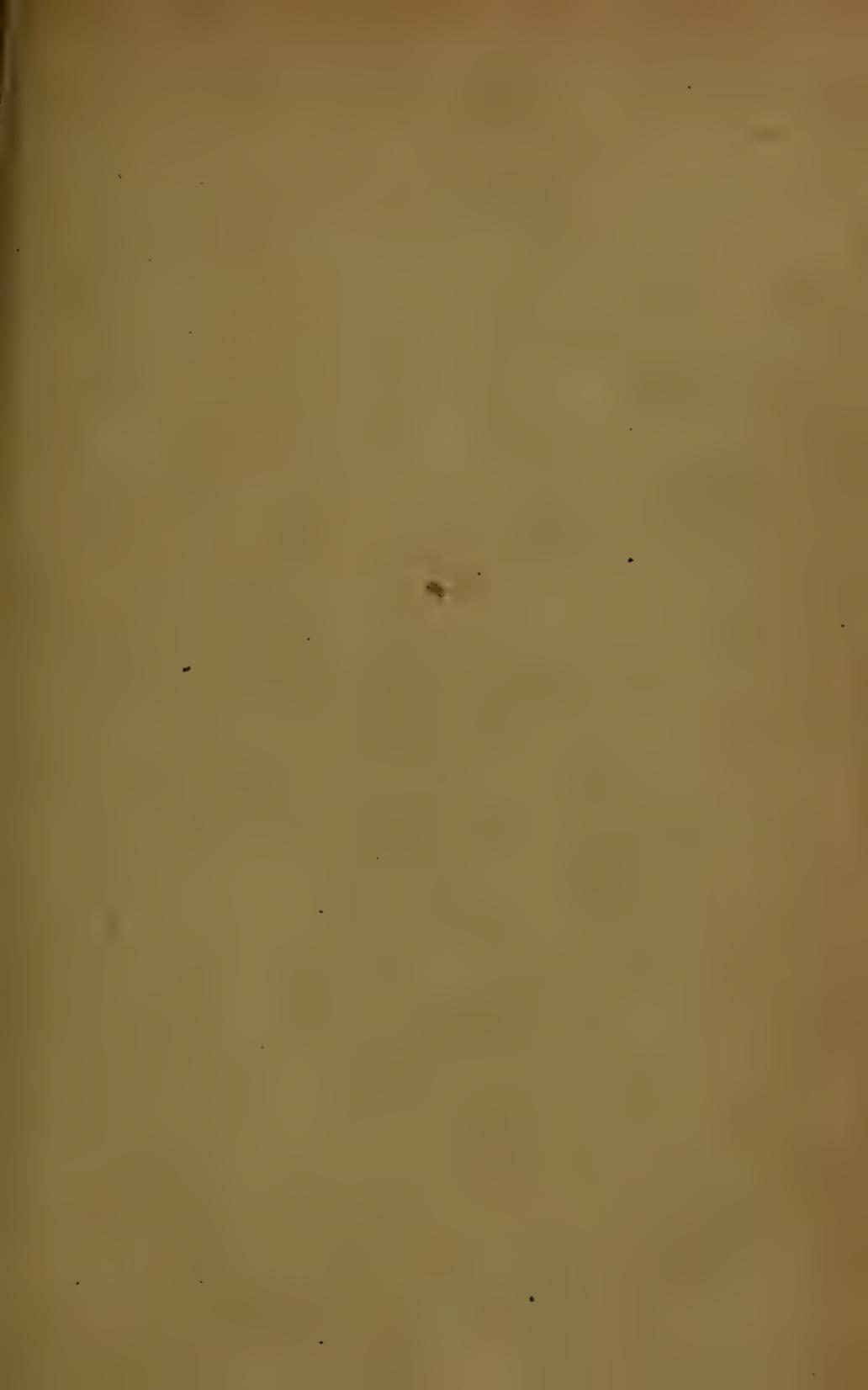
1892.—Sept. 1.		1893.—Aug. 31.	
To Balance in National Security		By Rent and Attendance,	£8 13 6
Savings Bank, - - -	£50 0 0	Postage, Stationery, &c., - - -	11 9 3½
Balance in Treasurer's hands, - - -	3 5 8	Printing Circulars, - - -	10 14 0
	£53 5 8	Printing Proceedings, - - -	63 14 0
1893.—Aug. 31.		Carriage on Proceedings and Exchanges, - - -	2 11 0½
To 195 Members' Annual Subscriptions @ 7s. 6d.,	73 2 6	Library—New Books, - - -	8 0 0
Entry-money @ 7s. 6d., - - -	2 5 0	Insurance, Postages, &c., - - -	0 16 5
Arrears, - - -	3 7 6	Binding, - - -	5 12 10
17 Associates' Subscriptions @ 2s. 6d., - - -	2 2 6	Balance in National Security	
Arrears, - - -	0 2 6	Savings Bank, - - -	£39 0 0
Interest, - - -	6 11 3	Less due to Treasurer,	6 10 9½
Proceedings sold, - - -	3 3 4½		32 9 2½
	£144 0 3½		£144 0 3½
		Life Members' Fund—	
		Invested in 5 per cent. Debentures of The Modern Per-	
		manent Building and Investment Society, Melbourne, - - -	£100 0 0
		On Deposit Receipt in Clydesdale Bank, - - -	15 10 0
			£115 10 0

GLASGOW, 18th October, 1893.—We have examined the Books for the year 1892-93, and have compared the Vouchers, and find them correct; the sum in the National Security Savings Bank being Thirty-nine Pounds, and the amount due to Treasurer being Six Pounds Ten Shillings and Ninepence-Halfpenny Sterling. We have also seen the Vouchers for the Capital Account, amounting to One Hundred and Fifteen Pounds Ten Shillings.

(Signed) THOS. G. BISHOP, }
W. A. DOBIE, }
Auditors.



Pres
1893



PUBLICATIONS
OF THE
NATURAL HISTORY SOCIETY OF GLASGOW.

PROCEEDINGS—

Vol. I.	Part 1.	228 pp.	3 Plates.	1850-58.	(<i>out of print</i>)
"	"	2.	156 pp.	4 "	1868-69. Price 4/.
Vol. II.	Part 1.	164 pp.	1 "	1869-71.	" 3/6.
"	"	2.	192 pp.	2 "	1871-75. " 4/6.
This Part contains Titles and Contents for Vols. I. and II.					
Vol. III.	Part 1.	100 pp.	-	1875-76.	" 2/6.
"	"	2.	128 pp.	2 Plates.	1876-77. " 2.
"	"	3.	192 pp.	1 "	1877-78. " 3/6.
This Part contains Title and Contents for Vol. III.					
Vol. IV.	Part 1.	114 pp.	4 Plates.	1878-79.	" 4/.
"	"	2.	218 pp.	2 "	1879-80. " 4/6.
This Part contains Title and Contents for Vol. IV.					
Vol. V.	Part 1.	154 pp.	2 Plates.	1880-81.	" 4/.
"	"	2.	100 pp.	3 "	1881-82. " 3/.
"	"	3.	71 pp.	-	1882-83. " 2/.
This Part contains Title and Contents for Vol. V.					

INDEX TO PROCEEDINGS, Vols. I. to V. - 1851-83. Price 3/.

PROCEEDINGS AND TRANSACTIONS (New Series)—

Vol. I.	Part 1.	136 pp.	-	1883-84.	Price 3/.
"	"	2.	169 pp.	3 Plates.	1884-85. " 4/6.
"	"	3.	220 pp.	3 "	1885-86. " 5/6.
This Part contains Title and Index for Vol. I.					
Vol. II.	Part 1.	182 pp.	2 Plates.	1886-87.	" 4/6.
"	"	2.	272 pp.	1 "	1887-88. " 6/.
This Part contains Title and Index for Vol. II.					
Vol. III.	Part 1.	112 pp.	1 Plate.	1888-89.	" 3/.
"	"	2.	108 pp.	1 "	1889-90. " 3/.
"	"	3.	190 pp.	-	1889-92. " 4/6.
This Part contains Title and Index for Vol. III.					
Vol. IV.	Part 1.	158 pp.	1 Plate.	1892-94.	" 4/.

THE FAUNA OF SCOTLAND, with special reference to Clydesdale and the Western District:

Mammalia.	By E. R. Alston, F.Z.S., F.L.S.,	-	-	Price 1/6.
Crustacea—Part I. Ostracoda.	By David Robertson, F.L.S., F.G.S.,	-	-	Price 1/6.
Hymenoptera—Part I.	By Peter Cameron, F.R.S.,	-	-	" 1/6.
"	" II. " " "	-	-	" 1/6.
THE DECAPOD AND SCHIZOPOD CRUSTACEA OF THE FIRTH OF CLYDE.	By J. R. Henderson, M.B., F.L.S.,	-	-	Price 2/.
A CONTRIBUTION TOWARDS A CATALOGUE OF THE AMPHIPODA AND ISOPODA OF THE FIRTH OF CLYDE.	By David Robertson, F.L.S., F.G.S.,	-	-	Price 3/6.
A FURTHER CONTRIBUTION TOWARDS A CATALOGUE OF THE AMPHIPODA AND ISOPODA OF THE FIRTH OF CLYDE AND WEST OF SCOTLAND.	By David Robertson, F.L.S., F.G.S.,	-	-	Price 1/6.
A CONTRIBUTION TOWARDS A NEUROPTEROUS FAUNA OF IRELAND.	By James J. F. X. King, F.E.S.,	-	-	Price 1/6.
A CATALOGUE OF THE BRITISH TENTHREDINIDÆ.	By Peter Cameron, F.E.S.,	-	-	Price 1/.

Printed on one side of the paper, for the use of Collectors.

NOTES ON THE FAUNA AND FLORA OF THE WEST OF SCOTLAND, with Lists.
Compiled for the Meeting of the British Association, Glasgow,
September, 1876. Small 8vo. Price 1/6.

Copies of any of the above may be had from the Hon. Librarian, Mr. JAMES MITCHELL, 240 Darnley Street, Pollokshields, Glasgow.

TRANSACTIONS
OF THE
NATURAL HISTORY SOCIETY
OF GLASGOW

(INCLUDING THE PROCEEDINGS OF THE SOCIETY).

VOL. IV. (NEW SERIES.) PART II.

1894-95.

WITH TWO PLATES.



GLASGOW: PUBLISHED BY THE SOCIETY
AT ITS ROOMS, 207 BATH STREET.

1896.

TRANSACTIONS
OF THE
NATURAL HISTORY SOCIETY
OF GLASGOW

(INCLUDING THE PROCEEDINGS OF THE SOCIETY).

VOL. IV. (NEW SERIES.) PART II.

1894-95.

WITH TWO PLATES.



GLASGOW: PUBLISHED BY THE SOCIETY
AT ITS ROOMS, 207 BATH STREET.

1896.

CONTENTS.

	PAGE
Occurrence of <i>Cladium germanicum</i> , Schrad., in Bute. By James Ballantyne, Rothesay, - - - - -	167
A Day with the Dredge at Machrie Bay, Arran. By Rev. G. A. Frank Knight, M.A., - - - - -	169
<i>Bonnemaisonia asparagoides</i> , C. Ag., that gave a blue stain to paper. By David Robertson, F.L.S., F.G.S., - - - - -	172
<i>Halicystis ovalis</i> (Areschoug), an Alga, from Lamash. By David Robertson, F.L.S., F.G.S., - - - - -	174
A Passing Glance at the Flora of Palestine. By Rev. Hugh Macmillan, D.D., LL.D., F.R.S.E., Corresponding Member, -	175
Notes on the Irruption of Little Auks (<i>Mergulus alle</i> , L.) in*the Winter of 1894-5 on the West of Scotland—Oban to Ayr. By John Paterson, - - - - -	195
Contribution to the Topographical Botany of the West of Scotland. By Peter Ewing, F.L.S., - - - - -	199
<i>Cystopteris montana</i> , Bernhardt, in Stirlingshire. By A. Somerville, B.Sc., F.L.S., - - - - -	215
<i>Lima hians</i> , Gmel., and its Mode of Life. By J. D. F. Gilchrist, M.A., B.Sc., Ph.D., - - - - -	218
<i>Plantago maritima</i> , L., its Distribution in Ayrshire. By John Smith, Corresponding Member, - - - - -	226
Meteorological Notes, and Remarks upon the Weather during the Year 1894, with its General Effects upon Vegetation. By James Whitton, Superintendent of Parks, Glasgow, - - - - -	229
The Little Auk (<i>Mergulus alle</i> , L.). By W. Craibe Angus, - - -	241
Jottings from my Note-Book. By Dr. David Robertson, F.L.S., F.G.S.—The Gulls and their Neighbours, - - - - -	244
Records of Measurements of Trees made in 1893 and 1894. By Richard M'Kay and John Renwick (with Two Plates [II. and III.]), - - - - -	246
A Word about Wasps. By James Campbell, C.M., - - - - -	265
Reports on Excursions—	
Castle Wemyss; Ross Hall, Crookston, - - - - -	268
West Kilbride, - - - - -	269
Roseneath, - - - - -	271
Dougalston Loch; Tullichewan Castle, - - - - -	272
Garnkirk; Monkton; Botanic Gardens; Balfron, - - - - -	274
Auchenharvie and Montgreenan, - - - - -	274
Ardeer Sandhills, - - - - -	274
Strathleven, - - - - -	275
Cochno, - - - - -	277

	PAGE
Proceedings of the Society, - - - - -	-280-314
Some Results of "Anchor Work in the Laminarian Zone." By Rev. G. A. Frank Knight, M.A., - - - - -	280
Spiders from Corrie and Dalry. By Frank L. Grant, M.A., - - -	282
On the Occurrence of <i>Pyrola minor</i> , L., var. <i>arenaria</i> , L.B., on the Ardeer Sandhills. By John Smith, Corresponding Member, -	283
Waste-heap Plants from Crossmyloof. By T. B. Wilkie, -	284, 286
On the Occurrence of <i>Puccinia ribis</i> , DC., new to Britain. By Rev. Dr. Keith, Forres, Corresponding Member, - - - - -	287
Report of the Council on the Business of Session 1893-94, - - -	288
Election of Office-Bearers for Session 1894-95, - - - - -	290
Invitation to Members to visit the Marine Station at Millport. By Dr. David Robertson, F.L.S., F.G.S., - - - - -	291
<i>In Memoriam</i> —Mr. Donald Farquhar and Mr. John Stewart, -	292
Notes on the "Cruickston Dollar." By C. Sherry, - - - - -	294
A List of Wigtownshire Plants. By James M'Andrew, Corre- sponding Member, - - - - -	295
Notes on the Molluscan genus <i>Lima</i> , Bruguière. By A. Somer- ville, B.Sc., F.L.S., - - - - -	296
The Distribution of <i>Juncus tenuis</i> , Willd., in Britain and abroad. By A. Somerville, B.Sc., F.L.S., - - - - -	297
New Library Catalogue; gift of Mr. D. Mackinnon, - - - - -	299
Appointment of Finance Committee, - - - - -	299
On <i>Sargassum bacciferum</i> , Agardh. By Professor Thomas King, -	300
On the newly-determined Pondweed, <i>Potamogeton Bennettii</i> , Fryer. By Colonel J. S. Stirling and R. Kidston, F.R.S.E., F.G.S., -	300
Abstract Statement of Accounts for Session 1893-94, - - - - -	302
List of Office-Bearers, Members, and Associates, - - - - -	303

Occurrence of *Cladium germanicum*, Schrad., in Bute.

By J. BALLANTYNE, Rothesay.

[Read 30th October, 1894.]

IN the north end of the Island of Bute, between the Black, Sight, and Mulich Hills, at an elevation of some 433 feet, is a sheet of water known as the Bull Loch. The loch is said to derive its name from bull-headed fish which have been caught in it. The name more probably refers to the bull trout, *Salmo trutta*, which could obtain easy access to the loch by the Lagganbeg Burn, which flows from the western end, and empties itself into the Kyles of Bute. It may be that char or alpine trout, *Salmo salvelinus*, are caught in it, and are termed bull trout, as is sometimes the case in Highland districts.

Accompanied by Mr. James Lyle, M.A., Rothesay, I visited the loch for the first time on the 4th of August last (1894), and as we passed along its south side, we noticed a plant, which was new to us, growing amongst large quantities of the common reed, *Phragmites communis*, Trin. The plant we afterwards ascertained to be *Cladium germanicum*, Schrad., recorded in Hooker's "Student's Flora," third edition, as obtained in Scotland in Sutherland, Berwick, and Wigtown shires only. As it has not previously been recorded, so far as we know, for the Clydesdale District and West of Scotland I have pleasure, at the request of Professor King, in submitting it for your inspection.

It was found growing in from 2 to 3 feet of water, at a distance of 5 to 10 feet out from the margin of the loch, which is not sloping on this side but about 2 feet deep. The plants were growing on a soft mossy bottom in some eight or nine different spots, from near the outlet of the loch, along its southern side for a distance of a half to two-thirds of its length.

Not knowing at the time that the plant is so rare in Scotland, we simply took specimens from the upper part of the stem, and therefore I cannot say anything about its root-stock; but the following is a description from the specimens obtained:—

Stems obscurely trigonous, and 3 to 4 feet in length. Leaves very long, the points triangular and about half the length of the

leaf; the margins and keel strongly serrulated. Bracts sheathing, leafy, and gradually becoming smaller upwards, with their points triangular, and margins and keel serrulated. Cymes on variable peduncles, axillary and terminal, with spikelets clustered in pedicelled heads. Scales or glumes five, pale brown; lower ones short, ovate, obtuse and barren; upper oblong-lanceolate, and flowering, one staminate and one fertile. Stamens two, with apiculate anthers. Styles three.

The plant was not far enough advanced for me to get the nuts for examination, but they are said to be "small, ovoid, trigonous beaked, and brown."

The principal difference between this plant and the description given in "The Student's Flora" is in the bracts, which are described as setaceous, whereas in the Bull Loch specimens they are in every respect similar to the leaves, only smaller. Whether the fact of it growing in a loch instead of in bogs and marshes, the habitat hitherto recorded for it, has anything to do with the extra development of the bracts it would be difficult to say, but it is possible the difference in its habitat may modify it to a certain extent.

As to the question whether the plant has recently made its appearance in the loch or been there for a considerable length of time, I think the evidence is in favour of the latter theory. It seems likely to have been at one time fairly plentiful in Scotland, but now becoming extinct. We would, at least, infer this from its present distribution over Scotland, since it is found in Sutherlandshire in the north, and in Berwick and Wigtown shires in the south. It is also said to be local in England, although found in a number of counties. This would indicate that it is becoming extinct more rapidly in the northern country. Its growing in so many spots in the Bull Loch also favours the idea that at one time it has been quite plentiful there, but is now becoming exterminated; and I am inclined to think *Phragmites* may have something to do with this, as this plant is growing in great profusion along all that side of the loch, and seems to leave very little room for anything else to grow.

"A Day with the Dredge at Machrie Bay, Arran."

By REV. G. A. FRANK KNIGHT, M.A.

[Read 30th October, 1894.]

PERHAPS the greatest charm of field-work in any department of Natural History is the charm of the unknown. The Rambler never can tell what he may light on in the form of some rare or curious organism. To the marine dredger this conviction of never knowing what may next turn up constitutes the mainstay of his hope. He lets down his insignificant implement into the depths, and faith is always vigorous that his work will, in some way or other, be rewarded.

It was from a desire to explore the bottom in a new locality, and to obtain some idea of the Mollusca of the district, that I conveyed my dredge, sieves, ropes, bottles, &c., to Machrie Bay in August last. The coastline on the west of Arran is slightly curved inwards at the part opposite to Brodick, and Machrie Bay is the area lying between Dugary Lodge on the north and King's Cove on the south. From the physical configuration of the land one would expect a very gradual shelving of the bank into the Kilbrannan Sound, and on a reference to the chart this presupposition is confirmed. The plain of Tormore is continued westwards into the sea for a mile or so, and only then dips down somewhat suddenly to about 30 fathoms. Between this and the Cantyre coast the greatest depth is only 47 fathoms, although opposite Dugary it reaches 60, and a little farther north 73 fathoms.

Owing to the open character of the channel towards the south, the incoming Atlantic swell round the Mull renders dredging in this quarter possible only when weather is favourable. On a calm day—August 21st—I found myself in a small boat off Tormore, accompanied by my uncle, Mr. A. Somerville, F.L.S. An "ancient mariner" of the neighbourhood was taken to assist in rowing, but his muscular exertions seemed hardly on a par with the force of his criticisms on our scientific "folly." He probably felt justified in his own opinion, for it rained during almost the entire three hours we were out, with that peculiar pertinacity for which our climate is renowned. Pulling straight out about three quarters of

a mile, we let down the dredge in 20 fathoms. The bottom was muddy sand, which, on being washed, disappeared rapidly through the meshes of the sieves. A second haul—in 29 fathoms—was disappointing, the bag coming up all but empty. Perhaps the most annoying circumstance in a dredger's work is when an under-current, running contrary to that on the surface, negatives the hard and steady pulling at the oars. A third and last haul was more successful, the sand yielding, on examination, some of the less common *Rissoe*. Among the species of more particular interest obtained were *Nucula sulcata*, Bronn., *Axinus croulinensis*, Jeff., *Scrobicularia prismatica* (Mont.), *Rissoa abyssicola*, Forb., *R. inconspicua*, Ald., *R. proxima*, Ald., *R. vitrea* (Mont.), *Odostomia Scillæ* (Scac.), *Pleurotoma costata* (Don.), and *P. brachystoma*, Phil.

What strikes every one who has had opportunity of employing the dredge is, as a rule, not the wealth of specimens obtained, but the number of species represented frequently in a day's work. The dredge in the three hauls we had did not probably work over more than a few dozen yards of the bottom, and yet some 51 species and varieties of Mollusca were met with.

I desire, in closing, to express my obligations to Mr. J. T. Marshall, of Torquay, for subjecting the siftings obtained to a minute investigation, and for his kindness in determining some of the rarer species. The following is a complete list of what were obtained:—

Anomia ephippium, L.	Venus gallina, var. laminosa, Mont.
Pecten opercularis (L.).	Lucinopsis undata (Penn.).
Mytilus modiolus, L.	Psammobia ferröensis (Chem.).
Nucula sulcata, Bronn.	Mactra subtruncata (Da C.).
„ tenuis (Mont.).	Scrobicularia prismatica (Mont.).
Montacuta bidentata (Mont.).	„ nitida (Müll.).
Axinus flexuosus (Mont.).	„ alba (Wood).
„ croulinensis, Jeff.	Solecurtus antiquatus (Pult.).
Cardium echinatum, L.	Solen pellucidus, Penn.
„ fasciatum, Mont.	Thracia prætenuis (Pult.).
„ nodosum, Turt.	Corbula gibba, Olivi.
„ minimum, Phil.	Mya truncata, L.
Cyprina islandica (L.).	Saxicava rugosa (L.).
Venus lineta, Pult.	Dentalium entalis, L.
„ gallina, L.	

<i>Helcion pellucidum</i> (L.).	<i>Odostomia Scillæ</i> (Scac.).
„ <i>pellucidum</i> , var. <i>lævis</i> (Penn.).	<i>Natica Alderi</i> , Forb.
<i>Capulus hungaricus</i> (L.).	„ <i>Montacuti</i> , Forb.
<i>Rissoa abyssicola</i> , Forb.	<i>Aporrhais pes-pelecani</i> (L.).
„ <i>inconspicua</i> , Ald.	<i>Pleurotoma costata</i> (Don.).
„ <i>proxima</i> , Ald.	„ <i>brachystoma</i> , Phil.
„ <i>vitrea</i> (Mont.).	„ <i>turricula</i> (Mont.).
<i>Turritella terebra</i> (L.).	<i>Cylichna umbilicata</i> (Mont.).
<i>Odostomia pallida</i> (Mont.).	„ <i>cylindracea</i> (Penn.).
„ <i>rufa</i> , var. <i>fulvocincta</i> (Thomp.).	<i>Actæon tornatilis</i> (L.).
	<i>Bulla utriculus</i> , Broc.
	<i>Philine scabra</i> (Müll.).

Shore search at Machrie Bay enabled me to add the following to the list of species occurring in the locality. It will be observed that in several instances a species has been repeated, as I have thought it best to keep the two lists independent of each other :—

<i>Pecten maximus</i> (L.).	<i>Mya truncata</i> , L.
<i>Mytilus edulis</i> , L.	<i>Patella vulgata</i> , L.
<i>Pectunculus glycymeris</i> (L.).	„ <i>vulgata</i> , var. <i>depressa</i> , Penn.
<i>Lucina borealis</i> (L.).	<i>Trochus magus</i> , L.
<i>Cardium edule</i> , L.	„ <i>cinerarius</i> , L.
„ <i>norvegicum</i> , Speng.	„ <i>zizyphinus</i> , L.
<i>Venus exoleta</i> , L.	<i>Littorina obtusata</i> (L.).
„ <i>fasciata</i> (Da C.).	„ <i>rudis</i> , Maton.
„ <i>casina</i> , L.	„ <i>littorea</i> (L.).
„ <i>gallina</i> , L.	<i>Purpura lapillus</i> (L.).
<i>Tapes pullastra</i> (Mont.).	<i>Buccinum undatum</i> , L.
<i>Tellina crassa</i> (Penn.).	<i>Fusus antiquus</i> (L.).
„ <i>balthica</i> , L.	„ <i>gracilis</i> (Da C.).
„ <i>tenuis</i> , Da C.	<i>Nassa reticulata</i> (L.).
<i>Mactra subtruncata</i> (Da C.).	<i>Cypræa europæa</i> , Mont.
<i>Lutraria elliptica</i> , Lmk.	
<i>Solen siliqua</i> , L.	

Deducting, then, the three species—*Venus gallina*, *Mactra subtruncata*, *Mya truncata*—common to both lists, the total number of species and varieties of Mollusca obtained in the day's work was 80.

Bonnemaisonia asparagoides, C. Ag., that gave a blue stain to paper.

By DAVID ROBERTSON, F.L.S., F.G.S.

[Read 26th December, 1894.]

A SPECIMEN of this alga was mounted in the usual way, on paper, in sea water. Nothing was noticed unusual about it till it was taken out of the press a day after, still in a damp state. It was then noticed that it had stained the paper a dark blue. It was supposed that it had become stained with ink, as the colour was much like that with which I had been writing. On closer examination, it was seen that the colour had issued from along the branches only, and must have come from the connecting points of the plant and the paper. Another specimen of the same alga was tried in a similar way, with a like result. Other red seaweeds, mounted by the same process, and on the same paper, were not affected in this manner. Again, another piece of *Bonnemaisonia* was mounted on a similar, though a different, paper, but in this no change took place. I was curious to know if this was common to the alga. Accordingly I sent a stained piece to Mr. George Murray, F.L.S., of the British Museum, who handed it over to Mr. A. Batters, F.L.S., an eminent Marine Botanist, who writes me—"I have been examining the specimen of *Bonnemaisonia* on the stained paper that you sent to the British Museum. When a thin slice of the paper is examined under the microscope, the stain is seen to be made up of a number of minute bluish-violet grains, the colour being precisely that of starch stained by iodine. I am inclined to think there has been an excess of starch in the dressing of the paper, and that it has been acted on by the iodine contained in the alga." He adds—"In ordinary cases *Bonnemaisonia* does not act in this manner." What Mr. Batters suggests is most likely, in a great measure, to be correct—namely, that the blue stains most probably arise from

the union of starch in the paper with iodine in the alga. Taking for granted that there had been an excess of starch in the dressing of the paper on which the plant is mounted, and that free iodine can be taken directly from the living sea-weed, the question still remains—why did not the starch in the same paper act on other sea-weeds in a similar way?

Jottings from my Note-book.

By DAVID ROBERTSON, F.L.S., F.G.S.

HALICYSTIS OVALIS (Areschoug), an Alga, specimens of which were exhibited.

[Read 29th January, 1895.]

I HAVE not had the opportunity of seeing any book in which this species has been recorded, therefore I can say little of its habits or distribution further than what has come under my own observation. About two years ago Dr. Murray, of the *Challenger*, in his yacht *Medusa*, in company with Professor Schmitz, and Mr. George Murray of the British Museum, when dredging in Kilbrannan Sound in 8 to 9 fathoms on a bottom of *Melobesia*, met with a single specimen of this species about the size of an ordinary garden pea. I am not aware that it had been obtained prior to this in Britain. I had the privilege of seeing the specimen, which gave me the hope that if it ever came under my notice I would most likely detect it. In the month of September last, at Lamlash, Arran, on one of our dredging excursions, on a bank of *Melobesia* in 7 fathoms, near the north channel of the bay, first one and then another of the highly-prized *Halicystis* were secured by Mrs. Robertson, and by close search on various occasions a large number were obtained, but mostly all small, many not much larger than an ordinary-sized pin's head. They are somewhat ovate, colour pale green, attached by a short peduncle to the branches of *Lithothamnion coralloides* (Cru.), and its var. *sub-simplex* (Batters). On looking for what we usually call a sea-weed, without a previous knowledge of the appearance of *Halicystis ovalis*, it is so like the ova of some animal that it might be readily mistaken for such.

A Passing Glance at the Flora of Palestine.

By Rev. HUGH MACMILLAN, D.D., LL.D., F.R.S.E.

[Read 26th February, 1895.]

PALESTINE was Divinely designated "a land flowing with milk and honey." But that description hardly applies to it now. The great outlines of the scenery are still very much what they ever were, but the subordinate features are almost entirely altered. The country is laid waste; its terraces broken down, and the soil washed away from them; its woods and forests have disappeared; and thorns and thistles have covered its fields, long withdrawn from cultivation. The first sight of Palestine is more or less disenchanting for these reasons. No one can recognise the sacred scenes of his imagination in the hoary wilderness, haggard and austere, which spreads before his eyes.

And yet, in spite of all these changes, no country possesses a richer or more varied flora. It is questionable, indeed, if the fact of its being so generally uncultivated has not provided more favourable conditions for the growth and spread of wild flowers, than when every inch of its soil was made productive. More plants are crowded together in the extreme south of Africa than in any other part of the globe; and the same may be said of the Holy Land. It represents the region of maximum species. This result is to be attributed to the variety of its physical structure and conformation, as well as to the variety of its climate and meteorology. Indeed, there is no country in the world which presents such a variety within the same limited area. In Palestine we see spread out horizontally, what we see vertically on any lofty mountain rising above the snow-line in the tropics—a near conjunction of different types of vegetable life, ranging from the arctic plants of the snowy summit to the tropical botany at the base. These two extremes exist in a temperate climate. A tropical mountain, which would exhibit vertically these contrasts of climate and of productions, would have its general surface

tropical, harmonising with the region in which it stood. But in Palestine, while the general surface of the country is temperate, the contrasts of climate and productions are secured by lifting, within a small area, one part to the arctic heights of the Lebanon, and sinking the other part to the tropical depths of the Jordan Valley.

That Jordan Valley is the special feature of Palestine. It is an extraordinary depression or crevasse in the bowels of the earth, extending from a little above the Sea of Galilee down to the southern extremity of the Dead Sea. It is altogether unique. There is nothing like it anywhere else. The country ascends in the north about 10,000 feet above the level of the sea, and sinks in the south to a depth of 1,320 feet below the level of the sea. The climate of the former region is therefore temperate, while that of the latter is semi-tropical. Between these two extremes, the various climates of different localities differ as much from each other as those of England and India. And the vegetable productions are equally dissimilar.

The Botany of Western Palestine differs but little from the Botany of Italy, Southern Europe, and Asia Minor. We find the same genera and species largely in the Riviera. But the Botany of Eastern Palestine, and especially of the Valley of the Jordan and the Dead Sea Basin, is entirely different from the European flora. The plants of Lebanon remind us of those of Northern Europe; those of Galilee, Samaria, and Jerusalem, of Italy, Spain, and Greece; and those of Jericho and the Jordan Valley, of Arabia, India, and Egypt. The great bulk of the Palestine plants belong to what is called the Germanic flora. The largest genus of plants is *Astragalus*, a Leguminous tribe, which has no less than seventy species belonging to it, covering in most cases, in great profusion, the drier and more barren districts. These species of *Astragalus* are nearly all identical, or very closely allied, to the *Astragali* of the lower ranges of the Himalayas, or the hills of Afghanistan. Being an Asiatic more than a European family, they must have emigrated westward from the Indian mountains to the hill country of Palestine during a late period in its geologic history. The hundred or so species of semi-tropical plants which belong to the Jordan Valley and the basin of the Dead Sea, some of which are of Indian, but most are of African type, were

brought to this region when there was a close unbroken connection, during the later Miocene period, between it and Africa.

This peculiar African flora is associated with a peculiar African fauna. The little Sun-bird and the Orange-winged Blackbird of tropical Africa are confined, in Palestine, exclusively to the Valley of the Jordan. Tristram's Night-jar, found in the Jordan Valley only in Palestine, has been discovered in Southern Abyssinia. In the Sea of Galilee, there are fishes of the Siluroid type which belong to a group essentially African, and which are almost identical with those occurring in Lakes Nyanza and Tanganyika. There are also shells of the Melanopsis type found in the Sea of Galilee, which occur in larger and more luxuriant forms in the great Equatorial lakes. The Egyptian Crocodile still lingers in the marshes of the Wady Zerka, or Crocodile River, which flows through the north-west corner of the Plain of Sharon under Carmel; the little Coney, or Hyrax, of the deep ravines of the Wilderness of Judea, belongs to an African type, and is closely allied to the great African pachyderms the Hippopotamus and Rhinoceros; and the marshy Lake of Merom, or Huleh, to the north of the Sea of Galilee, is almost choked up with enormous quantities of the Papyrus—not the *Papyrus syriacus* which occurs along the coast of Palestine and lines the banks of the Kishon at Carmel—but the true *Papyrus antiquorum* (the bulrush of the Nile), which is now to be found in that river only as far south as Gondokoro. All this African flora and fauna in the Valley of the Jordan are relics of the later Miocene period, when a most remarkable depression of the earth's crust extended from beyond Baalbec, down through the Jordan Valley and the Dead Sea, through the Gulf of Akabah and the Red Sea, as far as the great lakes of Central Africa. This depression has been in parts filled up by volcanic elevation, and by the silt and debris of streams and rivers, causing the isolation of certain parts, and the formation of a great chain of lakes in the hollows, corresponding to the great chain in North America running from Winnipeg to Ontario. The Red Sea and the Nile Valley, Lakes Nyanza, Nyassa, and Tanganyika, are therefore all parts of the same geological system which includes the Dead Sea, the Valley of the Jordan, the Sea of Galilee, Lake Huleh, and the great Plain of Cœle-Syria, north of Damascus.

After the warm Tertiary period in Palestine, the land became elevated ; the water that filled the whole rift from Baalbec to the Dead Sea, and converted it into a great lake, was drained, leaving only Lake Huleh, the Sea of Galilee, and the Dead Sea ; and then came a period of great cold. This cold was scarcely felt by the plants and animals in the Jordan Valley, for they continued comparatively unchanged in its relatively hot climate down to our own times. But a great change passed over the flora of the rest of Palestine. And the large number of species of *Trifolium*, or Clover family—upwards of fifty—a peculiarly Central European type of plants now found on the uplands of the Holy Land, came from the west after the Glacial period.

The alpine flora of Hermon and Lebanon dates its origin from the same epoch. This last flora is very limited, owing to the sterile nature of the limestone soil on the higher points, and to the extreme dryness of the climate during a considerable part of the year. For this reason also there are fewer boreal plants to be found on the Lebanon range than on the Himalayas at analogous heights, although the former is in a higher latitude. Of the ancient Glacial flora *Rhododendron ponticum*, *Draba verna*, *Arabis alpina*, and *Oxyria reniformis* are the characteristic remains on the highest summits of Hermon. No Gentians, Primulas, or Saxifrages, familiar to us on our own Scottish mountains and on the Alps, are to be found. The most remarkable plant belonging to the old flora of the upper regions is undoubtedly the famous Cedar of Lebanon. The well-known grove so often visited by travellers, consisting of about 400 trees, spreads over the top of an old Glacial moraine at a height of 6,400 feet above the sea. It is gratifying to know that there are still extensive remains of the magnificent primitive forests scattered in secluded regions of the great range. But owing to the increasing population of Lebanon—the only part of Syria which is Christian, and therefore flourishing—the trees are rapidly disappearing, being cut down for firewood. The peasants call the Cedar by its old Bible name of “Arz ;” and it is a curious philological fact that the name of our common Larch, or *Larix*, is derived from this word by a contraction of “El Arz,” the Cedar. The Moors of Northern Africa saw the native Cedar of the Atlas range, and they applied to it the name of the closely allied Cedar of Lebanon, which they had learned

from their brethren in Syria. And the Spaniards in turn, being struck with the resemblance of the Larch of Europe in many respects to the African Cedar, applied to it the Moorish name; and from the Spaniards we obtained our English word. The Cedar during the Tertiary period extended from the Himalayas to the Atlas Mountains; and the groves of Lebanon, the Deodars of India and North Africa, are the relics at present surviving.

Of the 3,100 species of plants that have been catalogued as having been observed or gathered in the Holy Land, about 500 are common British wild flowers. Some of them, like the Shepherd's Purse, are ubiquitous, being found on the shores of the Dead Sea and on the heights of Hermon; and the different kinds of Crane's-bill cling about the walls and ruins of the hill country of Judea, as they cling about our own banks and dykes; and the sight of these familiar plants in such new and strange associations awakens pleasant thoughts of home in the mind. The common Bramble lays hold of the skirt of the Jew in the neighbourhood of Jerusalem as it bids the unsuspecting Gentile "bide awee" when he too-hurriedly passes through a wood in the vicinity of Glasgow! In the broad pool formed by the overflowing of a fountain in the hollow below Bethel, I was delighted to see, covering the whole surface with a sheet of dazzling white bloom, the *Ranunculus aquatilis*, which is so common in our own ponds. And at Banias, close beside the source of the Jordan, I was struck with the western appearance of everything. It seemed like a bit of Scotland accidentally introduced into the oriental world. The trees were very like our own Oaks, and Willows, and Poplars; the weeds were actually our own Buttercups, Poppies, Fumitories, Mallows, Water-cresses, Nettles, and even Docks. And I was led to reflect how by a sufficient amount of moisture and shade, creating the conditions of a northern climate, a northern type of plant-life can be naturally introduced into almost any part of a semi-tropical region. High up towards the source of the River Pharpar, issuing from the snows of Hermon, I gathered on its banks the round luxuriant clusters of the *Oxyria reniformis*, which the waters had brought down from the summits, just as I had gathered them in the island above Tay Bridge at Aberfeldy, to which they had been brought by the flooded waters that swept down the sides of Ben Lawers; and as I tasted the refreshing acid

leaves of this mountain sorrel in the burning heat, the circumstance recalled the memory of many a romantic botanical excursion on the Highland hills. We hardly notice the excessively common and hardy Dog-Mercury, which fills our woods in Spring; but when I saw a clump of it in a little wood at Samaria, I never greeted the most gorgeous flower with such effusive admiration, for it brought back the April blood of long ago into my veins. And when my foot accidentally trod upon a tuft of *Geranium Robertianum* growing on the green sward of the sacred enclosure of the Haram, in front of the Mosque of Ouar at Jerusalem, and the keen familiar foxy smell of its leaves came up to my nostrils, I was transported at once in imagination to the little schoolhouse in the corner of a wood filled with this plant, to which I used to find my way when a boy, with my clothes perfumed with its fragrance. When passing the marshes filled with Papyrus, on the margin of Lake Huleh, I saw in the spaces of open water the graceful milk-white cups of our own Water-lily, and here and there the expanded buttons of the yellow species, gleaming golden in the brilliant sunshine from among the dark-green leaves; and the sight brought up fairy visions of moorland lochs far away, with crimson reflections of heather banks mingling with the snowy chalices in the bright blue depths. And when I climbed the hill behind Nazareth, where our Lord spent His early days, and saw the ground covered with myriads of Daisies, that looked the same as our own "wee modest crimson-tipped flower," only they were larger and more luxuriant—the *Bellis sylvestris* of Southern Europe instead of the *Bellis perennis* of our meadows—I thought of our Saviour often visiting this spot, and gathering and admiring these familiar Daisies, and perhaps making chains of them as we ourselves did in our childhood; and the thought made Him more real, and brought Him nearer than a hundred sermons could have done.

I may remark, that not only were we too early in the season, during our visit to Palestine last March, for the full blaze of flowers for which the country is remarkable, and which is usually about the beginning or middle of April. but our mode of travel was utterly unfavourable for making a collection of plants. Our large personally-conducted party had to pass rapidly over the ground; no opportunity of lingering here and there by the way could be

afforded; the day and hour of our arrival at and departure from any particular place was fixed beforehand, and could not be changed without altering the arrangements of the whole tour. I journeyed from Jaffa to Jerusalem by carriage, encamping one night at Latroun, and the pace was too fast and continuous to allow me to alight and observe more particularly, or gather any unusual plant which attracted my attention; and during the rest of my travels through Palestine, from Hebron to Damascus, I was on horseback, and was too inexpert an equestrian to get on and off my horse every few minutes to examine the novel flora. It would have required an accomplished circus-rider to perform this feat, without the risk of being left behind by the rest of the party, and falling into the hands of some predatory Bedouin. My horse, too, exhibited distinct signs of dislike to my inconvenient pursuits. Accustomed to go at a steady continuous pace day after day and hour after hour, in the line of cavalcade, from morning to night, he did not understand why his rider should stop and dismount every few minutes to pluck up some worthless wayside weed. He was all impatience to go on. It was only during the short space of time before we departed in the morning from any place, when we rested at noon for lunch, and when we arrived in the evening at our camping ground, that I could do a little botanizing. But except in the morning I was usually far too tired to be tempted to move a step from the resting-place in search of plants.

Then, too, I had no facilities for drying plants, and for carrying about with me the cumbrous materials required in the process. I was too deadbeat at the end of each day's journey to look after the few specimens I had collected, and preserve them properly. In consequence, they were wasted, and had to be thrown away as useless. In these circumstances I did almost no collecting at all. To add to my disabilities, a tropical storm burst upon us between the Dead Sea and Jericho, wetted everything I had through and through, destroyed all my specimens, and reduced all my botanical paper to hopeless pulp. So I had to content myself with mere observation of the wayside flora, and with recording in my note-book, or oftenest with storing up in my memory—which as regards such matters I am thankful to say is very retentive, and may be relied upon—the peculiarities of the

plants as I journeyed on from place to place. In order to study the Botany of Palestine thoroughly, and make a good collection of plants, you must give to the task as many weeks as I gave days, and you must rest for long periods at a time in certain centres, and make long excursions from them throughout the surrounding country. Your visit must also extend over several seasons; for though there is a great simultaneous rush of flowers over the whole country at the beginning of April, yet many plants blossom sooner or later than this, and you must be in time for their unfolding. A resident in Jerusalem has grand facilities for acquiring a complete knowledge of the flora, for he can choose his own time; and owing to the small size of the country and the close contiguity of all its principal points, the different habitats, even in the most remote localities, are not too far off, and he has all the appliances for pressing the specimens he gathers always at hand.

In an extensive garden next to Hardwig's Hotel at Jaffa, I saw a rare assemblage of semi-tropical plants, which reminded me of Mr. Hanbury's wonderful acclimatization garden near Mentone. I was informed that the garden did not belong to the hotel; but I could not find out who had formed it. The Castor-oil Tree was very luxuriant; and a large number of Acacias, Mimosas, Fan-palms, Bananas, India-rubber, and Orange Trees made the most delicious shade in the ardent sunshine.

The first plant I saw after leaving Jaffa and entering upon the Plain of Sharon was a foreigner. This was the *Opuntia*, or Prickly Pear, of which all the hedges are made. It protected the Orange groves at Jaffa from the highway by a formidable barrier of thorns more than twelve feet high. I thought of the fabled gardens of the Hesperides guarded by the dragon. It could not have done its duty better than these vegetable dragons. The *Opuntia*, like all the members of the Cactus family, belongs exclusively to the Western World, and could only have been introduced into Palestine after the discovery of America. Ignorance of this fact has led to many curious anachronisms among painters and travellers. Some of the old masters painted incidents in our Lord's life, surrounded by landscapes in which this *Opuntia*, or Prickly Pear, figured largely; innocently imagining that as it is now, so it must always have

been, a characteristic feature of the sacred soil. I could not but admire the æsthetic effects of the gray-green hue of the hedges of Prickly Pear, which was the right background to throw off to the greatest advantage the golden hues of the oranges and lemons which they enclosed. Each round fleshy leaf of the Cactus hedge shone in the rays of the sun, as if it had been a mirror.

In the wide Plain of Sharon there was, notwithstanding the earliness of the season, a wonderful profusion of Crocuses and Cyclamens, and, above all, Scarlet Anemones—*Anemone coronaria*. Oh, those Scarlet Anemones! I never saw such a gorgeous spectacle in all my life. It was worth going all the way to see this alone! The fields for twenty miles, uninterrupted by a single hedge-row or boundary-wall, were covered with them, as if the land was on fire. They glowed in the vivid sunshine, that made their soft velvety petals almost transparent, like flames in the heart of a furnace. We began at first to gather them at every halt, so intoxicated were we with their beauty; but so vast was the abundance that familiarity had its usual effect upon us, and they subsequently retreated into the background of our consciousness, though they added vastly, all the same, to our insensible enjoyment of the Palestinian landscapes. This was undoubtedly the flower which our Lord must have had in His mind's eye, when He bade us consider the Lilies how they grow. I saw it flourishing in myriads on the Horns of Hattin, where the Sermon on the Mount was delivered; and it must have been in full bloom there when our Saviour stood on the spot. Red was the royal colour in the East; and therefore the Scarlet Anemones must have suggested to our Lord the robes of Solomon; and certainly never on any king's garments was there such a wealth of glory diffused as these Plains of Sharon exhibited, decked with myriads of these flowers. The too-dazzling hues of the Anemones were relieved by the fresh light-green of an extraordinary species of Squill, called the *Urginea Scilla*. It grew in thick succulent tufts, with broad tender leaves like those of a Leek, and looked altogether like a tropical plant, so luxuriant was its appearance. It had a great white bulb as large as a good-sized turnip. It covered the ground for miles, and grew sometimes to the exclusion of everything else. It was a perfect pest to the peasants; and we saw them everywhere busy uprooting it. Heaps of the bulbs, with their withering

foliage, were torn up and left here and there, and long lines were made of them to mark off each cultivator's portion of the ground.

After leaving Ramleh and entering upon the mountain region, I observed a considerable change in the character of the flora. The soft herbaceous plants of the plain gave place to a low shrubby vegetation on the arid limestone hills and terraces. The *Arbutus*, with its large leaves, and the *Lentiscus*, were the most conspicuous shrubs. The rocks were yellow with the broom-like blossoms of the *Calycotome villosa*; and the Locust Tree, with its rich dark-green glossy foliage, afforded a grateful shade in the hot defile of Bab-el-Wady. At Kirjath-jearim there was a clump of native Pines (*Pinus halepensis*), which seemed to be more suited for the heights of the Lebanon, than for association with the solitary Date-palm that grew not far off.

There is a remarkable contrast between the flora on the western slopes of the mountain plateau of Judea and the flora of the eastern side. Immediately after you pass over the Mount of Olives, and descend into the Wilderness of Judea, there is a distinct change of vegetation. The desert type of plants suddenly begins to appear. Only a few ubiquitous species remain behind of the Mediterranean flora of the western plains and uplands. From Jaffa to Jerusalem the ascent of 2,600 feet on the western side is very gradual, and is spread over a distance of about 40 miles; but the descent from Jerusalem on the eastern side to the Valley of the Jordan, about 3,800 feet, is very abrupt, and is compressed into half the distance. It is like the descent of a mountain side, about the rate of one foot in twenty. And the flora makes an equally rapid change. I found *Ranunculus Asiaticus*, a semi-tropical species, taking the place of *Anemone coronaria*, and covering the ground with its showy scarlet blossoms. It is so like the *Anemone* that it is often mistaken for it; and for a long time, to my wonderment, I was accompanied, as I thought, by my old familiar friend from the Plains of Sharon, though I could not understand how it could endure the heat and the aridity of the soil and air, until I stopped on one occasion and gathered a specimen, when I discovered that it was a new plant, adapted to the altered conditions. To my surprise I also found here a lovely little blue *Ixia*, the *Ixolirion montanum*, which also grows at the edge of the snow on Mount Hermon;

a singular example of a plant enduring the two extremes of heat and cold, and presenting a curious problem in geographical botany—like the occurrence of the Sea-pink and Scurvy-grass on the sea-shore and on the highest points of our Scottish hills, and in no intermediate ground. But perhaps the heat and dryness of the air on the summit of Hermon will present conditions not so dissimilar as one would suppose to those of the Wilderness of Judea. The *Paronychia argentea*, a curious little plant, like a mixture of a Pellitory and a Polygonum, takes the place of our common Plantago as a way-weed, and is conspicuous by its silvery trailing runners on every dusty path. It is gathered by the Arabs and dried as a substitute for tea. And, preserving the curious habit of our common Nettle, by only growing where human habitations still exist, or where they have once been in now waste ground, a remarkable species of Nettle, the *Urtica pilulifera*, luxuriated around Bedouin encampments, or in spots marked by ruined walls. This is a most virulent species, and I was severely stung by its leaves when attempting to gather beside it some specimens of the Scarlet Ranunculus on the Plains of Jericho. It produces, as its name indicates, curious round balls, in which its seed is contained; and in this respect it approximates in appearance and type of structure to the fruit of the Bread-fruit Tree, which, as is well known, belongs to the Nettle family.

The banks of the Jordan at the celebrated Bathing-place were fringed with thickets of the *Populus Euphratica*, remarkable for the extraordinary variety of the shapes of its leaves, especially in young trees. Luxuriant Willows belonging to the species *Salix octandra*, probably the true Babylonian Willow on which the captive Jews in Babylon hung their harps, dipped their pendent branches into the sacred stream. The Tamarisks of this locality had, many of them, on their boughs curious little nests, made out of fragments of the leaves glued together, full of an Indian species of Ant. This symbiosis, or commensalism, must have a double purpose to serve, ministering to the wants of the Ants, and also to the functions of the tree. The False Balsam was abundant in the neighbourhood, *Balanites Egyptiaca*, the *Zukkum* of the natives, reminding one of the spices for which the Plain of Jericho used to be celebrated. Its foliage is deep green, and from its large olive-like fruit a fragrant oil is extracted which is used for healing

purposes, and is palmed off upon pilgrims as the true Balm of Gilead. At the Fountain of Elisha I saw the largest specimen of the thorny Zizyphus, or Jujube Tree, in Palestine. It is called *Spina Christi*, because, according to tradition, it was of its thorny branches that our Lord's crown of thorns was made.

I was especially struck with a superb Mistletoe which grew in large tufts, parasitically, on this Jujube Tree, and is confined, I believe, to the Valley of the Jordan in Palestine. It is called *Loranthus Indicus*. Its brilliant tropical-looking blossoms hung in scarlet festoons from the topmost boughs of the trees, giving them the appearance of being enveloped in flames, and reminding one of the burning bush of the desert that glowed with a fire that did not consume. This parasite grew also upon the *Acacia farnesiana*, which is very abundant in the neighbourhood of Jericho, and on the eastern side of the Dead Sea. This tree is celebrated for the delicious fragrance of its yellow flowers, and is grown in the fields of Grasse in the Riviera for the manufacture of perfumes. You can imagine what a feast to almost every sense is produced by the combination of the scarlet flowers of the *Loranthus* with the delicious fragrance of the yellow flossy blooms of the *Acacia*, and the elegance of its bright green foliage. To add to the attractiveness of the sight, the *Loranthus* is cross-fertilized by means of the lovely little Sun-bird, a species which looks like a Humming-bird, but belongs to a different type altogether, and is confined to the Jordan Valley, as I have already mentioned. This living fragment of a rainbow seems attached to the flowers of the Mistletoe, following it wherever it appears; and its long bill is covered with the yellow pollen while dipping it into the scarlet tubes in search of honey. Our own common European Mistletoe (the *Viscum album*) is not unfrequently found on the poplars, which are the common trees in the higher grounds in the north. It is somewhat abundant about Bania, and along the lower spurs of Hermon on the way to Damascus. In the warm southern parts of Palestine it gives place to a more tender and luxuriant species, the Oriental Mistletoe (*Viscum cruciatum*), which grows in profusion in many of the olive yards, and is the staple food of the Jay. It forms a solid mass of glossy dark-green foliage, which easily distinguishes it from the gray-green foliage of the tree on which it grows. It produces a great quantity of bright crimson berries. This Mistletoe is found

in Europe only in Southern Spain. It is parasitic almost entirely upon Olive Trees. I picked some fine specimens from some venerable Olives at Mamre, behind Abraham's Oak, not far from the new Russian hospital on the brow of the hill. I found it also in the Valley of Jehoshaphat at Jerusalem, and in the extensive Olive groves in the outskirts of Nablous, through which the road to Samaria passes. In this latter place it has become a perfect plague; for large numbers of the trees are infested with it, presenting a melancholy spectacle with their ragged and almost leafless branches, contrasting with the healthy full-foliaged appearance of the other trees on which it does not grow. The eye picks out the diseased trees at once, while the mind wonders why the industrious inhabitants of this fair and fertile spot make no effort to hinder the spread of a parasite which is fast killing their choicest Olive trees, and seriously diminishing a crop upon which they so largely depend. But the habitat of this Mistletoe that interested me most, was the "Field of the Shepherds," below Bethlehem, said by a very ancient tradition to be the spot where "the glad tidings of great joy" were made known to the midnight watchers beside their flocks by the herald angels. This field is surrounded by a rude low wall, and within it are some fine old Olive Trees, on one of which I noticed the matted luxuriant tufts of this parasite. The association of Bethlehem with the Mistletoe struck me at the time as a very singular one. Here, where the first Christmas was observed, I saw growing a plant which forms an essential feature in the festive season in northern and western lands. We cannot imagine a Christmas without its Mistletoe, any more than without its Holly, for the decoration of our homes and churches and feasts on this joyous occasion. But it has no part in the Christmas observances of the East. It is essentially a northern symbol. It is an importation into the Christian festival of a mystic plant which belonged to the old nature worship of our pagan forefathers. Christianity adopted it, and consecrated it to the new faith, and gave it a new significance. As the wise men of the East brought their frankincense and myrrh to the cradle of the Divine child, so the wise men of the West brought their Mistletoe, which they had been accustomed to use in their weird spells of Druidic worship.

One solitary Palm Tree, about twenty feet high, stands conspicuous near the tower of Jericho, at Er-Riha; the last surviving relic in this place of the ancient extensive Palm forests for which Jericho was celebrated. At the Convent of Mar-Saba, between Jericho and Jerusalem, there is, I may mention, a Date Palm of great antiquity which always bears a stoneless fruit, and cannot therefore be propagated except by suckers. Where Herod's Jericho stood, near the mouth of the savage Wady Kelt, several aged Sycamore Trees may still be seen, to remind one of the tree which Zaccheus climbed when our Lord passed by with the multitude. This tree is a species of *Ficus*, with large lateral branches springing from the trunk so close to the ground that it is a very easy task to climb them. Small of stature, therefore, as Zaccheus was, he had no difficulty in mounting into the Sycamore Tree. It produces straight from its trunk clusters of figs, which are eaten by the peasants, although they are very insipid. They require to be punctured or cut by a peculiar instrument while in the bud stage, for without this operation the fruit will not form; and this was the chief work, we are told, of the prophet Amos.

The Sycamore Tree at Jericho into which Zaccheus climbed is a good example of the verisimilitude and true local colouring of Scripture. The tree belongs principally to Egypt, where its wood used to be employed in making coffins; and it is too tender, therefore, to thrive in the Highlands of Palestine. It occurs only on the sea-coast, and in the Valley of the Jordan, where frost is unknown. It is said in the Psalms that God destroyed the Sycamore Trees of the Egyptians with frost. All the Sycamore Trees of Palestine, wherever found, belong to the State; and not only the trees, but all the space over which their shade extends, is taken from the proprietor and appropriated by the government.

In the Arab gardens round the modern Jericho a few Sugar-canes are cultivated, the lingering remains of the luxuriant crops which yielded a large revenue to the crusading knights of Jerusalem; and as a resident in Greenock I was peculiarly interested in seeing the ruins of the sugar-mills in the neighbourhood, which they had erected.

At Er-Riha, which is supposed to be the site of old Gilgal, I noticed the wild Gourd, still growing over the ruins of ancient

buildings, which Elisha's servant gathered in this place for a meal to the starving prophets during a great famine, and which would have poisoned them all had not Elisha neutralised its virulent qualities by putting some meal into the pot. This was an exceedingly natural mistake for the servant to have made, for he was a stranger to the productions of the locality, having come from the north of Palestine, where there was a species of Gourd or Melon grown in the gardens, very like this Gilgal plant, and which was exceedingly good to eat. I saw the deadly Gourd in question (*Citrullus Colocynthis*), from which we prepare the well-known drastic medicine, straggling along the bare ground for many yards, with its long tendrils and large oak-shaped leaves; and the fruit, about the size of an orange, looked like a ripe melon, very tempting both in appearance and smell, so that it was no wonder that the prophet's servant should have been deceived by it. On the plain of the Jordan I also saw a few specimens of the *Acacia Seyal*—the Shittim Tree of Scripture—from which the wood of the Tabernacle was derived. It looked a weird gnarled tree, with dense clumps of foliage which the sun could not penetrate, and certainly more like a bush than a tree. On the opposite side of the Jordan there were groups of this singular tree scattered here and there, some of them very aged and battered; and they preserve still the old name of Abel-Shittim—"the meadow of the Acacias"—given to the place where they grow, which was the last camping-ground of the Israelites before they crossed the river and entered the Promised Land.

The flora of the northern extremity of the Dead Sea is wonderfully varied and luxuriant. The bitter waters of this grim inland basin, 1,320 feet below the level of the ocean, are utterly destitute of life; but nothing can be brighter or more luxuriant than the vegetation that covers the sandy banks on its shores. The main peculiarity of its flora, so far as I could observe during a brief visit, seems to be the great variety of species compared with the number of individuals. Almost every plant I noticed was different; and it was represented only by one or two specimens. Social plants forming groups, tufts, and clusters were, to an unusual extent, absent, with the exception of some grasses. And hence the traveller, visiting the spot for a few hours or a few days, would inevitably miss seeing many plants which a more thorough and pro-

longed search would have added to his list. Another peculiarity of the flora of the Dead Sea struck me at the time. On account of the extraordinary evaporation that takes place in this heated furnace, balancing and drawing up into the air the inflow of all the water of the Jordan, the climate is a great deal moister than it is in the Wilderness of Judea, or among the mountains of Moab—to the east and south. Masses of swirling vapour and silvery mists, at morning and sunset, very often overhang this deep trench. Consequently, though we find here growing a great many representative species of the dry desert flora, their appearance has been greatly modified by the changed circumstances. On the shores of the Dead Sea the woolly plants of the desert lose a great deal of their pubescence, develop to a certain extent their thorns into foliage, and are not nearly so pungent or so sticky and gummy as they are in their own proper soil, which has created these adaptations by its excessive aridity. Another peculiarity still of the flora of the Dead Sea is the almost continuous flowering and fruiting of the plants, owing to the invariableness of the conditions. The climate hardly changes all the year round. Consequently you see plants of the same kind side by side, one in flower and the other in fruit, and others in both flower and fruit at the same time. There seems to be very little respite in these exhaustive functions; and the species as a whole seem to be comparatively short-lived.

The plant which catches the eye most conspicuously is *Chrysanthemum coronarium*, whose white stars grow in great abundance among the delicate grasses on the sandy banks quite close to the waters of the Dead Sea. It was almost the only plant that was gregarious, and it was a most effective ornament in the place. Of the bushes, the most attractive was the graceful Retama (*Retama monosperma*), closely allied to our Broom, with large hanging bunches of small pink flowers and minute foliage. It grows to a height of a dozen feet. It is essentially a desert plant, and was the Juniper, under the shadow of which the disconsolate Elijah lay down to die at Horeb. I also saw the curious Camphire bush, *Lawsonia alba*, to which reference is made in the Song of Solomon: "My beloved is unto me as a cluster of camphire in the vineyards of Engedi." As a wild plant it belongs to the Asiatic peninsula. It is almost extinct in this locality; and I have no doubt that the few specimens I saw were escapes from the ancient gardens of

Jericho, where the plant used to be cultivated not only for its pretty pinkish-white blossoms and powerful aromatic fragrance, but also because it yielded the henna of oriental commerce, with which women dyed their fingers brown. It is another striking proof of the local accuracy of the Bible when it speaks of the Camphire of Engedi; for the plant is only found there, in a wild state, in Palestine; and it was from this place that it was introduced into the gardens of Jericho. The Soap-plant (*Salicornia fruticosa*) abounded everywhere. It is called by the Bedouins *Kali*, and is used by them for soap, as kelp used to be on our Scottish coasts. It is from the Arabic name of this plant that our word *alkali* comes. Very prevalent and most remarkable were the bushes of *Anabasis* or *Salsola articulata*, with their slender twigs composed of short, succulent, jointed segments. They accumulated round their roots wind-blown hillocks of sand, where ants and lizards burrowed. The Bedouins call this bush *Rimth*. So abundant is it about Sinai that a valley of the district is called Wady Rimthi, from the abundance of the *Anabasis* bushes in it. A vast number of snails of *Helix Seetzeni* adhered to the bushes.

I observed one specimen of perhaps the most curious plant of Palestine, the Osher or true Apple of Sodom, or Apple of the Dead Sea—the *Calotropis procera*. It is a shrub of the Asclepiad family, with a light cork-like bark and large glossy leaves, which emit when punctured a flow of acrid milk. There is nothing like it in our European flora. Its blossom is like that of a small Magnolia, and the fruit, which it bears at the same time on different parts of the bush, is about the size and shape and colour of an orange. When fully ripe it cracks open like a puff-ball, revealing, instead of the delicious juicy flesh which its outside indicated, nothing but a tuft of dry seeds winged with silky filaments. The Bedouins, according to the old “Doctrine of Signatures,” or the “*similia similibus curantur*” principle, give the milky juice of the leaves to women when unable to suckle their offspring, in order to procure an abundant supply of milk. In the valley of the Jordan, the only place where the Osher is found wild is at Engedi; but here and there an escape from the gardens where it is cultivated occurs. Its native country is in all probability Midian or Nubia, for in these countries it attains to the stature of a tree, with a trunk two feet in circumference, and

branches fifteen feet long, instead of its puny shrub-like dimensions on the shores of the Dead Sea. It was probably introduced here intentionally, and cultivated as a plant of domestic value, from Midian or Nubia by wandering tribes; or its seed may have been transported accidentally to this region during the frequent communications that existed in ancient times by this route with the far south. Quite close to the shore of the Dead Sea there was a perfect jungle of aquatic plants, more or less familiar to us in our own country. The luxuriance and great height which they attained were remarkable. *Juncus maritimus*, var. *arabica*, was nearly 7 feet high; *Inula crithmoides*, a yellow-flowered groundsel-like plant, 5 feet; *Lycopus europæus*, 6 feet; while *Lythrum Salicaria* reached the gigantic height of 14 feet. In swampy places *Arundo donax* formed almost impenetrable brakes. This little group of distinct and wide-spread maritime plants owe their presence in this spot to the visits of aquatic birds, and the semi-tropical climate causes them to flourish exceedingly.

Taking a general view of the Palestine flora, one is struck with the large number of thorny plants, the evidence of a wasted soil and a desiccated climate. The fields in Galilee especially were covered with thickets of the white-bleached skeletons of monstrous Thistles as tall as a man, through which it was often difficult to force our way. Their appearance was remarkably picturesque, and in some cases classically graceful, as befitted a family claiming relationship with the Corinthian Acanthus. The waste places everywhere were covered with gigantic Asphodels, white and yellow. Masses of a gigantic Umbelliferous plant, the *Ferula communis*, 6 or 7 feet high, with huge stems and broad fine-leaved fronds of foliage, exceedingly graceful and effective, grew in the utmost profusion in the uplands of Galilee, looking at a distance in some places like young plantations of Pine Trees. In company with them were Hollyhocks, Knapweeds, and that curious woolly Labiate, with its tall stems and long spikes of flowers, the *Erimostachys lanciniata*. Saponarias, Malvas of various species, blue Anchusa, Grape Hyacinth, Star of Bethlehem, several kinds of Linum of different colours, were weeds in the corn-fields; while Tulips, Cyclamens, Amaryllises, and Irises found shelter and moisture for their bulbous roots under the vast quantities of stones that strewed the cultivated ground. This ex-

traordinary profusion of stones, covering the ground everywhere, seemed to us an indication of very miserable soil and very slovenly farming, accustomed as we were to a very different state of things in Scotland; but in reality, without these stones covering the fields, cultivation would be almost impossible in that arid land; for the stones give the necessary shade to the roots of the plants, and enable them to defy the scorching sun; and most abundant and luxuriant crops spring up in these apparently desolate stony wildernesses. Labiates and Leguminous plants still abound, as they have always abounded; and these orders probably contain a larger proportion of nectar than any others. And these yield by their foliage the abundance of milk, and by their blossoms the abundance of honey, for which the country has always been famous.

Cryptogamic plants are nowhere a feature in the Palestine flora. Ferns are extremely scarce. In only a few places, such as the damp shady crevices of the walls around the Pools of Solomon, among the dripping rocks of the Robber's Valley between Bethel and Singil, and on the sides of Gerizim, did I observe the *Adiantum Capillus-Veneris* in any quantity or luxuriance, although it occurs in many places all over the country in a small and stunted form. The most common Fern is the Ceterach, which grows everywhere on limestone rocks, and is particularly abundant by the wayside from Bethlehem to Hebron. Here and there I found a few tufts of the *Cheilanthes fragrans*, which used to be common in the Riviera, but is now almost extinct there. On the ruins of Ephesus I gathered splendid specimens. The *Pteris cretica* occurs in a few places, as it does in the vallons of Nice, and in some parts of Southern Italy, but it is very rare. In the driest situations among walls and rocks our own black-stalked Spleenwort flourished exceedingly; and on the shady banks crept the fronds of the *Selaginella denticulata*, assuming the most varied hues, from the deepest green to the brightest scarlet.

I was greatly disappointed in regard to the Lichens and Mosses. They are almost wanting in the flora of Palestine. Only a few species appear at the foot of Hermon and in the woods of Lebanon. What kinds I observed were the common species of our own country, or at least of the south of Europe. The Riviera, dry as it is, is much richer in this class of Cryptogamic plants.

The arid mountainous regions in the south of the Holy Land, blistered by unmitigated light and heat, are destitute of that beautiful coloration which Mosses and Lichens give to our alpine rocks; the trunks of the trees are bare of all such adornment; while the vague ruins scattered over the face of the country have no drapery of beauty to soften their harsh aspect, and harmonize them with the bosom of nature to which they are slowly returning—no venerable appearance to impress the mind with a sense of their vast antiquity. There are no shady woods or forests anywhere, and very few trees of sufficient age or size to afford a secure and quiet resting-place for the slow growth of these patient plants. Such full-grown trees have been cut down during the devastating wars that have swept over the country age after age; and the peasantry have wantonly destroyed them for fuel. Even fruit-trees are not nearly so numerous as we should be led to expect in a land so well adapted for their cultivation. The marvel, indeed, is, that there should be any at all; considering that fruit-trees are annually taxed, to the amount of several piastres from the very year that they are planted, by the oppressive government. For these reasons, the scenery of Palestine lacks that look of completeness which the upholstery of Grass, and Fern, and Lichen, and Moss gives to our own country. It seems to be more a sketch or outline than a finished picture. And even when we admire the glowing hues which the ardent sun gives to its naked rocks—for the less verdure the more light and colour—we long for the soft greenness which the tiny forms of the vegetable world give to our own woodland nooks; for the mossy carpets that steal all noises from the foot in our forests, and for the silvery lichens that give to our pines the appearance of mystic Druids in solemn conclave, in those haunts that are dear to the heart of the botanist under the shadow of the Grampians.

Notes on the Irruption of Little Auks (*Mergulus alle*, Linn.)
in the Winter of 1894-5 on the West of Scotland
—Oban to Ayr. By JOHN PATERSON.

[Read 26th March, 1895.]

THE irruption of Little Auks in the winter of 1894-5 in point of magnitude is without a parallel so far as the history of Ornithology in Scotland has been written. On this account it is important that, while its memory is fresh, some attempt should be made to record as many of the occurrences as possible for that portion of Scotland, chiefly west of this city, having as its northern limit the Sound of Mull, and extending to Lendalfoot in South Ayrshire. From an inquiry relating to this area not much can be hoped for, as it is not favourably placed for receiving a share of the mass of birds which, travelling from the north, strike our eastern seaboard, and become dispersed along the coasts there.

As regards what is strictly called the Clyde Faunal Area, it is landlocked to the north, east, and west, and, while forming a natural trap for any movement from the south, can only expect to be favoured with a few birds blown from the companies arriving on the east, or such as, arriving on the west, straggle down to Argyll, and reach Clyde from the west. As the natural corollary, then, of the geographical position of the Clyde area, we find the list for this district to be a very meagre one.

I may here say that before I had gone far in this inquiry, I learned from Mr. W. Eagle Clarke that he was collecting information for the whole of Scotland, with the view of publishing details, and a map, in the April number of the *Annals of Scottish Natural History*, showing the wreck of this species on our shores. Such data as he asked for I placed at his disposal, and the fact is here referred to because he has promptly sent me a proof of the paper he is publishing. I have thus the advantage of reviewing his opinion with regard to the occurrences on the west. It appears that only two specimens are reported from the Outer Hebrides,

and none has been seen in Tiree. With reference to Clyde and the fringing districts, Mr. Clarke thinks it "not improbable that the birds occurring there may have found their way from the east coast. The distance between the Firths of Forth and Clyde," he goes on to say, "is only some forty miles, over low country; and we have the important testimony of Mr. James Lumsden that they arrived at Loch Lomond, or practically in the Clyde, *after the severe gale from the east*, which is pretty conclusive evidence in favour of the opinion expressed."

The reference to the gale from the east is to the cyclonic period beginning on 12th January. Now, I believe there is some ground for Mr. Clarke's supposition. I consider it quite likely that some of our visitors came across country from the Forth. There is no great physical barrier between the water-sheds, and the examples found on the 15th January at Killearn, and 20th January at Old Killearn and Dennistoun in this city, also a few about the same time on the lower end of the west shore of Loch Lomond, may have come to us in the way suggested. But this must be taken in connection with other facts before us. Thus, a week or so before the cyclonic period referred to, three were seen at Gourrock, and Mr. Lees, Alexandria, to whom Mr. Lumsden, like myself, is indebted for information regarding the Loch Lomond specimens, states precisely that "the first Little Auk was brought in on 4th January alive, having been caught by a shepherd on the hill top above Tulliechewan Castle. It fell at his feet among the heather, and was easily caught. There was a strong *westerly* wind blowing at the time, with snow." On the following day one was found dead by a roadman on the loch shore at Auchendennan Bay. It is therefore likely, I think, that some of the specimens found in Clyde have come as stragglers from the west.

So far as the area under review is concerned, the birds seem, from the information in my possession, to have been most abundant from the Sound of Mull and Oban to Islay inclusive. If we assume with Mr. Clarke, from the almost entire absence of any notices of occurrences in the north-west and the islands of the Outer Hebrides, that the birds did not come "north about," then some other route than that *via* Forth and Clyde must be found for those occurring in the Inner Hebrides. This is not difficult to suggest. The great glen connecting the Moray Firth

with Loch Linnhe would naturally lead any that had got cornered in the Moray Firth down to Oban, where a "good percentage" of those passing through the hands of Mr. Bisshopp there were found, and Islay being in the same line of flight, it is natural that in that island they should have been frequent, as it would be a kind of *Ultima Thule* to them. It is significant that Messrs. M'Leay & Son, Inverness, got 60 birds for preservation, a number almost equalling that of all the taxidermists in the south-west together. Further, about 20 per cent of those coming to Glasgow for preservation were from the east.

Turning now to the southern part of our area, to Renfrewshire and Ayrshire, the occurrences there were few. Thus, besides the three at Gourrock previously mentioned, I have only another in the former county, on the borders of Mearns Parish, where one which flew off Balgray Dam was captured on the road which skirts it on the north by a carter, and kept alive for several days. With regard to Renfrewshire also, Mr. Clymie, of Greenock, informs me that none have reached him for preservation this winter.

In Ayrshire one was got at Dalry, in the first week in February, and sent to Mr. Eaton, Kilmarnock, for preservation, and another was found on the shore at Ayr by Mr. W. C. S. Fergusson. The latter gentleman kindly took the trouble to interrogate all those in Ayr who take in birds for preservation regarding the Little Auk, but without result. A visit I paid to the shore below Ayr, on 1st January, yielded nothing: this was nine days after the great storm. Mr. Chas. Berry, the naturalist of Lendalfoot, informs me he has not seen one this year.

The salient features of their occurrence in the west, then, are their almost total absence from the Outer Hebrides and north-west coast (provided the information from a district so sparsely peopled, and with such an enormous coast-line, can be relied on as conclusive); also their absence from Ayrshire; their greatest frequency in the west, in the line of the Great Glen, from Oban to Islay; their scattered occurrence in the Clyde area, probably attributable in part to some having been blown across country directly from the east coast, the remainder being an overflow from the stream assumed to have come down the Great Glen to the Inner Hebrides.

The following particulars are perhaps worthy of preservation :—
Argyllshire.—Mr. C. H. Bisshopp, Oban, writes that he received 26 birds between 20th December and 25th February, the whole of them local—"that is to say, that the coast of Mull on north, and Easdale on south, were the furthest limits." They were all in a more or less emaciated state, and the last one that came to him was "just getting the black neck."

Dr. T. F. Gilmour writes from Port Ellen, Islay, that "they seemed to grow common all at once everywhere on the coast, and even far inland." The end of January or beginning of February is the nearest approximation to a date that he gives.

Mr. M'Culloch received one for preservation on 15th January, which had been killed in Campbeltown.

Dumbartonshire.—Mr. Jas. Lumsden, Arden, referred me to Mr. Lees, Alexandria, for particulars of the Loch Lomond specimens. The first two that reached Mr. Lees have already been mentioned; the last one was found on the loch side near Rossdhu, on the 2nd of February, "and was very lean, being almost a skeleton." Seven in all came to Mr. Lees from the lower end of the western shore of Loch Lomond. He is of opinion that they were "blown across with the west winds which blew very strongly the first week of the year."

Mr. Jubb, F.C. Minister, Luss, informed Mr. H. B. Watt of one that had been found in Glenfruin, about the beginning of February. One which had been shot at Garscube reached Mr. M'Culloch on the 4th of that month.

Stirlingshire.—Mr. M'Culloch had birds from the Killearn district on 15th and 20th January and 11th February, all found dead; also two from Rowardennan on 18th January and 25th February respectively.

Lanarkshire.—One was found near Dennistoun, and reached Mr. M'Culloch on 20th January.

Contribution to the Topographical Botany of the West of Scotland.

By PETER EWING, F.L.S.

[Read 29th January, 1895.]

THE following list of new records of plants occurring in the West of Scotland is in continuation of the series laid before the Society up to 29th April, 1890, and published in my Catalogue in 1892. This list brings the records for the West of Scotland up to date, so far as known.

When I have a voucher for the plant, I use the alphabetical character representing the county, as shown below; when I have no voucher, but have found the plant elsewhere recorded, I use the Watsonian Vice-County number. Each name is prefixed by its number in the Eighth Edition of the *London Catalogue*, so far as it goes.

EXPLANATION OF CATALOGUE.—Watsonian Vice-Counties have been the guide as to districts, and appear thus:—

VICE-Co.

No.	COUNTY NAME.	SYNONYM.
75.	Ayr.	a.
76.	Renfrew.	b.
77.	Lanark.	c.
86.	Stirling.	d.
97.	Westernness (Western Water Sheds of Inverness-shire and the Northern detached part of Argyle).	e.
98.	Argyle (part of Argyleshire North and East of the Crinan Canal).	f.
99.	Dumbarton (this and Stirling appear to me two badly arranged Counties for Topographical work).	g.
100.	Clyde Isles (Arran, Bute, and the Cumbraes).	h.
101.	Cantyre (from the Crinan Canal Southwards).	i.
102.	South Ebudes (Islay, Jura, Colonsay, and Scarba).	j.

VICE-Co.

No.	COUNTY NAME.	SYNONYM.
103.	Mid Ebudes (Mull, Tyree, and Coll).	k.
104.	North Ebudes (Muich, Eigg, Canna, and Skye).	l.
105.	West Ross (Western half of Ross-shire, including the detached parts of Cromarty).	m.
110.	Hebrides (Barra, North and South Uist, Harris, and Lewis).	n.

All these provinces, except 110, have been visited by one or other of us. This I have included in a way, so far as my knowledge of it goes.

The following is the list :—

- 319. *Acer campestre*, Linn. b, Wood.
- 758. *Achillea Millefolium*, Linn. 110.
- 759. „ *Ptarmica*, Linn. 110.
- 45. *Aconitum Napellus*, Linn. b, Ewing.
- 1464. *Acorus Calamus*, Linn. d.
- 501. *Agrimonia Eupatoria*, Linn. n.
- 502. „ *odorata*, Mill. c, Ewing. n.
- 1753. *Agropyron junceum*, Beauv. 97, 110.
- 1655. *Agrostis canina*, Linn. 110.
- 1656. „ *alba*, Linn. 110.
- 1657. „ *b pumila*, Linn. 110.
- 1671. *Aira præcox*, Linn. h.
- 1160. *Ajuga reptans*, Linn. n.
- 1161. „ *pyramidalis*, Linn. 110.
- 497. *Alchemilla arvensis*, Lam. 110.
- 498. „ *b montana*, Willd. f, Ewing.
- 499. „ *alpina*, Linn. h.
- 1470. *Alisma Plantago*, Linn. h.
- 1400. *Allium vineale*, Linn. h.
- 1403. „ *Schœnoprasum*, Linn. 86.
- 1407. „ *ursinum*, Linn. n.
- 1274. *Alnus glutinosa*, Linn. 110.
- 1642. *Alopecurus agrestis*, Linn. b, Wilkies.
- 1644. „ *geniculatus*, Linn. c, Ewing.
- 1646. „ *pratensis*, Linn. 110.
- 1667. *Ammophila arundinacea*, Host. c, Ewing. 104. 110.

956. *Anagallis arvensis*, Linn. 110.
 958. „ *tenella*, Linn. n.
 988. *Anchusa officinalis*, Linn. g, Watt.
 989. „ *sempervirens*, Linn. h, Ewing.
 7. *Anemone nemorosa*, Linn. h.
 762. *Anthemis Cotula*, Linn. b, Wilkies.
 763. „ *arvensis*, Linn. a, Boyd.
 1640. *Anthoxanthum Puelii*, Lecoq and Lamotte. b.
 Wilkies.
 365. *Anthyllis Vulneraria*, Linn. n.
 1663. *Apera Spica-venti*, Beauv. b, Wilkies, d.
 625. *Apium nodiflorum*, Reichb. n.
 88. *Arabis sagittata*, DC. h.
 „ *alpina*, 104.
 796. *Arctium minus*, Schk. n.
 797. „ *intermedium*, Lange, 105.
 915. *Arctostaphylos alpina*, Spreng. 97.
 774. *Artemisia maritima*, Linn. g, Ewing.
 708. *Asperula arvensis*, Linn. b, Wilkies.
 1770. *Asplenium Adiantum-nigrum*, Linn. 110.
 „ *c Serpentina*, Koch, 98.
 1775. „ *Ruta-muraria*, Linn. b, Wilkies, h.
 1193. *Atriplex erecta*, Huds. c, Ewing.
 1197. „ *laciniata*, Linn. 76, 101, 102, 104, n.
 1018. *Atropa Belladonna*, Linn. d, Wilkies.
 1680. *Avena pubescens*, Huds. d, n.
 1155. *Ballota nigra*, Linn. 77.
 82. *Barbarea stricta*, Andr. c and g, Watt.
 1070. *Bartsia viscosa*, Linn. g, Watt.
 1273. *Betula nana*, Linn. 97.
 756. *Bidens tripartita*, Linn. b, Wilkies.
 987. *Borago officinalis*, Linn. b, Wilkies, d.
 1809. *Botrychium Lunaria*, Sw. c, Ewing, h, n.
 1744. *Brachypodium sylvaticum*, Roem. and Schult. n.
 123. *Brassica oleracea*, Linn. a, Ewing.
 124. „ *Napus*, Linn. 110.
 126. „ *Rapa*, Linn. a, Ewing.
 132. „ *alba*, Boiss. b, Wilkies, 110.
 1733. *Bromus asper*, Murr. 105.

1736. *Bromus tectorum*, Linn. b, Wilkies.
 1739. „ *secalinus*, Linn. a, Ewing.
 1740. „ *racemosus*, Linn. b, Wilkies.
 1743. „ *arvensis*, Linn. b, Wilkies.
 619. *Bupleurum rotundifolium*, Linn. b, Wilkies.
 153. *Cakile maritima*, Scop. 103, n.
 582. *Callitriche stagnalis*, Scop. b, Ewing.
 583. „ *hamulata*, Kuetz. h.
 585. „ *autumnalis*, Linn. d.
 37. *Caltha minor*, Syme, g, Watt.
 1009. *Calystegia Soldanella*, R.Br. a, Ewing, h, n.
 121. *Camelina sativa*, Crantz, b, Wilkies.
Campanula lancifolia, h, Watt.
 904. „ *rapunculoides*, Linn. a, Wilkies.
 94. *Cardamine flexuosa*, With. h.
 1553. *Carex dioica*, Linn. b, Wilkies, h.
 1557. „ *pauciflora*, Lightf. h.
 1560. „ *disticha*, Huds. b, Wilkies.
 1562. „ *Ehrhartiana* (Hoppe), d.
 1564. „ *paniculata*, Linn. b, Wilkies, g, Watt, h.
 1576. „ *alpicola* (Wahl.), 97.
 1581. „ *stricta*, Good. b, King.
 1582. „ *acuta*, Linn. b, King.
 1584. „ *rigida*, Good. h, 110.
 1587. „ *Goodenowii*, J. Gay, h.
 1590. „ *limosa*, Linn. b, Wilkies, 110.
 1596. „ *pilulifera*, Linn. b, Ewing, h, 102.
 1598. „ *præcox*, Jacq. h.
 1600. „ *pallescens*, Linn. h.
 1606. „ *pendula*, Huds. c, Ewing.
 1610. „ *lævigata*, Sm. f, Watt, h, 105.
 1612. „ *distans*, Linn. h, 110.
 1615. „ *extensa*, Good. 105, 110.
 1619. „ *hirta*, Linn. h.
 1622. „ *riparia*, Curtis, d.
 1623. „ *rostrata*, Stokes, h.
 1625. „ *pulla*, Good. f, Ewing, g, Ewing, 104, 105.
 793. *Carlina vulgaris*, Linn. a, Smith, 104.
 1275. *Carpinus Betulus*, Linn. b, Wilkies.

- 1278.**Castanea sativa*, Mill. b, Ewing.
 1693. *Catabrosa aquatica*, Beauv. g, Watt.
 678. *Caucalis nodosa*, Scop. b, Wilkies.
 816. *Centaurea nigra*, Linn. n.
 817. „ *Scabiosa*, Linn. d.
 959. *Centunculus minimus*, Linn. 76, h, Boyd, 110.
 218. *Cerastium arcticum*, Lange, 98.
 1833. *Chara fragilis*, Desv. 97, 99, 100, 104, n.
 „ *b barbata*, Gant. h, King.
 „ *c capillacea*, Coss. et G. 86.
 1836. „ *aspera*, Willd. n.
 1839. „ *contraria*, Kuetz, 100.
 1842. „ *hispida*, Linn. n.
 1843. „ *vulgaris*, Linn. 100, 104, 110.
 „ *e melanopyrena*, A.Br. h, King.
 75.**Cheiranthus Cheiri*, Linn. a and b, Wilkies.
 62. *Chelidonium majus*, Linn. c, Ewing.
 „ *b laciniatum* (DC.), d, Ewing.
 766. *Chrysanthemum Leucanthemum*, Linn. n.
 553. *Chrysosplenium oppositifolium*, Linn. 110.
 823. *Cichorium Intybus*, Linn. b, Wilkies.
 627. *Cicuta virosa*, Linn. c, Ewing, n.
 1551. *Cladium germanicum*, Schrad. h, Ballantyne, 105.
 107. *Cochlearia alpina* (Wats.), 104, 110.
 108. „ *danica*, Linn. a, Ewing, 102, n.
 617. *Conium maculatum*, Linn. b, Wood, 110.
 1395. *Convallaria majalis*, Linn. a and b, Wilkies, d, n.
 1010. *Convolvulus arvensis*, Linn. h.
 649. *Coriandrum sativum*, Linn. b, Wilkies.
 64. *Corydalis lutea*, DC. c and d, Ewing.
 65. „ *claviculata*, DC. b, Wilkies, h.
 1276. *Corylus Avellana*, Linn. n.
 152. *Crambe maritima*, Linn. h.
 833. *Crepis biennis*, Linn. d.
 1766. *Cryptogramme crispa*, R. Br., said to be extinct in
 Renfrewshire (?).
 672. *Daucus Carota*, Linn. 110.
 44. *Delphinium Ajacis*, Reichb. b, Ewing.
 1676. *Deschampsia montana* (Huds.), 104.

720. *Dipsacus sylvestris*, Linn. b, Wood, d, Ewing.
 779. *Doronicum Pardalianches*, Linn. b, Wilkies.
 100. *Draba muralis*, Linn. c, Johnstone.
 101. „ *incana*, Linn. 105.
 102. „ *rupestris*, R. Br. 98.
 575. *Drosera anglica*, Huds. h, n.
 576. „ *intermedia*, Hayne, 105.
 1628. *Echinochloa Crus-galli*, Linn. b, Wilkies.
 257. *Elatine hexandra*, DC. d.
 1760. *Elymus arenarius*, Linn. 105.
 598. *Epilobium obscurum*, Schreb. n.
 „ *palustre x obscurum*, 97, 98, 105.
 1811. *Equisetum maximum*, Lam. 105.
 1813. „ *pratense*, Ehrh. 110.
 1815. „ *palustre*, Linn. h.
 1817. „ *limosum*, Sm. h.
 1545. *Eriophorum latifolium*, Hoppe, 98.
 305. *Erodium cicutarium*, L'Hérit. n.
 611. *Eryngium maritimum*, Linn. 104, n.
 119. *Erysimum cheiranthoides*, Linn. b, Wood.
 967. *Erythræa Centaurium*, Pers. b, Ewing 104.
 969. „ *littoralis*, Fr. h, Watt.
 315. *Euonymus europæus*, Linn. d.
 1254. *Euphorbia Cyparissias*, Linn. a, Ewing.
 1068. *Euphrasia gracilis* (Fr.), c, d, e, f, g, i, j, k, l, and
 m, Ewing.
 1718. *Festuca procumbens*, Kunth, d.
 1720. „ *loliacea*, Huds. d, 102, 110.
 1724. „ *sciuroides*, Roth, g, Watt, h.
 1726. „ *rubra*, Linn. g, Watt.
 1728. „ *fallax*, Th. 110.
 1729. „ *sylvatica*, Vill. 105.
 1730. „ *elatior*, Linn. 104.
 735. *Filago germanica*, Linn. h.
 66. *Fumaria pallidiflora*, Jord. g, Watt.
 67. „ *confusa*, Jord. 102, n.
 69. „ *densiflora*, DC. g, Watt.
 70. „ *officinalis*, Linn. n.
 692. *Galium boreale*, Linn. h.

694. *Galium verum*, Linn. n.
 695. „ *erectum*, Huds. 105.
 696. „ *Mollugo*, Linn. g, Wilkies.
 700. „ *uliginosum*, Linn. 102, n.
 320. *Genista anglica*, Linn. c, Turner.
 291. *Geranium sanguineum*, Linn. c, Ewing.
 294. „ *phæum*, Linn. b, Ewing.
 301. „ *dissectum*, Linn. 105, n.
 302. „ *columbinum*, Linn. 102.
 303. „ *lucidum*, Linn. h, Ewing.
 1712. *Glyceria fluitans*, R.Br. n.
 1713. „ *plicata*, Fr. 98, 100.
 1716. „ *distans*, Wahl. b, Wilkies.
 742. *Gnaphalium uliginosum*, Linn. h, n.
 1365. *Habenaria albida*, R.Br. g, Watt, h.
 1366. „ *viridis*, R.Br. b, Wood, h, n.
 1367. „ *bifolia*, R.Br. 102.
 1368. „ *chloroleuca*, Ridley, h.
 679. *Hedera Helix*, Linn. n.
 41. *Helleborus fœtidus*, Linn. d.
 111. *Hesperis matronalis*, Linn. b, Ewing.
 841. *Hieracium holosericeum*, Backh. 97.
 842. „ *eximium*, Backh. 105.
 846. „ *nigrescens*, Willd. 105.
 847. „ *lingulatum*, Backh, d, g, Watt.
 851. „ *anglicum*, Fr. n.
 „ *b cerinthiforme*, Backh. g, Watt, 110.
 853. „ *pallidum*, Biv. d.
 855. „ *argenteum*, Fr. n.
 859. „ *murorum*, Linn. n.
 863. „ *vulgatum*, Fr. c, Ewing, n.
 865. „ *gothicum*, Fr. c, Johnstone, d.
 869. „ *prenanthoides*, Vill. c, Ewing, d, 105.
 871. „ *strictum*, auct. angl. c, Johnstone, 104.
 873. „ *crocatum*, Fr. c, Johnstone, d, 110.
 874. „ *Eupatorium*, Griseb. c, King.
 875. „ *boreale*, Fr. a and b, Ewing.
 „ *auratum*, Fries. c, Ewing.
 „ *sparsifolium*, Lindeb. 98, g, Watt, 104, 110.

- Hieracium Friesii*, Hartm. d.
 „ *Buglossoides*, Arw. Touvet, 97, g,
 Watt, 104.
 „ *onosmoides*, Fr. 104.
 „ *prælongum*, Lindeb. 105.
 „ *Sommerfeltii*, Lindeb. 98, g, Watt.
 „ *augustatum*, Lindeb. 98.
 „ *submurorum*, Lindeb. 98.
 „ *Scoticum*, Hanb. n.
 „ *sinuans*, Hanb. 98.
 „ *calliophyllum*, Hanb. 98.
 „ *Pictorum*, Linton, 98.
 „ *Marshalli*, Linton, 98.
 „ *duriceps*, Hanb. d, g, Watt, 98.
 „ *strictum*, Fries., verus, 75.
 856. „ *nitidum*, Backh. 97.
 „ *euprepes*, Hanb. 98.
 „ *stenolepes*, Lindeb. 99, 104.
 „ *Boswelli*, Linton, 104.
 862. „ *flocculosum*, Backh. 98.
 „ *Backhousii*, Hanb. 98.
 „ *cæσιο-murorum*, Lindeb. 98.
 „ *Langwellense*, Hanb. 98.
 „ *atratum*, Fr. 98.
 „ *rivale*, Hanb. 98.
 „ *gravestellum*, Dahlst. 98.
 „ *orarium*, Lindeb. g, Watt.
 „ *subsecundum*, Hanb. g, Watt.
 1241. *Hippophae rhamnoides*, Linn. b, Wilkies.
 577. *Hippuris vulgaris*, Linn. n.
 1761. *Hymenophyllum tunbridgense*, Smith, h.
 1762. „ *unilaterale*, Bory, b, King, h.
 1020. *Hyoscyamus niger*, Linn. b, Wilkies.
 265. *Hypericum quadratum*, Stokes, h.
 267. „ *humifusum*, Linn. h.
 270. „ *hirsutum*, Linn. c, Johnstone.
 272. „ *elodes*, Huds. n.
 148. *Iberis amara*, Linn. b, Wilkies.
 1829. *Isoetes lacustris*, Linn. a, Smith.

1429. *Juncus Gerardi*, Lois. d.
 1435. „ *effusus*, Linn. 110.
 1439. „ *supinus*, Mœnch, h, Ballantyne.
 1442. „ *lamprocarpus*, Ehrh. h.
 1318. *Juniperus communis*, Linn. 98, 110.
 1552. *Kobresia caricina*, Willd. 98.
 1691. *Koeleria cristata*, Pers. n.
 883. *Lactuca virosa*, Linn. d, Wilkies.
 886. „ *muralis*, Fresen. a, Smith.
 1149. *Lamium intermedium*, Fr. 103.
 1150. „ *hybridum*, Vill. 102, 110.
 1152. „ *maculatum*, Linn. h, Shearer.
 1798. *Lastræa spinulosa*, Presl. 110.
 395. *Lathyrus Aphaca*, Linn. b, Wilkies.
 1466. *Lemna minor*, Linn. h, n.
 880. *Leontodon hispidus*, Linn. 102.
 881. „ *b pratensis* (Koch), 110.
 139. *Lepidium latifolium*, Linn. c, Turner.
 140. „ *runderale*, Linn. d.
 141. „ *sativum*, Linn. f, Wilkies.
 144.* „ *Draba*, Linn. b, Wilkies.
 662. *Ligusticum scoticum*, Linn. h.
 962. *Ligustrum vulgare*, Linn. d, Ewing.
 1028. *Linaria Cymbalaria*, Mill. b, Wilkies, d, Ewing.
 „ *minor*, Desv. d.
 1035. „ *vulgaris*, Mill. b, Ewing.
 687. *Linnæa borealis*, Gronov. 105.
 290. *Linum usitatissimum*, Linn. c, Johnstone.
 1330. *Listera cordata*, R.Br. h.
 1331. „ *ovata*, R.Br. h.
 1004. *Lithospermum officinale*, Linn. h.
 1005. „ *arvense*, Linn. n.
 1170. *Littorella lacustris*, Linn. n.
 895. *Lobelia Dortmanna*, Linn. h, 105.
 1748. *Lolium temulentum*, Linn. b, Wilkies.
 366. *Lotus corniculatus*, Linn. n.
 1449. *Luzula pilosa*, Willd. 110.
 1453. „ *campestris*, DC. 110.
 204. *Lychnis alba*, Mill. b, Wilkies.

206. *Lychnis Flos-cuculi*, Linn. n.
 1822. *Lycopodium Selago*, Linn. h, 110.
 1826. „ *alpinum*, Linn. 110.
 1827. „ *complanatum*. This does not occur
 in Scotland; the plant so named is *L. alpinum*,
 var. *decipiens*, Syme.
 990. *Lycopsis arvensis*, Linn. n.
 1116. *Lycopus europæus*, Linn. 104, n.
 587. *Lythrum Salicaria*, Linn. n.
 1326. *Malaxis paludosa*, Sw. 110.
 279. *Malva rotundifolia*, Linn. b, Ewing.
 768. *Matricaria inodora*, Linn. n.
 „ *c. maritima*, Linn. a, Ewing, 110.
 58. *Meconopsis cambrica*, Vig. b, King, c, Ewing.
 335. *Medicago denticulata*, Willd. a, Ewing, b, Wilkies.
 336. „ *maculata*, Sibth. a, Ewing.
 1076. *Melampyrum montanum*, Johnstone, 97.
 1077. „ *sylvaticum*, Linn. c, Ewing.
 338. *Melilotus altissima*, Thuill. b, Wilkies.
 339.* „ *alba*, Desr. b, Wilkies.
 340. „ *officinalis*, Desr. b, Ewing, d.
 341. „ *parviflora*, Lam. b, Wilkies.
 1104. *Mentha sylvestris*, Linn. b, Ewing.
 1108. „ *hirsuta*, Linn. n.
 979. *Menyanthes trifoliata*, Linn. n.
 1262. *Mercurialis annua*, Linn. a, Ewing, b, Wilkies.
 1044. *Mimulus luteus*, Linn. b, Ewing.
 996. *Myosotis repens*, D. Don, h.
 998. „ *sylvatica*, Hoffm. c, Ewing, 104.
 999. „ *b. umbrosa*, Bab. a and g, Ewing.
 1270. *Myrica Gale*, Linn. n.
 579. *Myriophyllum spicatum*, Linn. h, Ewing, n.
 580. „ *alterniflorum*, DC. h, n.
 76. *Nasturtium officinale*, R. Br. n.
 77. „ *sylvestre*, R. Br. b, King.
 1329. *Neottia Nidus-avis*, Rich. d.
 1128. *Nepeta Cataria*, Linn. d.
 1855. *Nitella translucens*, Agardh. 110.
 1856. „ *flexilis*, Agardh. 97.

1857. *Nitella opaca*, Agardh. 76, 86, 98, 104, 110.
 50. *Nuphar luteum*, Sm. 105, 110.
 52. *Nymphæa alba*, Linn. b, Ewing.
 651. *Cœnanthe fistulosa*, Linn. b, Ewing.
 654. „ *Lachenalii*, Gmel. b, Ewing, 105.
 655. „ *crocata*, Linn. n.
 327. *Ononis repens*, Linn. b, Ewing.
 328. „ *spinosa*, Linn. d.
 1807. *Ophioglossum vulgatum*, Linn. b, Wood, h, 110.
 1354. *Orchis incarnata*, Linn. 105, n.
 1355. „ *latifolia*, Linn. n.
 1413. *Ornithogalum umbellatum*, Linn. b, Wilkies.
 1084. *Orobanche rubra*, Sm. 103, 104, 105, 110.
 1806. *Osmunda regalis*, Linn. n.
 1220. *Oxyria digyna*, Hill, h.
 55. *Papaver dubium*, Linn. n.
 589. *Peplis Portula*, Linn. n.
 778. *Petasites albus*, Gærtn. b, Ewing, d.
 668. *Peucedanum Ostruthium*, Koch, b, Wilkies.
 1636. *Phalaris canariensis*, Linn. b, Wilkies.
 1652. *Phleum arenarium*, Linn. d.
 1687. *Phragmites communis*, Trin. h, 110.
 1100. *Pinguicula lusitanica*, Linn. h, Ewing, 110.
 1164. *Plantago media*, Linn. b and c, Wilkies.
 1705. *Poa glauca*, Sm. f, Ewing, 104, d, Watt.
 1706. „ *Balfourii*, Bab. f, Ewing.
 1708. „ *compressa*, Linn. b, Wilkies.
 1710. „ *pratensis*, Linn. n.
 981. *Polemonium cœruleum*, Linn. b, Wood.
 177. *Polygala vulgaris*, Linn. 102, 105, n.
 1392. *Polygonatum multiflorum*, All. b, Ewing.
 1208. *Polygonum Roberti*, Loisel. h, 110.
 1211. „ *minus*, Huds. b, Ewing.
 1216. „ *amphibium*, Linn. h, 104.
 „ *b terrestre*, Leers, 110.
 1217. „ *Bistorta*, Linn. n.
 1658. *Polypogon monspeliensis*, Desf. b, Wilkies.
 1311. *Populus alba*, Linn. c, Ewing, 97.
 1314. „ *nigra*, Linn. g, Watt.

1479. *Potamogeton natans*, Linn. n.
 1480. „ *polygonifolius*, Pour. h.
 „ *b pseudo-fluitans*, Syme, g, Watt.
 1483. „ *rufescens*, Schrad. 98, 101, 103, 104,
 105.
 1487. „ *heterophyllus*, Schreb. 86, 105, n.
 1488. „ *nitens*, Web. 103.
 1494. „ *prælongus*, Wulf, 104.
 1495. „ *perfoliatus*, Linn. n.
 1496. „ *crispus*, Linn. 101.
 „ *Bennettii*, Fryer, d.
 1501. „ *Friesii*, Rupr. 77, n.
 1502. „ *pusillus*, Linn. 97.
 1505. „ *pectinatus*, Linn. n.
 1507. „ *filiformis*, Nolte, 102.
 483. *Potentilla norvegica*, Linn. b, Wilkies, c, Ewing.
 489. „ *procumbens*, Sibth. h, King.
 495. „ *Comarum*, Nestl. n.
 407. *Prunus communis*, Huds. 104.
 928. *Pyrola rotundifolia*, Linn. 77.
 929. „ *media*, Sw. 97, 10.
 930. „ *arenaria*, a, Smith.
 525. *Pyrus Aria*, Sm. d.
 526. „ *latifolia*, Syme, d.
 12. *Ranunculus circinatus*, Sibth. 105.
 14. „ *pseudo-fluitans*, Bab. c, Ewing.
 15. „ *trichophyllus*, Chaix, a, Ewing, g.
 Watt, 110.
 16. „ *Drouetii*, Godr. 102, n.
 17. „ *heterophyllus*, Web. ex. p. 98.
 18. „ *d penicillatus*, Hiern. c, Ewing.
 19. „ *Baudotii*, Godr. n.
 21. „ *Lenormandi*, F. Schultz, b, Ewing,
 d, 102.
 23. „ *scleratus*, Linn. h.
 „ *petiolaris*, Marshall, 97, f, Ewing, 104.
 27. „ *Lingua*, Linn. 105.
 31. „ *bulbosus*, Linn. h.
 32. „ *Sardous*, Crantz, b and c, Ewing.

36. *Ranunculus Ficaria*, Linn. 110.
 154. *Raphanus Raphanistrum*, Linn. 110.
 155. „ *maritimus*, Sm. 110.
 1078. *Rhinanthus Crista-galli*, Linn. n.
 1548. *Rhynchospora alba*, Vahl. h.
 506. *Rosa spinosissima* Linn. n.
 507. „ *b Sabini* (Woods), 102.
 509. „ *mollis*, Sm. n.
 514. „ *e dumalis* (Bechst.), n.
 „ *p verticillacantha* (Mérat.), g, Watt.
 516. „ *arvensis*, Huds. d.
 416. *Rubus Idæus*, Linn. n.
 419. „ *plicatus*, W. & N. 98.
 438. „ *carpinifolius*, W. & N. 97.
 439. „ *villicaulis*, Kœhl. 97.
 442. „ *mucronatus*, Blox. 98, 105.
 471. „ *corylifolius*, Sm. 110.
 „ *pulcherrimus*, Newn. 97, 98.
 474. „ *a umbrosus*, Maassii, Focke, n.
 476. „ *Chamæmorus*, Linn. g, Wilkies.
 „ *calvatus*, Blox. 105.
 „ *rosaceus*, W. & N. 97.
 „ *dumnoniensis*, Bab. 97, 98.
 „ *selmeri*, Linn. 98.
 1226. *Rumex obtusifolius*, Linn. 110.
 1230. „ *aquaticus*, Linn. 86, 97, 110.
 1509. *Ruppia rostellata*, Koch, 104, 110.
 240. *Sagina apetala*, Linn. n.
 243. „ *Linnæi*, Presl. 98.
 245. „ *subulata*, Presl. h, Ewing.
 1473. *Sagittaria sagittifolia*, Linn. d, Wilkies.
 1200. *Salicornia herbacea*, Linn. h.
 1280. *Salix pentandra*, Linn. 110.
 1281. „ *fragilis*, Linn. 110.
 „ *c Russelliana* (Sm.), 110.
 1282. „ *alba*, Linn. 110.
 1285. „ *purpurea*, Linn. b. Ewing, f, King.
 1287. „ *rubra*, Huds. c, King.
 1289. „ *viminalis*, Linn. d, h, King, 110.

1295. *Salix cinerea*, Linn. 110.
 „ *b aquatica* (Sm.), 110.
 1297. „ *Caprea*, Linn. b, Ewing.
 1300. „ *nigricans*, “Sm.,” f, Ewing, g, Watt.
 1302. „ *repens*, Linn. h, King.
 „ *b fusca* (Linn.), 110.
 1304. „ *lapponum*, Linn. 86, 97.
 1309. „ *herbacea*, Linn. h.
 1310. „ *reticulata*, Linn. 98.
 „ *ludificans*, F. B. White, i, e, 1299 × 1296, 75.
 „ *coriaceus* (Schl.), Forbes, i, e, 1300 × 1296, 75.
 „ *simulatrix*, F. B. White, i, e, 1309 × 1305, 98.
 1204. *Salsola Kali*, Linn. 104, 110.
 1126. *Salvia Verbenaca*, Linn. a, Wilkies.
 683. *Sambucus nigra*, Linn. 110.
 960. *Samolus Valerandi*, Linn. n.
 614. *Sanicula europæa*, Linn. h.
 536. *Saxifraga oppositifolia*, Linn. 110.
 538. „ *stellaris*, Linn. h.
 551. „ *sponhemica*, Gmel. 104.
 643. *Scandix Pecten-Veneris*, Linn. b, Paterson.
 1550. *Schœnus nigricans*, Linn. b, Ewing, n.
 1410. *Scilla verna*, Huds. 104, n.
 1411. „ *nutans*, Sm. 110.
 1526. *Scirpus pauciflorus*, Light. n.
 1529. „ *fluitans*, Linn. 97.
 1530. „ *Savii*, Seb. and Maur. h, King, 103 n.
 1534. „ *Tabernæmontani*, Gmel. n.
 1538. „ *maritimus*, Linn. n.
 1040. *Scrophularia umbrosa*, Dum. b, Wilkies.
 1043. „ *vernalis*, Linn. b, Ewing.
 1131. *Scutellaria minor*, Linn. h, Renwick, n.
 562. *Sedum Rhodiola*, DC. h.
 570. „ *reflexum*, Linn. d.
 137. *Senebiera didyma*, Pers. b, Wilkies.
 783. *Senecio viscosus*, Linn. b, Ewing.
 788. „ *saracenicus*, Linn. c, Ewing.
 709. *Sherardia arvensis*, Linn. n.
 660. *Silaus pratensis*, Bess. 102.

192. *Silene Cucubalus*, Wibel. h.
 198. „ *acaulis*, Linn. 97, 110.
 202. „ *noctiflora*, Linn. b, Wilkies, d.
 112. *Sisymbrium Thaliana*, Hook. h.
 113. „ *officinale*, Scop. 110.
 636. *Sium erectum*, Huds. b, Wood.
 618. *Smyrniolum Olusatrum*, Linn. b and d, Wilkies
 1016. *Solanum nigrum*, Linn. f, Wilkies.
 727. *Solidago angustifolia*, Gaud. d, Ewing.
 „ *c cambrica* (Huds.), g, Watt.
 1459. *Sparganium simplex*, Huds. d, h.
 1460. „ *affine*, Schnizl. n.
 247. *Spergula sativa* (Bœnn.), n.
 414. *Spiræa Ulmaria*, Linn. n.
 1135. *Stachys Betonica*, Benth. a, Ewing.
 221. *Stellaria aquatica*, Scop. d.
 1203. *Suæda maritima*, Dum. h.
 882. *Taraxacum palustre* (DC.), h, 110.
 3. *Thalictrum minus*, Linn. 97, 104, 105, n.
 145. *Thlaspi arvense*, Linn. b, Wilkies.
 1119. *Thymus Chamædryas*, Fr. 104.
 954. *Trientalis europæa*, Linn. g, Somerville.
 344. *Trifolium medium*, Linn. n.
 360. „ *resupinatum*, Linn. b, Wilkies.
 1679. *Trisetum flavescens*, Beauv. a and d, Wilkies.
 1455. *Typha latifolia*, Linn. b, Ewing.
 1456. „ *angustifolia*, Linn. c, Ewing.
 1092. *Utricularia vulgaris*, Linn. 97.
 1093. „ *neglecta*, Lehm. 98, g, Watt, 105.
 1095. „ *intermedia*, Hayne, g, Watt, 110.
 912. *Vaccinium uliginosum*, Linn. 97.
 712. *Valeriana pyrenaica*, Linn. b, Wilkies.
 715. *Valerianella olitoria*, Mœnch, n.
 1049. *Veronica polita*, Fr. f, Ewing.
 1051.* „ *persica*, Poir. b, Wood.
 1056. „ *b humifusa*, Dicks. 97, 105.
 1058. „ *alpina*, Linn. 97.
 1059. „ *saxatilis*, Linn. 97.
 1065. „ *scutellata*, Linn. h.

1066. *Veronica Anagallis*, Linn. n.
686. *Viburnum Lantana*, Linn. b, Wood.
381. *Vicia hirsuta*, Koch, f, Ewing, h.
385. „ *Orobus*, DC. c, Turner.
386. „ *sylvatica*, Linn. c, Ewing.
170. *Viola canina*, Linn. a, Ewing.
175. „ *Curtisii*, Forster, 105, n.
898. *Wahlenbergia hederacea*, Reichb. a, Wilkies.
1784. *Woodsia hyperborea*, R.Br. 98.
1510. *Zannichellia palustris*, Linn. g, Watt.

Cystopteris montana, Bernhardi, in Stirlingshire.

By A. SOMERVILLE, B.Sc., F.L.S.

[Read 25th September, 1894.]

It is gratifying to be able at any time to add to the previously known stations in this little country of ours, Scotland, for any local organism, be it plant or animal. Our indigenous ferns—many of them at least—are dainty things, and information as to extension of their range is of interest, more especially when the species happens to be one confined to those higher levels; the flora of which is so linked with that of Scandinavia, and also, in a more distant degree, with the flora of the elevated areas of Central Europe.

Cystopteris montana of Bernhardi, the Mountain Bladder Fern, is one of our rarest *Cryptogamæ vasculares*. With what may be termed decidedly arctic sympathies, it usually selects for its habitat a moist situation in *cloud-land*, at between 2,300 and 3,600 feet, with a northern, or, in one case, a north-western exposure, and where it will receive little of the direct rays of the sun.

When on Ben Lomond in August last (1894), in company with Mr. Robert Kidston, F.G.S., Colonel J. S. Stirling of Gargunnoch, and Dr. R. Braithwaite, F.L.S., author of the "British Moss Flora," I had the pleasure to meet with this interesting plant, previously unrecorded for Stirlingshire, recognising its deltoid, very compound fronds, and long stipes, from having seen them on hills north of Glen Lochay, Mid-Perthshire, in 1888. Mr. Arthur Bennett, F.L.S., to whom the plant has been submitted, remarks in connection with it: "I think the *Cystopteris* must be *C. montana*, though certainly the glandular setæ are much less numerous than usual." Fronds only were brought away by me, and it is to be hoped that this local species may spread at its newly-found station, viz., the wet grassy ledges of the precipitous cliffs of the northern face of the hill, at about 3,000 feet, and in company with its congener, *C. fragilis*, Bernh.

It is somewhat remarkable that, though Ben Lomond is but twenty-seven miles distant in a direct line from Glasgow, and is visited annually by many botanists, it should only at this late day be telling us that *Cystopteris montana* belongs to its flora, and



Lowest pinna of *Cystopteris montana* (showing fructification).

so to the flora of Stirlingshire. Through the kindness of Mr. Bennett, I am in a position to give particulars in full of the other five counties in Britain in which *C. montana* has been found. They are: (69) Westmoreland, on Helvellyn; (88) Perth, Mid, on the Breadalbanes; (90) Forfar, in Caenlochan Glen; (92) Aberdeen, South, in Glen Callater; and, lastly, Argyle, Main, on Ben Laoigh, on its north-west side, as I have been kindly informed by Mr. G. Claridge Druce, F.L.S., who was the discoverer of it there. *C. montana* was first found in Britain by Mr. W. Wilson, on Ben Lawers, in 1836. Its foreign distribution, according to Sir J. D. Hooker, is in "arctic and alpine regions in Europe, Asia, and America."

The Ferns of the British Isles, leaving out of account *Hymenophyllum*, *Trichomanes*, *Osmunda*, and the *Ophioglossaceæ*,—the fructification in which is exceptional,—are, as we know, classified mainly on the basis of the structure and position, on the back of the frond, of the *sori* or groups of *sporangia*, those minute stalked capsules in which the microscopic spores are contained. These *sori* may, as regards their position, be either,—

- (1) Placed along the edge of the frond (marginal), and covered by an involucre (called also an *indusium*), which is continuous with the frond, as in *Adiantum*, *Pteris*, *Cryptogramme*, and *Lomaria*; or
- (2) On the back of the frond (dorsal), linear in shape, protected by a linear involucre, as in *Asplenium* and *Scolopendrium*; or
- (3) On the back of the frond (dorsal), globose in shape, and with either a lacerated, hooded, orbicular-peltate or reniform involucre, as, respectively, in *Woodsia*, *Cystopteris*, *Aspidium*, and *Nephrodium*; or

- (4) They may still be on the back (dorsal), but unprotected by any involucre, as in *Polypodium* and *Gymnogramme*.

From the foregoing, which is based on the classification given by Sir J. D. Hooker in "The Student's Flora," *Cystopteris* is seen to belong to the third group. Its involucre, membranous in substance, ovate, convex and acute in form, and eventually becoming reflexed, is attached by a broad base to the back of a veinlet, and, arching forward closely over the cluster of spore capsules, presents the appearance of a little sac, hence the name *Cystopteris*, Bladder Fern, from *κύστις*, a sac or bladder.

The genus *Cystopteris*, of which there are five species known to science, has in Britain (excluding the doubtful *C. alpina* of Desvaux) two representatives, viz., the subject of this communication, and *C. fragilis*, Bernh. The latter, as we know, is common; I have taken it near Glasgow under the shade of a hawthorn hedge, between Possil Marsh and Cadder "Wilderness" in Lanarkshire. The altitudinal range of *C. fragilis* is from the sea-level to 4,000 feet, contrasting in this with *C. montana*, which latter, however, though an "alpine," grows well from its creeping rhizome in our gardens under cultivation.

[For permission to use the figure I am indebted to the courtesy of Messrs. Swan Sonnenschein & Co., publishers of "British Ferns, and where found."]

Lima hians and its Mode of Life.

By J. D. F. GILCHRIST, M.A., B.Sc., Ph.D.

[Read 29th January, 1895.]

It seems to be a general rule in the Animal Kingdom that with the cessation of the struggle for existence there is a degeneration of the organism; in other words, in proportion to the ease with which an animal finds its food and its security against enemies is the decrease in the complexity of its organisation. This law could not be illustrated more forcibly (excluding parasitic life) than in the group of the Bivalve Mollusca. Nothing is simpler or easier than their mode of procuring nourishment. The animal is enclosed between two shells, and the food consists of the particles of organic matter (diatoms, protozoa, larvæ, &c.) sifted out from the current of water created by the ciliated gills and passing between the shells. The animal, moreover, is usually so securely protected by its thick calcareous shells that comparatively few enemies in proportion to its numbers and varieties care to tackle so formidable a mouthful. We may instance as a typical example the common Oyster, belonging to the group with which we are here concerned.

In such cases degeneration begins in the most highly developed and most unstable part of the organism, viz., the nervous system and its associated sensory organs. As these are chiefly located in the head region, this is the first part to exhibit traces of the retrograde process. In the Bivalves this has proceeded so far that the head has entirely disappeared. In the case of the Oyster, degeneration has gone even further, and there is, in addition, the loss of the foot or organ of locomotion, so that the whole activity of the creature is reduced almost to the lowest vegetative existence.

Simple as is this mode of life, however, many points regarding food supply, growth, and propagation, of importance from a scientific as well as from an economic point of view, require renewed and scientific investigation.

The Oyster finds an effective, if sole, mode of protection in its huge shells. The only call upon the organism in the way of defence seems to be the adding to these of additional layers of carbonate of lime.

There are, however, two closely allied types which have not this thick shell, and have to make shifts to protect themselves in other ways. It is this very weakness, however, which has led to their higher development as compared with that of their more sluggish relative. They may be described as reformed oysters, for their modifications, we have reason to believe, are of a secondary origin. The reform has taken place in two directions, and it is with one of these that we are specially concerned.

The only points of direct communication between the animal and the outside world are the edges of the mantle which secrete the shell, and the foot. It is in these that the advance in organisation shows itself.

Pecten, our common Scallop, is an animal of comparatively active habits. It can suddenly close its shell, driving out the water so forcibly as to give the body an impetus in the opposite direction, so that, unlike the Oyster, it has some power of locomotion. Besides, the edge of the mantle is fringed with a series of eye-spots sensitive to the lightest shadow, and thus capable of giving timely warning of the approach of danger.

The other direction in which specialisation is exhibited is in *Lima*, another genus of the same family. There is also here a comparatively thin shell, but the shells cannot be securely closed as in *Pecten*, and a large gap is left even when the valves are closely appressed. The animal, however, protects itself in another way. It has also, though not eyes, elaborate sensory organs, fitted to its special mode of life.

Having made ourselves acquainted with the family connections, or to use Haeckel's useful word, the "palingenetic" character of *Lima*, we are now in a position to investigate the personal characteristics by which it is adapted to its own peculiar mode of life—the cœnogenetic or more recently acquired characters.

Various observers have devoted attention to the habits of *Lima hians*, the animal which we are about to examine, as it affords special facilities for observation, being easily kept in captivity. We owe many valuable observations on the living animal to Robertson, Norman, Landsborough, and others. More minute histological work has been done by Rawitz. The aim of the present paper is, by combining these observations on the living and dead animal, and by recording some new observations, to give a general sketch of the animal and its mode of life.

The specimens examined were procured at Millport by dredging in water of 15 to 20 fathoms at the "Tan Buoy." Great quantities of them can be got by means of the "scoop" dredge, but the most satisfactory "nests" are got by bringing up weed with the grapnel; at the roots of these a Lima nest and its occupant are generally found. The material brought up by the dredge is a mass of nullipores (*Melobesia*), in which the nests or little burrows of the Limas may be seen. The mass is bound together by these, and if the whole be put in water and broken up, the animals may be observed flopping off in a jerky manner, a habit admirably adapted to escape seizure by any too confident fish, so sudden and unexpected is each contraction by which the animal darts away. Any desired number of the animals may be got, especially if some one from the "Marine Station" is present who knows the ground and the method of proceeding; and he must needs be a discontented dredger who is not satisfied with the quantity brought home for examination. The animals may be placed in aquaria along with the nests or without them, when their peculiar mode of progression may be easily studied. If supplied with material they begin the reconstruction of a nest. This material need not necessarily be the nullipores to which they are accustomed, but any material will do. Mrs. Robertson has even induced one to construct a beautiful nest of glass beads. At Rothesay they build their nests of gravel, and occasionally in the hauls at the "Tan Buoy" a nest was found with its occupant securely lodged in the folded frond of a sea-weed.

There are two organs of chief importance in Lima, and they play the chief part in the peculiar mode of life of the animal. These are the foot and the mantle, with which therefore we begin our examination of the animal.

The foot is specialized into a long muscular organ which can be used with great dexterity. It serves the purpose of an anchor, a locomotory organ, and a spinning apparatus. The animal may sometimes be seen securely attached to the bottom or even the sides of the aquarium by this organ, and floating buoyantly in the water like a ship at anchor. Again it may be seen to attach the foot at some distance and drag the body along. It has even been observed (Robertson) to ascend the sides of the glass vessel by aid of this organ. The foot must be used in this way to some considerable extent; its other means of locomotion, as we shall see, are only capable of propelling the animal in one direction, and

there is no evidence of its being able to turn in the nest. A third and equally important function which this organ has to perform is the spinning of the threads with which to bind together the material of which the nest is constructed. Occasionally the animal may be observed to apply the tip of the foot for a short time to some object lying near, and when it is drawn off a fine thread will be observed to have become attached, and thereafter spun out to be fixed somewhere else in the burrow. By constant repetition of this process, the burrow is at last lined with a sort of feltwork, and the parts are bound so closely together as to require some force to pull them apart.

As we stated, the animal is not particular as to what material it may thus bind together. It is not even at a loss when there is lack of material with which to build, for it then constructs an ingenious lattice-work of its own byssus threads. This is well illustrated in a specimen kept by Mr. M'Crie, now for six months, which has built a sort of awning of its threads to increase its household accommodation.

The second important organ in Lima is the mantle. The primary function of this organ in all Molluscs is the secretion of the shell, under which it lies as a thin layer of tissue. This is often the sole function of the mantle, which usually comes the length of the edge of the shell, but does not project beyond it except to form a siphon or suction-tube. But in the case of Lima the fact that there is this little possibility of communication with the outside world has led to wonderful specialization in the form of a complicated sensory organ adapted to its mode of life. The edges of the mantle have given rise to a great number of filamentous tentacles which project in every direction, giving the whole animal the appearance of a regular *Caput Medusæ*. These snake-like tentacles usually also exhibit a constant twisting and waving motion, and project occasionally far out from the nest through the little apertures left in the feltwork of byssus threads.

Various observations have been made as to the properties of these remarkable tentacles. Thus they sometimes adhere to the finger, or anything applied to them, so firmly that the animal may thus be dragged through the water in the aquarium (Robertson). They will even break off sometimes, by what seems to be a voluntary throwing off, rather than be detached from the object to which they adhere. Thus tentacles or parts of tentacles may be occa-

sionally found detached from the animal and adhering to the glass in which the Limas have been placed. Again, observations have often been made on the characteristic motion of the tentacles and their power of retaining vitality long after being broken off from the animal. But none of the recorded observations seem to throw light on the part these curious organs play in the economy of the animal. Landsborough has suggested that they may be for catching the prey on which the animal feeds, doubtless having in his mind the somewhat similar tentacles in *Actinia* and the part these play in catching and drawing the prey into the mouth of this animal. There is no further reason for this supposition, and much against it. The question also naturally suggests itself here as to whether the adhesion of the tentacles is due to the same cause as in the Cœlenterates, viz., stinging cells.

Some light will be thrown on these points by a minuter examination of the tentacles. If a tentacle be cut off and laid on a slide under the microscope, the process of fixing may be observed. It will be seen that a quantity of mucus is slowly given out at the little ring-like swellings that occur at intervals on the tentacles. After a time this adheres so firmly to the glass as to prevent further motion of the tentacle. This, and not the presence of stinging cells, is, no doubt, the cause of the adhesiveness. We can further examine the nature of the cellular elements by means of sections. It is then seen that the main shaft of the tentacle is composed of well-developed muscular elements, and that the swellings which occur at intervals are composed of glandular cells secreting the mucus, and of the characteristic sensory cells which Fleming first discovered in the tentacles of *Helix*, viz., cells provided with sensory hairs or bristles. All the tentacles are not, however, alike as to the proportion of sensory and glandular cells present. The longer and more central tentacles have a preponderance of glandular cells, while the shorter and more laterally placed have a preponderance of sensory cells. This is quite in keeping with the observed facts, for the longer tentacles show little or no reaction to stimuli, while there is an immediate shrinking and closure of the shell on irritation of the shorter.

These shorter tentacles are in immediate contact with the walls of the nest, so that by them the animal is at once made aware of any disturbance that may threaten encroachment on its premises, and by the sudden contraction to be afterwards described can at

once remove to another and safer part of its tunnel. But the use of the longer and more glandular tentacles is more puzzling. There is little doubt that it is by their means that the feltwork of the nest is smeared with the slimy secretion which occurs through it. When closely examined, this sticky coating is found to have caught up great numbers of diatoms, doubtless brought in by the constant current of water. The object of this smearing, if it has an object, is rendered more obscure by the observed fact (M'Crie) that the excreta of the animal are also caught in this way. Several observers have mentioned the offensive and persistent odour imparted to the hands after handling the animals, no doubt from this mucus, and it might be suggested that this is a means of warding off enemies. This, however, cannot be accepted till at least we know more of the so-called "olfactory" organ of marine animals. It is a well-known fact that our olfactory organs are quite incapable of appreciating any smell in a liquid applied to the sensory epithelium. A recent writer has gone the length of denying any power of "smell" to any purely marine animals.

So far then as we can judge from histological evidence, the function of these longer tentacles is the smearing of the nest with mucus, to ascertain the object of which requires renewed observation.

These longer tentacles may be irritated or even cut off without disturbing the animal, and we have seen that it probably has the power of throwing them off when they become fixed in any way—a most valuable accomplishment—as the animal can thereby readily escape when these tentacles, which wander so far from the nest, are seized by some of its enemies with hostile intentions. Many other molluscs (Nudibranchs) exhibit the same power.

Besides the secretory and sensory elements, there are also well-developed muscular elements, and these play a part in the functional activity of the tentacles. Mr. M'Crie has observed the animal wholly suspended in the nest by their means, and perhaps, along with the foot, they play a part in the arranging of the material of which the nest is built, for if it be examined closely, some kind of assorting is evident in the disposition of the twisted and branched nullipores.

There is in Lima another modification of the mantle which serves almost as unique, though more apparent, a purpose. We have described the mantle as giving rise to a number of processes

just where it meets the edge of the shell. It is, however, continued beyond this, inwards towards the middle line, in the form of a pretty broad border. This, like the tentacles, extends all round the edges of both the shells, so that when the two borders meet each other the whole opening caused by the gaping of the shell is covered over and the animal itself is completely shut in. The arrangement may be compared to a pair of bellows, with some little difference in detail. The two shells correspond to the two wooden boards. We must, however, close up the valved aperture by which the wind finds access to the bellows, and in its stead make a larger aperture by cutting the leather up the centre into two parts which would correspond to the two borders of the mantle described above. We must further remove the nozzle, to which there is nothing to correspond, morphologically at least, in Lima. It may be hinted that we have now spoiled the bellows for blowing purposes, but this is not so; the only difficulty now is that the wind, although finding access to the bellows readily enough, yet comes out again in an indiscriminate manner by the way it went in. That is, however, because the cut edges of the leather are applied edge to edge, and it is obvious that, if these be slightly folded in so as to meet with part of their flat surfaces opposed, the bellows will perform their function just as before, care being taken to leave a part of the cut edges near the hinge not folded in so that the wind can escape by this part as by a nozzle. This, at any rate, is the ingenious plan successfully adopted by Lima, and it is a fact that on the sudden closure of the shells a stream of water is driven out by this aperture at the hinge, the consequence of which is that the animal is propelled with a sudden impulse in the opposite direction, that is, away from the hinge. It is interesting to compare Pecten with our Mollusc, as it shows a complete failure to solve the problem of the mutilated bellows, and its mode of progression is merely by a sudden closure of the valves. This, as will be readily understood, is a less effective method, and sends the animal in the opposite direction to that in Lima, viz., towards the hinge.

Another fact of interest in the domestic economy of *Lima hians* is that there is almost invariably, living in the nest along with it, a peculiar green gelatinous worm. So constant is this association that it is probably a case of commensalism, but in what way we are as yet unable to say. It is one more puzzle to be solved in

connection with this curious animal. Its solution would perhaps throw light upon other obscure matters we have met with. Perhaps, for instance, it may be the scavenger of the household, whose sanitary arrangements we had cause to find fault with.

It will be apparent that, in trying to understand the habits and mode of life of Lima, we have but raised a few questions which we cannot fully answer, and that many more such questions remain to be raised. In view of modern attainments in histological work, of new ideas as to the relation between organism and environment, new conceptions of philogeny and embryology, this line of research is one that deserves increasing attention, and though it may be admitted to be difficult work, it is certainly the key to the solution of many scientific questions of the present day. It is a return to older methods of observation, but with increased means at our disposal for appreciating the significance of our observations.

Plantago maritima, Linn., its Distribution in Ayrshire.

By JOHN SMITH, Monkredding.

[Read 25th February, 1895.]

SOME of our shore plants are peculiar, in so far that they do not only grow at sea-level, but are found on some of our highest mountains. *Plantago maritima* is, perhaps, the strangest of all the maritime-inland plants, in occurring, not only at sea-level and on high hills, but also in certain intermediate localities. Its abundance at sea-level must be well known to every botanist, occurring, as it does, on all sorts of soil and kinds of rock, although it appears to be absent from purely sandy stretches, such as the shore-line from Saltcoats to Barassie, &c.

For the first 200 feet or so above sea-level, this plant appears to be totally absent, and its absence from this zone is strange and unaccountable, seeing that when in inland situations it is very frequently a roadside plant; and one would think that its distribution from place to place downhill would be comparatively simple, by the seeds getting washed, in some cases, along the roadsides, as well as getting fixed by the mud to the feet of pedestrians, &c., and in this manner shifted from place to place. Its absence from cultivated fields along the roadsides is also curious, seeing that in many places the fields are dressed with roadside parings. Of course, in many cases these are treated with lime before being spread on the fields; but even this will not account for its absence from cultivated land, as many seeds must be blown upon such land during gales, and many must find a resting-place there after being carried by birds, &c. And one would think it can't be from the richness of the soil preventing its growth, as the roadsides where it often grows are the richest soils we have, from the large quantity of manure they are constantly receiving.

The following are the Ayrshire inland localities where I have observed this plant growing:—

1. Kilwinning Parish.—At Bullerholes, on an old grass-grown road; and on the main road at Auchentiber, where it passes

through a peat moss. The latter is an interesting station, as showing its introduction there to be comparatively recent. 230 to 270 feet above sea-level.

2. Craigie.—Very abundant on roadside from Adamhill and for a mile south-westwards, at from 300 to 800 feet above sea-level. I have not seen it grow so luxuriantly anywhere else. At some parts it resembled a crop of short, thickly-grown rye-grass, and might have been cut with the scythe like hay. In flower and fruit on 27th August, 1888.

3. Coylton.—On roadsides, 300 to 400 feet above tide, 29th August, 1888.

4. Ochiltree.—Roadside at 500 feet of altitude, 3rd September, 1888.

5. Stair.—Roadsides, and on a burn side, 250 to 300 feet above sea-level, 3rd September, 1888.

6. Auchinleck.—Near Darmalloch, on the Glenmore Water, at 650 feet above the sea, 8th August, 1888.

7. Dalrymple.—Roadsides, 200 feet above sea-level, 23rd August, 1888.

8. New Cumnock.—Black Craig Hill, near the base, 1,300 feet above sea-level; in flower, 11th August, 1888.

9. Straiton.—On moor between Straiton and Patna, at 800 feet of altitude; in flower and fruit, 30th August, 1888.

10. Dailly.—Near Craighead, at 350 feet above the sea, 21st July, 1888.

11. Girvan.—On Ardmillan Hill, small plants, 30th June, 1888.

12. Ballantrae Hills, up to 1,000 feet; in flower and fruit, 8th August, 1888.

13. Barr.—Up to about 1,300 feet, near the Rowantree Inn (now a ruin) and neighbourhood, 3rd August, 1888.

14. Colmonell.—On roadsides about Barrhill and Pinwherry, 8th August, 1888.

I have also found it growing in the following inland stations, although I have not noted the circumstances:—Dalry, Old Cumnock, Stewarton, and Symington.

I have also got it on Merrick Mountain, just opposite the Ayrshire border, growing along with *Armeria maritima*, Auct., and a few Alpine plants.

On the Horse Isle, off Ardrossan, I have collected *Plantago maritima*, var. *hirsuta*, Syme, a form with thickly-set and spreading hairs, and, so far as I know, hitherto recorded for Shetland only.

Meteorological Notes, and Remarks upon the Weather during the Year 1894, with its General Effects upon Vegetation. By JAMES WHITTON, Superintendent of Parks, Glasgow.

[Read 22nd March, 1895.]

IN closing a Report on the weather of 1893, we expressed a hope which has not been fulfilled, as the weather of 1894 has not been so fine as that of its predecessor. Still, taking things all round,¹ we cannot say that it was a bad season, for, although wet and somewhat cold in the early part, the glorious autumn redeemed matters considerably, and the crops were, on the whole, satisfactory.

It may be proper to state that, as in past years, the notes are based upon observations taken at Queen's Park. During the year the Parks Committee placed a set of meteorological instruments in each of the principal parks, which promise to show interesting comparisons, especially in regard to the rainfall.

January.—With the advent of the year, the unusually fine weather which characterised the closing days of 1893 suddenly changed. The wind having moved from S.W. to N., hard frost set in, and continued until the 9th. The cold was intense, with a bitter N.E. wind. On the 7th, 21° frost were registered—the lowest reading of the year. During the month the thermometer was at or below freezing point (32°) on sixteen mornings, and a total of 103° frost was registered.

On the 9th, the wind moved southwards, and mild, changeable weather was experienced. Towards the end of the month the weather was stormy, with snow at intervals. The rainfall amounted to 4·87 in., of which 1·45 in. were registered on the 27th, but this included some melted snow. There were only ten dry days during the month.

The comparatively open weather caused spring flowers to appear earlier than usual, and snowdrops were in bloom in

Queen's Park on the 24th. The buds on willows, poplars, &c., also swelled up. The average day temperature was 41° , the highest reading (51°) being on the 12th, and the lowest (22°) on the 7th. The night temperature averaged 31° , the highest reading (43°) was on the 14th, and the lowest (11°) on the 7th. The average temperatures were similar to those of January, 1893. The barometer readings were very erratic, and chiefly ranged between 29.00 and 29.50. The highest (30.40) occurred on 3rd, and the lowest (28.80) on 20th.

February.—Throughout this month the weather was changeable and stormy. The heavy rainfall and high winds which predominated were exceptional in severity. On the 1st, 2 in. of snow fell, which rapidly disappeared under the influence of a strong S.W. wind. For a few days thereafter, though somewhat windy, the atmosphere was comparatively clear and bracing, especially on the 5th. A sudden change occurred on the 6th, with high winds and heavy showers, which lasted two days, and the rivers were in full flood on the 7th. The rapid rise of the barometer on the 8th to 29.65, was followed by a steady fall to 28.60 on the 12th, during which we experienced a severe storm of wind, rain, and snow, culminating on the night of the 11th in a hurricane of exceptional severity, which did immense damage to property throughout the country. The rapid fall of the barometer was followed by a more rapid rise, the pressure having increased from 28.60 on the 12th to 29.70 on the 13th, or more than an inch in 24 hours. Until the end of the month there were "all sorts of weather," the changes being sudden and erratic. On the afternoons and evenings of the 23rd and 25th sharp gales occurred.

As already stated, the rainfall was exceptionally heavy, the quantity registered amounting to 8.96 in.—very much in excess of the average. There were only six dry days, and frost totalling 35° for nine mornings was registered during the month, while the average maximum temperature was 44° , and the average minimum 33° . The winds were chiefly from S.W.

Owing to the absence of hard frosts, combined with the comparative mildness of the weather, there was a rapid growth amongst spring flowering plants. Crocuses were in bloom on the

7th—almost a month earlier than in 1893—and many other flowering plants were equally far advanced.

March.—The changeable weather of last month continued until the 13th instant, when it gradually became more settled, and we had some beautiful bright days towards the end of the month.

Although the temperature was not above the average, there was an absence of hard frosts. During the month only 22° frost were registered on eight mornings, the lowest readings being on the 16th and 17th, when 5° frost were recorded on each morning.

The maximum (day) temperature averaged 51°, and the minimum (night) temperature 33°, which are somewhat similar to those of 1893. With the rainfall, however, there was a marked disparity, as 3·37 in. fell on fifteen days, against 0·74 in. on twelve days in March, 1893.

The lowest reading of the barometer was on the 13th, when it fell to 28·70 in. We had then high winds and hail-showers. Thereafter the pressure increased, and on the 23rd and 24th it reached 30·25 in.—the highest reading during the month. The winds for the first three weeks were chiefly from the S.W., after which easterly winds predominated.

Immediately after the weather settled, the increased sunshine caused spring flowers, which had been blooming intermittently for some weeks, to burst into full beauty, and the crocuses, snow-drops, grape hyacinths, &c., made a brilliant display. The willows, with their white and golden catkins, the early-blooming rhododendrons, and the leafing of the balsam poplars, made the Parks present a spring-like appearance, which tended much to the enjoyment of the people who crowded the Parks on Easter Sunday and the Spring Holiday.

April.—Although somewhat cold on account of the prevalence of N.E. winds, the weather was fairly good on the whole. No frost was registered, the thermometer only touching the freezing point (32°) on two occasions—a notable occurrence for the month of April. The highest reading was 64° on the 24th, and the lowest (32°) on the 2nd and 20th. The average maximum temperature was 56°, and the average minimum 39°. These are slightly under the average for the corresponding month of 1893.

The rainfall (1·91 in.) was also under the average, while there were fourteen dry days. The winds, excepting on four days, were easterly, the N.E. predominating. The barometer readings were fairly steady—from 29·30 to 30·05 in.

While the weather was not so dry and warm as in April last year, vegetation made a good start, and by the middle of the month several trees, notably sycamores and chestnuts, were leafing, and the early white rhododendrons in our Parks were in full bloom. However, the cold winds soon tarnished the latter, and checked the growth of the trees, and, generally speaking, vegetation at the end of the month was nearly a fortnight later than in 1893.

May.—Unlike the corresponding month of 1893, when atmospheric conditions were of a delightful character, the weather during this month was extremely disagreeable, being cold and changeable. The wind having changed on the 1st from E. to W., rain fell almost daily until the 18th, when the wind having again veered eastward, the weather became colder and drier, and continued so. The rainfall amounted to 2·28 in., and there were fourteen dry days. The barometer readings showed many changes, but within a moderate range—from 29·30 to 30·25 in. The temperature was also even, the maximum (day) averaging 55°, and the minimum (night) 37°, while the highest reading was only 63° on the 24th, and the lowest 28° (or 4° of frost) on the 21st and 22nd. The minimum thermometer was at or below 32° on five mornings, and 10° of frost were registered. Only on five days did the maximum thermometer rise above 60°, while in May, 1893, it was above that figure on twenty-two occasions, and the maximum and minimum averages were 61° and 45° respectively.

The cold winds and low temperature of the month had a damaging effect upon vegetation. The cold wave which passed over the country on the 21st and 22nd, when we had 4° of frost, seriously damaged the fruit crops, and caused considerable damage to the trees and shrubs throughout the Parks. Many trees, notably sycamores and chestnuts, had not only the foliage destroyed, but also the young shoots, and many made a second growth, which is rarely of a satisfactory nature. Consequent

on the frost, much of the beauty and wealth of bloom which the flowering trees and shrubs would have put forth after the glorious season of the preceding year was lost. Still, despite all, the bloom on the thorns, laburnums, lilacs, cherries, rhododendrons, &c., which escaped the frost, was exceptionally fine. In the flower-beds throughout the Parks and Squares, although many of the bulbous plants were much damaged, there was a satisfactory bloom on several kinds, especially various forms of garden narcissi and daffodils.

The leafing of the oak occurred on the 6th and the ash on the 17th, the oak being about ten days and the ash three weeks later than in 1893.

June.—For the first fortnight there was a continuance of the cold and unseasonable weather, and although it improved and became warmer towards the end of the month, there was not much progress in the growth of vegetation, consequent on the soil being wet and cold. Grass, however, may be stated as an exception, as it improved.

During the first and last weeks the winds were easterly, while in the middle of the month they were chiefly westerly, and generally light.

The barometer was fairly steady, varying from 29·50 in. to 30·25 in. The rainfall was about the average—2·76 in. Rain fell on sixteen days and in the first three weeks of the month, the last week being dry and warm.

The temperature in shade rose to 74° on the 27th and 30th, being 9° lower than the hottest day in June, 1893. The average day temperature was 63°, and the night 45°, both being about 5° lower than that of the corresponding month of preceding year.

July.—The 1st proved to be the hottest day of the year, when, with a light wind from the N.E., the thermometer in shade registered 79°. On the 6th a severe thunderstorm occurred, causing much damage to property by the heavy rainfall and lightning.

For the next fortnight the winds were from W. and S.W., with occasional heavy local showers and bright sunshine. Thereafter the weather was drier, and at times oppressively close and warm, with light N.E. winds. The barometer on the 1st indicated the pressure at 30·20 in., but on the wind changing from N.E. to

S.W. it fell to 29·10 in. on the 12th, again recovering to 29·95 in. on the 24th. The rainfall amounted to 2·71 in., but 1·18 in. of it fell during the thunderstorm of the 6th. There were nineteen dry days.

The maximum day temperature was 68°, one degree higher than in 1893, while the minimum was the same as then, viz., 50°.

The warm, genial weather, though at times close and somewhat oppressive, was suitable for vegetation, which made rapid progress. By the end of the month the plants in the Parks had improved in appearance, while many of the trees and shrubs, which were injured by the frosts in May, formed a new or second growth, which, however interesting to many observers, is not by any means a desirable feature, as these "second growths" rarely ripen sufficiently to flower the following season.

August.—After the fine, genial weather experienced in July, that of this month was disappointing, especially to holiday-makers and sportsmen. It opened with rain, and for the first three weeks there were only four dry days, while the temperature was low for the season. Heavy rains fell on the 3rd and 14th—an inch on each occasion. Rain fell on nineteen days to the amount of 4·87 in. The barometric pressure varied from 29 in. on the 15th to 30 in. on the 26th. Westerly winds prevailed throughout, with the exception of four days, when they were from the E.

Compared with the previous year, the temperature was 5° lower on the average, the maximum only averaging 63° and the minimum 48°. Only on two occasions did the maximum reach 70°, whereas in the preceding August that figure was reached or exceeded eleven times.

Despite the excessive rainfall and low temperature, vegetation made fairly good progress, though the bedding plants in the Parks were not up to the usual standard in bloom.

September.—Throughout this month the weather was of a delightful character, bright sunshine predominating daily, and hardly a shower worth noting. The showers were so light that in one of the Parks no rain was registered. The winds also were extremely light, and for half of the month were northerly, during

the other half chiefly westerly. The rainfall registered at Queen's Park only amounted to 0·14 in., and there were twenty-six dry days. The barometer was fairly high and steady, only ranging from 29·70 to 30·30 in. The average temperature, however, was 2° on the maximum and 3° on the minimum lower than in 1893, the figures being 58° and 42° respectively. There was 1° of frost registered on the 27th and 2° on the 28th, but no damage was done to vegetation.

The dry, sunny weather proved a blessing to farmers, and in many places throughout the country harvesting operations were begun and ended without a break. Indeed, complaints were made that the weather was too quiet and fine for harvesting, and that a good rain, with wind afterwards, would have done the grain more good. However, the general public enjoyed the bright weather, and the sunshine caused the plants in the City Parks and Gardens to bloom very profusely.

October.—For the first fortnight the weather continued fine, and little rain fell. Several days in the month were close and misty, with thick fog in the city. The first sharp autumn frost occurred on the 16th, when 4° of frost were registered. Soon thereafter the weather became more unsettled, and hard frosts were noted. In all, 44° of frost were registered on nine mornings. The barometer gradually moved, with very little variation, from 30·30 in. on the 1st to 29·75 in. on the 23rd, when it rapidly fell again to 28·40 in. Heavy rain fell on the 24th, and several disagreeable foggy days were experienced towards the end of the month. The rainfall amounted to 2·28 in., and we had seventeen dry days. Like the two preceding months, the average temperature was lower than in 1893, the maximum being only 51°, and the minimum 36°. Northerly and easterly winds were experienced during twenty-one days.

The frosts of the month closed the season for out-door flowers, and caused the deciduous trees to cast their leaves.

November.—Though very rainy and unsettled, the weather was exceptionally mild, frost only occurring on three mornings—26th to 28th—when a total of 9° was registered. The average temperature was 5° above that of the corresponding month in

1893. The maximum was 48° and the minimum 38° , the latter being thus higher than that of October! The winds were chiefly from the S.W., hence the mild, showery weather. During the first fortnight the barometer showed a low and irregular pressure, being down to 28.60 in. on the 14th; after which it steadily increased, and stood on the 30th at 30.30 in. The rainfall registered was 3.96 in. There were only eight dry days in the month.

December.—During the first week the weather, though foggy, was fine for the season; but afterwards it resembled that of November in being changeable, though more stormy, while it was also colder. There was much variety in the intermittent turns of frosts, fogs, rain, and snow-showers, which, combined with several gales, did not make the weather pleasant in the city. The barometer fell, with slight variations, from 30.30 in. on the 1st until the 17th, and from that date until the end of the month the readings were exceedingly erratic. On the 21st the pressure was 29.70 in., and sharply fell to 28.50 in. on the 22nd, when we experienced the great gale which caused so much damage throughout the country. The barometer rose as rapidly as it fell, standing at 29.80 in. on the 23rd, and gradually increased to 30.30 in. on the 27th, when it again rapidly fell to 28.90 in. on the 29th, on which date another severe gale swept over the country. With the exception of four days, the winds in December were all from the W. and S.W., and were extremely variable. The thermometer was at or below freezing (32°) on ten mornings, and a total of 30° of frost was registered. Though less frost was recorded, the average temperatures are lower than in December, 1893—the maximum being 44° and the minimum 34° . The rainfall, however, is less, as only 2.97 in. fell, and there were thirteen dry days.

In comparing the records, we find that the *rainfall of 1894 considerably exceeded the average of the past twelve years*. Rain to the amount of 41.48 in. fell on 196 days. In 1893 the amount was 33.05 in., on 171 days. October was the wettest month in 1893, with 5.02 in., and only 8 dry days; while February proved the wettest month in 1894, with 8.96 in., and with only 6 dry days. The driest month of the year was September, with only

an infinitesimal quantity of rain recorded. In the previous year, March was the driest month, when only 0·74 in. of rain fell.

It may be interesting to give the following table of rainfall as registered in the various Parks. It must, however, be explained that the registering instruments in the Parks—other than the Queen's—were only placed out at the end of March last; and that some allowance must be made for the difference in altitude, exposure, and situation of the gauges.

RAINFALL DURING 1894 IN THE PUBLIC PARKS.

MONTH.	QUEEN'S.	GLASGOW GREEN.	ALEX-ANDRA.	SPRING-BURN.	KELVIN-GROVE.	MAX-WELL.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
January,	4·87	...	...	...	...	...
February,	8·96	...	...	...	...	...
March, ...	3·37	...	...	...	...	...
April, ...	1·91	1·39	1·72	1·81	1·87	1·84
May, ...	2·28	2·98	3·15	3·66	3·00	2·72
June, ...	2·76	3·37	3·05	3·63	2·61	2·86
July, ...	2·71	3·19	2·73	3·08	2·97	2·90
August, ...	4·87	5·28	5·41	6·49	5·85	5·49
September,	0·14	0·20	0·21	0·19	0·00	0·11
October,	2·68	2·71	2·65	2·89	2·49	2·76
November,	3·96	3·91	3·51	3·39	3·50	4·21
December,	2·97	3·68	3·29	3·21	3·69	3·68
Totals, ...	41·48	26·71	25·72	28·35	25·98	26·57

Regarding the temperatures, they have been slightly lower than in 1893, when the mean temperature was 47°, while in 1894 it was 46°. On no occasion did the highest (day) temperature reach that of 1893, when 83° in the shade were registered on 19th June. The highest in 1894 was only 79°, on the 1st July. Again, in 1893 the thermometer was at or above 70° on thirty days, while in 1894 it was only so nineteen times. The coldest month in 1894 was January, when 103° of frost were registered on fifteen mornings, the lowest reading of the year being on the 7th, when there were 21° of frost. Throughout the year 256° of frost were registered on fifty-five mornings, against 306° on fifty-six mornings in 1893.

The barometrical charts show that the pressure was slightly higher than that of the previous year. While in 1893 the barometer was over 30 in. on sixty-five days and under 29 in. on eighteen days; in 1894 it was eighty-one times over 30 in., and also eighteen times under 29 in. The highest reading in 1893 was on the 30th December, when the barometer indicated 30.40 in., which figure was also the highest in 1894, on the 3rd January. The lowest reading in 1894 was 28.40 in. on the 25th October, against 28.30 in. on 17th November and 8th December in 1893.

Though we cannot indicate the force, it may be of interest to note the points from which the winds prevailed throughout the year. From the S.W., 112 days; N.E., 78; W., 71; E., 37; S.E., 23; N.W., 22; S., 19; and N., 3 days. Excluding the direct N. and S., the western group shows 205 times against 138 times for the eastern. In 1893 the figures were 239 and 113 for the respective groups.

From the foregoing notes it will be observed that the chief features of the weather of 1894 were (1) the comparative absence of sunshine during the early summer months, and (2) the excessive rainfall, with a comparative absence of hard frosts. After the abnormal rainfall in February and early March, the weather allowed out-door operations to be performed under fairly favourable conditions, and, after the splendid season of 1893, hopes were entertained of a bountiful fruit crop. These hopes, however, were rudely dispelled by the cold snap of May, when the frosts on 21st and 22nd did so much damage throughout the country. Vegetation, which started early, languished until the genial weather of the end of June and all July quickened the action, and caused a more vigorous growth than was expected after the serious check which plant-life had received. The wet weather in August caused some anxiety amongst farmers as to the harvest, but the glorious weather experienced during September made up the leeway, and the grain was cut and secured in most cases without receiving a shower, and in a space of time shorter than usual. Hay and grain crops were generally good in bulk and quality, but root crops were below the average. There was a fine display of bloom on the trees and shrubs in the Parks which escaped the May frosts, but, owing to the checks received then,

when starting into growth, neither the trees nor shrubs present the rich promise of bloom they did at the end of 1893. However, we hope the ensuing season may be propitious, and that, as in 1893, we may be blessed with plenty of sunshine—a very important factor on the welfare of the community.

Subjoined is the Meteorological Record for the last three years, as kept at Queen's Park, and the averages for the last twelve years.

COPY OF METEOROLOGICAL RECORD KEPT AT QUEEN'S PARK, GLASGOW.
RAIN GAUGE 143.95 FEET ABOVE SEA LEVEL.

MONTHS.	1892.				1893.				1894.				AVERAGES FOR THE LAST 12 YEARS.				
	Rainfall.		THERMO-METER.		Rainfall.		THERMO-METER.		Rainfall.		THERMO-METER.		Rainfall.		THERMO-METER.		
	Inches.	Dry Days.	Max.	Min.	Inches.	Dry Days.	Max.	Min.	Inches.	Dry Days.	Max.	Min.	Inches.	Dry Days.	Average Temperature.	Number of Days on which 1° or more of Frost was registered.	Degrees of Frost registered.
January,	2.32	13	40	30	1.14	17	40	32	4.87	10	42	31	40.87	200	47	42	182
February,	2.00	17	43	32	2.94	8	45	34	8.96	6	44	34	40.54	192	47	58	195
March, ...	0.58	24	45	29	0.74	19	52	35	3.37	16	52	34	28.70	200	46	62	361
April, ...	0.67	22	54	34	1.11	23	58	38	1.91	14	56	39	29.96	194	46	97	518
May, ...	4.09	17	61	41	3.28	18	61	45	2.28	14	55	38	25.78	203	47	97	417
June, ...	3.66	13	64	45	2.40	23	68	49	2.76	14	63	45	32.33	190	46	81	232
July, ...	1.72	22	65	48	2.19	18	67	51	2.71	19	69	50	26.18	194	47	59	250
August, ...	6.13	11	66	49	3.34	15	68	52	4.87	12	64	48	38.04	170	47	74	273
September,	4.12	14	58	44	3.25	11	60	45	0.14	26	59	43	36.09	184	46	85	371
October,	3.77	12	49	35	5.02	7	54	41	2.68	17	51	36	33.84	194	45	101	798
November,	3.11	13	47	36	3.07	19	44	32	3.96	8	49	38	33.05	186	47	56	306
December,	1.67	16	38	28	4.57	8	45	36	2.97	13	44	34	41.48	169	46	55	256
	33.84	194			33.05	186			41.48	169			33.90	189	46.42°	72	346°

JAS. WHITTON.

The Little Auk (*Mergulus alle*, Linn.).

By W. CRAIBE ANGUS.

[Read 26th April, 1895.]

BRITISH Ornithologists have told us but little, from their own personal observation, of the habits of the Little Auk. Except in the breeding season, when Spitzbergen and Greenland are its headquarters, this bird is oceanic in its habits, seldom coming inland except in very stormy weather. Although there are undoubted instances of its occurrence in Scotland in summer, the Little Auk may be regarded as only by accident a summer visitant. There are those who regard the presence of this species in the British Islands as accidental under any circumstances. Such is not my view. Without affirming that the bird is a regular frequenter of our shores, I am satisfied that it is of more frequent occurrence than is generally supposed, and, without laying claim to any special knowledge of the subject, I may give the result of my enquiries regarding the occurrence of the species on the Aberdeenshire coast, where I have had not unfrequent boating excursions in quest of wild fowl. On such occasions, Alexander Mitchell, who was widely known as a collector, was often of the party, and it is not too much to say that, in our winter outings, we would have been disappointed had we not, somewhere between the Dee and the Ythan, and at, say, from 15 to 20 miles from shore, come on the "Sea-doo," the name by which the Little Auk is there locally known. Those of the fishermen who took an interest in birds were not only familiar with the "Sea-doo," but they would not have thought it an unusual occurrence to have met with it in winter anywhere from Montrose to Banff, within what, for want of a better term, I may call the "Sea-doo" line. The boatmen on occasion would recapitulate with justifiable pride the enquiries which Dr. Fleming or Professor Macgillivray had addressed to

them regarding the bird. Professor Macgillivray, as we came to know, had shown a skin of the Little Auk to fishermen in the neighbourhood of the sea-fowl colonies. Speaking of the Professor, a Foot-Dee fisherwoman said, "He was sae ta'en up with the bird that he carried it in's hat," and that "her man tauld him sae muckle he did nae ken, that he wish't he had his buke to make owre again."

I may mention that there was a tradition among the fishermen that, along with the eagles, the "feck (majority) o' the Sea-dooos" disappeared from the rocky promontories. I have heard the older men say that they had seen the bird, at the breeding season, at Troup Head and the Bullers of Buchan.

Mr. Mitchell has from time to time stuffed local examples in summer plumage, that is, when the throat of the bird is brownish-black, and not whitish-grey, the plumage of the examples that have recently been in the hands of the bird-stuffers. But, with the single exception of an example that was obtained in June, near Stonehaven, I myself have not seen, in the flesh, the Little Auk in the perfection of its summer plumage. Macgillivray records the occurrence of the bird in July at the Bass Rock, and in local collections I have seen examples in the breeding plumage.

Without asserting that the habit of the species is changing or has changed on the East Coast, it is safe to say that it has, with more or less regularity, been found at almost all seasons of the year, and it may not be too much to hope that future observation may establish the claim of the Little Auk to be ranked, if not as a permanently resident species, at least as a regular winter visitant to our shores.

The Little Auk is the smallest, if not also the most agile, of our sea-birds. No bird seems more at home on the world of waters. It is compact, round, plump, a quick diver, and it does not seem to go far from the surface for its food. I have, when boating, frequently timed its excursions under water, and not in any instance did it remain quite two minutes below the surface. It seems less a swimming than a diving bird, and, paradoxical as it may seem, it is probably owing to its facility in diving that it loses its life in stormy weather. It does not make for the top of the waves, as other oceanic birds do, but dashes through them, as a circus-rider through a hoop, till, by continuous ducking, it succumbs from

exhaustion. Now and again, during severe storms, the bird is blown ashore and found inland, but it is there apparently owing to the force of the wind and not from choice. So far as my experience goes, this latter circumstance is covered by the remark of Willie Law, one of the most observant of the East Coast fishermen, "The Sea-doo's nae an inshore bird 'cep by stress o' weather."

Jottings from my Note-Book. By DAVID ROBERTSON,
LL.D., F.L.S., F.G.S.

THE GULLS AND THEIR NEIGHBOURS.

[Read 30th April, 1895.]

THE small birds must have a bad time of it during frost and snow in searching for food ; but the Gulls would seem to be better provided for against such straits, their supply being chiefly derived from the open sea. This, however, does not appear to be without exception, for by the month of October, when the weather becomes cold, the Gulls begin to gather on the shallow bays at low water. Many a time I have been sorry to see a pair of Dogs of the neighbourhood come day after day to hunt these poor, hungry birds from their only morning or evening meal ; but when the frost and snow fairly set in, the Gulls appeared by their behaviour to be still harder pressed, for they came in search of food to more frequented places, and with a boldness that they never show in summer. When crumbs were thrown out to them within a few feet of my window, although none might be seen at the time within sight, it was wonderful how soon a Gull would come flying past, obviously on the outlook for anything that it could pick up. Seeing the crumbs, it would begin, seemingly with caution, to circle round, widely at first, the circles gradually becoming narrower and lower. This appeared to be a signal, for immediately another and another would come, till more than a score would be circling nearer and nearer to the crumbs, till one would drop and pick up a bit and fly off with it ; then another one or two would do the same. The whole flock would then alight, first on their tiptoes, with their wings up ; but seeing more than they could carry away at a time, they got down on their feet, and made the most of the opportunity. The noise of their cackle, and their scramble to pick up as much as they could, were most amusing. In the midst of all their hurry their watchfulness did not leave them, for, on the slightest alarm, they

were up on the wing to a greater or lesser height, according to the amount of apprehended danger ; but as soon as they found that there was nothing to fear, they were down on the ground again, to finish what they had left. Sometimes a Crow or two joined the company, but their procedure was different ; they alighted a little way from the tempting food, and walked to it with much caution, watching, as they stepped forward, that no danger was near. They did not care for a small morsel ; but if a big bit could be got at, they grabbed it and made off.

The Gulls did not dispute the right of the Crows to share in the feast ; they rather appeared to be on good terms with them. This might arise to some extent from the hurry that all were in to get the most they could of what was fast disappearing. When the ground was cleared of what had been spread for them, sometimes a Gull or two would stay behind and search for any remaining bits.

As the small birds could not cope in the scramble with their larger neighbours, they came in afterwards for a share of what the Gulls had failed to pick up. They were chiefly Sparrows and Starlings, and they seemed to be on good terms with each other. The Starlings would go about their business in a civil kind of way, eager to pick up what they could get, and allow others to do the same. A couple of Blackbirds, and occasionally a Thrush or a Chaffinch, would come to share what was agoing. The Robin seldom came, and he was not welcome when he did come, being pugnacious, and showing a desire to have all to himself. That the Gulls do not find their food in the sea so abundantly in winter as they do in summer months may be due largely to the cold preventing it from coming so abundantly to the surface. The sea at a short depth is seldom with us under 40° Fahr., but the air in the time of frost is a good many degrees colder, and the water at the surface, of course, partakes much of the cold of the air above it.

Many of the feathered tribes depend greatly for their sustenance during frost and snow on what they can pick up along the shore, and few of them neglect the low tides in milder weather, or even in summer, when the surface of the sea is teeming with food, showing that the shore contributes much to the wants of these birds all the year round,

Records of Measurements of Trees made in 1893 and 1894. By RICHARD M'KAY and JOHN RENWICK.

(With two Plates [II. and III.])

[Read 4th September, 1894.]

For a number of years we have taken measurements of the larger and more interesting trees seen at excursions of the Society, and many of these measurements have been recorded from time to time in the reports which have appeared in the *Proceedings*.

It may, however, be of interest to bring together, in a tabulated form, for the sake of reference, measurements made during the last two years, with, in addition, some others from various parts of Scotland: those of trees in the western counties being placed first. In the cases where we have earlier measurements of the same trees they also are given, so that some idea of the rate of growth may be obtained. In all cases the girth was taken at the narrowest part of the trunk within reach.

The largest ASH trees observed at Society excursions were two near Mambeg Pier, on the Gareloch, girthing, in June, 1893, 14 feet 8 inches and 14 feet 5½ inches. These appear to be referred to by the late Rev. Robert Story, Minister of the Parish of Rosneath, in his report in the *New Statistical Account*, 1839. "In the contiguous farm of Membig," he says, "there is a deeply affecting spot by a beautifully sequestered little bay overhung with lofty trees, which cannot be omitted when noting the few antiquities, if they can be so called, which the 'isle' contains. There is, indeed, nothing seen there monumental of the doings or sufferings of man, only the green sward meets the eye, and no relics of any former age; but who can look on it without emotion? it is the traditionary burial-place of unchristened infants during the iron tyranny of the papal delusions. A sweetly-solemn seclusion, as if a dark and severe superstition, half-relenting its own uncharitableness, and yielding to a certain compunctious

tenderness of feeling, had sought for the loveliest spot in this beautiful 'isle' for the repose of those babes whose dust it had harshly doomed to exile from the sepulchre of their fathers."

An Ash, larger than these, was, till recently, to be seen at Drymen Churchyard, Stirlingshire. In the *New Statistical Account* of the parish, "written December, 1838, revised March, 1841," it is thus recorded:—"At the churchyard gate there is a noble Ash, once the *bell-tree*, which has weathered at least 200 years. This tree is mentioned in the *Agricultural Report* of Stirlingshire, published in 1812, and it may be interesting to compare its measurement at that date and the present. Its girth is there stated as 15 feet at 1 foot from the ground, and 13 feet 8 inches at the middle of the trunk. It now measures 16 feet 7 inches in circumference at 1 foot from the ground, and 16 feet 1 inch at the middle of the stem, about 5 feet from the ground." In the *Transactions of the Highland and Agricultural Society* for March, 1864, the tree is stated to be decaying at top—the girth (apparently) at 5 feet in 1858 having been 17 feet 1 inch; height, 65 feet; diameter of shade, 70 feet; age, between 200 and 300 years. When we saw it in May, 1889, it girthed 17 feet 5½ inches at 1 foot, and 17 feet 4½ inches at 5 feet. It was then very much decayed, and was blown down on 23rd September, 1892.

But still larger than the Drymen Ash is one at Logierait, in Perthshire, which, even with part of the circumference gone, we found in April, 1893, to measure 20 feet at 8 feet from the ground. The trunk is broken off at about 15 feet up, and is quite hollow at the base. In the *New Statistical Account*, November, 1842, the girth is given as 40 feet at 3 feet up, and 22 feet at 11 feet; the height as 60 feet, and said to have been at one time nearly 90 feet. Dr. D. Christison, in the *Transactions of the Botanical Society of Edinburgh*, Vol. XIX., says: "The tree, when complete, could hardly have girthed less than 30 feet at 5 feet up, and it must have been one of the largest trees in Scotland of which we have any record."

The grandest BEECH tree was one near Dougalston House—T. R. Ker, Esq.—with a solid bole girthing 16 feet 11 inches at 4 feet from the ground, and 20 feet high. About this height it divides into several large branches. One of these is supported by what may be described as a natural bracket or tie, about 18 inches in

diameter, joining it to the base of a branch growing in the opposite direction. The tree is over 80 feet in height, and stands at an altitude of about 180 feet above sea-level, in good rich soil, exposed to all quarters, especially to the south and south-west. In the *New Statistical Account*, 1839, it is recorded as measuring 16 feet at 3 feet. At the Society's excursion to Eglinton in 1892, we measured a Beech 17 feet $7\frac{1}{2}$ inches at 4 feet 9 inches, and at Stair House, on the banks of the Ayr, we found one 17 feet $8\frac{1}{2}$ inches at 4 feet 3 inches. All of these are splendid trees, but none of them can vie with the celebrated Beech at Newbattle Abbey, Mid-Lothian, the largest tree in Scotland, or even with one at Eccles, in Dumfriesshire, and one at Belton, in East Lothian.

The finest ELMS were seen at the excursion last June to Tullichewan, the estate of James Campbell, Esq., in the Vale of Leven. The tree which had the greatest girth was in Tullichewan Park, giving 19 feet 1 inch at 2 feet 5 inches, but this was not all true wood, and cannot be regarded as a fair record of size, much of the trunk being covered with protuberances. In Woodbank, the neighbouring estate, also belonging to Mr. Campbell, and tenanted by his son-in-law, W. E. Gilmour, Esq., were three fine Elms, the largest girthing 14 feet 9 inches at 5 feet 8 inches. Last year, in Ancrum Park, in Roxburghshire, the estate of Sir William Scott, Bart., we measured an Elm 18 feet $1\frac{1}{2}$ inches at 4 feet 6 inches.

The English Elm is not common in our district, and we were therefore pleased to find two good examples at Milton-Lockhart, the estate of Major-General David Blair Lockhart, the larger girthing 14 feet $1\frac{1}{2}$ inches at 5 feet 4 inches.

The two SILVER FIRS at Camsail, Rosneath, are unexcelled by any in Scotland. From the uneven nature of their trunks they are difficult to "tape" to a nicety, and probably no two sets of measurements would exactly agree. Those taken in 1894 having been found to differ from our previous figures, we have since remeasured the trees, and have substituted the latest results, namely, 21 feet $7\frac{1}{2}$ inches for the northern tree, and 21 feet $10\frac{1}{2}$ inches for the southern, in both cases at a height of 4 feet 6 inches on the south side, which we found to be the narrowest part of the trunk within reach. The stems swell out both above and below this point. The girth of 24 feet given for each in the

Highland and Agricultural Society's Transactions for 1864 was probably taken at the ground. The *New Statistical Account*, 1839, gives girth of each as 19 feet at 5 feet. The first branch in each tree goes off at a height of about 22 or 24 feet. Mr. R. Hutchison, in the *Highland and Agricultural Society's Transactions*, 1885, gives the following particulars:—"Eve," girth, 21 feet 8 inches at 5 feet; height of tree, 125 feet; length of bole, 90 feet. "Adam," girth at 5 feet, 22 feet; height, 130 feet; bole, 90 feet. These Firs, "the botanical glory of the parish," were planted by the Campbells of Carrick, the proprietors for many successive generations of Camsail. The last distinguished member of this family fell at Fontenoy in 1745, and thereafter Camsail was added to the Argyll property, in which it still remains.*

The GEAN tree at Mauldslic, the estate of Sir William Wallace Hozier, Bart., which, in March, 1893, girthed 12 feet 8 inches, is a very fine tree, and must, indeed, be beautiful when in flower.

At the Society's excursions for the past two years no large LIME trees have been measured—the two finest being at Milton-Lockhart, 11 feet 9 inches and 11 feet 8½ inches in girth; but at Ancrum Park we saw four splendid examples, one having the greatest girth of any tree we have yet measured—24 feet at 6 feet 4 inches—with a solid trunk, not fluted, as many Limes are. It is of the large-leaved species, which seems rare in our district. This magnificent tree may have been planted by a Bishop of Glasgow when at his country seat in Roxburghshire, this estate having belonged to the Glasgow Episcopate in pre-Reformation times.

Though the Lothians excel us in Beeches, and the Borders in Limes, we can hold our own with OAKS, the only one of these three trees that is native to Scotland. Our most formidable rival is the celebrated "Capon Tree" near Jedburgh, which we measured in 1893, and found to girth 22 feet 6¾ inches at the narrowest part of the gnarled trunk, at 5 feet 9 inches on the north-east side, and 3 feet 9 inches on the south-west. It divides at 6 feet into two stems, the northern girthing 16 feet 2½ inches at base, and the southern 10 feet 9½ inches. The diameter of the spread of the branches is 97 feet 2 inches. The tree is tall and massive,

* *The Book of Dumbartonshire*: Joseph Irving. 1879.

and shows few signs of decay; fungi, however, are growing on the trunk.

In 1890 the Society visited Strathleven estate, near Dumbarton, and The Lee, near Lanark, and saw on the former an Oak with a circumference of fully 23 feet, and at the latter the well-known "Pease Tree," which measured 23 feet 7½ inches in girth at 3 to 4 feet from the ground. None of the Oaks seen at the excursions during the last two years equal these, but three of them are interesting:—

"The Covenanters' Oak," at Dalziel House, Lanarkshire, the residence of Lord Hamilton, is the largest of the three, girthing 19 feet 2 inches at 2 feet 3 inches.

At Bargaran, in Renfrewshire, is the "Witches' Oak," decaying at top. It measures 18 feet 9 inches at 1 foot 3 inches, and divides at 1 foot 6 inches into 6 stems, one of them sub-dividing into two, thus making 7 stems, inside or around which, according to the legend, the witches used to dance. In the old farm-house of Bargaran, now demolished, occurred the alleged "manifestations" which resulted in one of the last trials for witchcraft in Scotland, in 1697.

At Blairquhosh, about three miles north-west of the village of Strathblane, in Stirlingshire, is "The Meikle Tree" (Plate II.), visited by the Society in 1893. Four hundred years previously this Oak is mentioned in a notarial instrument, dated 17th February, 1493, narrating the division of the lands of Blairquhosh. The late Mr. John Guthrie Smith, in his book, *The Parish of Strathblane*, says: "Blairquhosh then was divided into three parts in a formal and legal manner in 1493, and the deed narrates—'That the said Archibald Edmonstone, and his heirs for ever, shall have that east third part near the lands of Duntreath, beginning from the burn of Croftfelan, descending to the water of Blane by the ridge where the oak grows,' &c. This easter third part afterwards came to be called 'Blairquhosh Edmonstone,' and it has continued to be part of Duntreath estate down to the present day, and the same oak which was growing on the 'march' in 1493 is still growing on, in *green and vigorous old age, in 1886.*" Further on he says—"The Meikle Tree,' the splendid oak which stands by the roadside at Blairquhosh, was a favourite trysting-place, both for the peaceful purposes of making

bargains and drawing up agreements, and also, it may be supposed, for the assembling of the Strathblane branch of the Clan Buchanan, 'all bodin in feir of weir,' to attack their enemies or defend their friends." In the *Statistical Account*, 1795, the minister of the parish thus describes this tree, and a neighbouring one, which is known as "The Smiddy Oak": "Two trees adjoining to the public road at Blairquhosh, in the western extremity of the parish, attract the notice of passengers, as being unusually large in this part of the country. The trunk of the largest measures 15 feet in circumference, and its branches form the radii of a circle 30 yards in diameter. As the public road passes underneath it, it falls within the notice of every traveller. The other grows near it, and, though not quite so large, is a more beautiful tree, having a taller trunk, and more closely covered with foliage." These trees are also mentioned in the *New Statistical Account*, "revised 1841":—"A beautifully shaped oak at Blairquhoss at 4 feet from the ground is 11 feet in circumference. Another, near the same spot, forms an uncommonly noble specimen of the gnarled and knotty oak. Although it may be supposed to have seen seven centuries, it is still healthy and thriving. Four feet from the ground it is 15 feet 8 inches round. The branches diverge at the height of nine feet, and cover a circle of 281 feet." It has now begun to decay, but the lower dead branches have been cut off, and the truncated parts protected from the weather. The diameter of the spread of the branches has decreased ten feet since a century ago, being now 80 feet, but the girth of the trunk is still increasing, having grown in six seasons from 16 feet 8 inches to 16 feet 9 inches at 3 feet 5 inches above the ground.

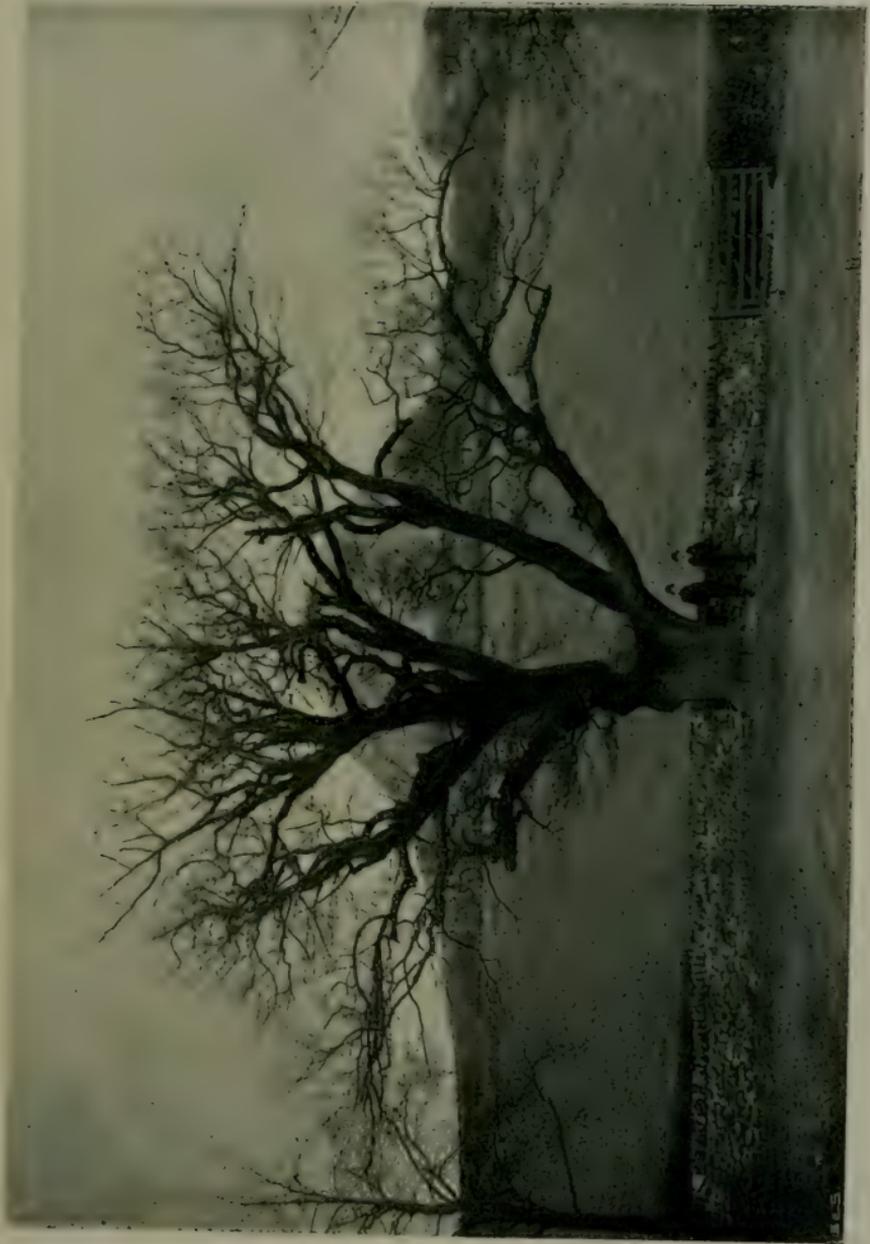
Nowhere have we seen larger WHITE POPLARS than two grand trees at Mauldslie, both of which showed an increase in girth between August, 1891, and March, 1893. The larger was, at the later date, 18 feet $2\frac{1}{2}$ inches at narrowest; the smaller, 15 feet $4\frac{1}{2}$ inches.

But the Border again comes to the front with the BLACK POPLAR, a splendid specimen of which we measured last year near Kelso Station, 19 feet 9 inches at 6 feet 3 inches. The largest in the west was seen at Dalziel; but it is, unfortunately, a mere stump, with the bark off, and girthing 16 feet at 3 feet 3 inches.

One in vigorous growth at Dalziel is 12 feet 6 inches at 5 feet 3 inches.

A ROWAN at Edinbarnet, the estate of Walter Mackenzie, Esq., is worthy of note, girthing 11 feet 4 inches at 2 feet 6 inches. It divides at 3 feet, and the larger stem is 6 feet 2 inches at 1 foot above the division.

The largest SYCAMORE (*Acer pseudo-platanus*, L.) seen at a Society excursion recently was at Erskine, the estate of Lord Blantyre. It measured 15 feet 3½ inches at 6 feet, 15 feet 4 inches at 7 feet 10 inches, with a splendid bole. It is a really fine tree, in good condition, and the noble proprietor may well be proud of it. Near the west lodge of Erskine is a tree with the greater girth of 19 feet at 2 feet 3 inches, but with a much shorter bole. It widens upwards, and divides at 7 feet into four stems. A mile farther west, at Bishopton Old House, is a Sycamore, under the shade of which John Knox is said to have preached. It had, in 1887, a girth of 15 feet 5 inches at 5 feet, and a spread of 83 feet. It is figured by Strutt in *Sylva Britannica*, 1830, but the circumference given by him of 20 feet at the ground is evidently an exaggeration. At Loganswraes, near Barrhead, is another splendid and tall tree (Plate III.), girthing 18 feet 1½ inches at 3 feet 6 inches, the narrowest part of a short bole of 5 feet. In 1841 it measured 15 feet 3 inches. All these trees are in Renfrewshire, which is thus probably excelled by few counties in Scotland for Sycamores.



From Photo. by

Robt. M. Morton, 20th April, 1895.

OAK AT BLAIRQUHOSH, STIRLINGSHIRE.





From Photo. by

John Fleming, 22nd January, 1896.

SYCAMORE AT LOGANSWRAES, RENFREWSHIRE.



ACACIA—*Robinia pseud-acacia*.

Place.	County.	Date.	Girth.	At
Milton-Lockhart,	Lanark,	August, 1893,	Ft. In. 6 1	Ft. In. 2 5

ARAUCARIA IMBRICATA.

Place.	County.	Date.	Girth.	At
Erskine,	Renfrew,	Feby., 1893,	Ft. In. 4 1½ 4 2½	Ft. In. 4 0 2 0

ASH—*Fraxinus excelsior*.

Place.	County.	Date.	Girth.	At
1. Drymen,	Stirling,	About 1812,	Ft. In. 13 8	At 5 ft. <i>a</i>
		" 1838,	16 1	" " <i>b</i>
		In 1858,	17 1	" " <i>c</i>
2. Mambeg,	Dumbarton,	May, 1889,	17 4½	At 5 ft. <i>d</i>
3. Do.,	Do.,	June, 1893,	14 8	4 9
4. Ardgowan,	Renfrew,	Do.,	14 5½	4 6
		May, 1889,	13 2	2 4
5. Mauldslie,	Lanark,	April, 1894,	13 2	" "
		Aug., 1891,	12 3½	4 6
6. Pollok,	Renfrew,	March, 1893,	12 4	4 6 <i>e</i>
7. Edinbarnet,	Dumbarton,	July, 1893,	11 10¾	4 5
8. Tullichewan,	Do.,	May, 1893,	11 6½	5 6 <i>f</i>
9. Logierait,	Perth,	June, 1894,	10 10½	5 2
10. Melrose Abbey,	Roxburgh,	April, 1893,	20 0	8 0 <i>g</i>
		July, 1894,	12 9½	5 0

a. At middle of trunk; 15 ft. at 1 ft.—*Agricultural Report of Stirlingshire*, published 1812.

b. At middle of stem, about 5 feet from ground; 16 ft. 7 in. at 1 ft.—*New Statistical Account*: written December, 1838; revised March, 1841.

c. In 1858, "decaying at top."—*Highland and Agricultural Society's Transactions*, March, 1864.

d. 17 ft. 5½ in. at 1 ft. in May, 1889.

No. 1, "The Bell Tree," blown down 23rd September, 1892.

e. 12 ft. 2½ in. at 5 ft. 6.

f. 12 ft. 4½ in. at 3 ft.

g. Trunk broken off at about 15 ft. *New Statistical Account*, 1842, gives circumference 53½ ft. at ground, 40 ft. at 3 ft., 22 ft. at 11 ft.; height, 60 ft.; but said to have been at one time nearly 90 ft.

Mr. Hutchison, in *Highland and Agricultural Society's Transactions*, 1880, gives girth as 29 ft. 7 in. at 6 ft.; height, 63 ft. In July, 1770, girth, 16 ft. at 4 ft.; 70 feet high.

BEECH—*Fagus sylvatica*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Stair House, . . .	Ayr,	Oct., 1892,	17	8½	4	3
2. Dougalston, . . .	Dumbarton,	March, 1893,	15	6	6	8a
3. Duntreath, . . .	Stirling,	Feb'y., 1888,	14	5½	6	0
		Oct., 1891,	14	7¾	„	b
		Oct., 1893,	14	11	„	„
		Oct., 1894,	14	11½	„	„
4. Rosneath, . . .	Dumbarton,	June, 1894,	14	10	5	0
5. Erskine, . . .	Renfrew,	Feb'y., 1893,	14	8½	3	0c
6. Mauldslic, . . .	Lanark,	March, 1893,	14	2	2	3
7. Stair House, . . .	Ayr,	Oct., 1892,	13	9	5	0
8. Dalziel, . . .	Lanark,	May, 1893,	13	8½	4	8d
9. Dougalston, . . .	Dumbarton,	March, 1893,	13	5	4	10e
10. Do., . . .	Do.,	Do.,	13	5	4	8f
11. Tullichewan, . . .	Do.,	June, 1894,	13	4½	5	0g
12. Stair House, . . .	Ayr,	Oct., 1892,	13	1	3	6
13. Mains, . . .	Dumbarton,	April, 1893,	12	8½	4	10
14. Dalziel, . . .	Lanark,	May, 1893,	12	7	5	0d
15. Stair House, . . .	Ayr,	Oct., 1892,	12	3½	4	6
16. Edinbarnet, . . .	Dumbarton,	May, 1893,	12	2¼	3	0
17. Dalziel, . . .	Lanark,	May, 1893,	11	11	5	9d
18. Murdostoun, . . .	Do.,	Sept., 1893,	11	10½	5	6h
19. Do., . . .	Do.,	Do.,	11	9	4	3
20. Do., . . .	Do.,	Do.,	11	7½	6	0
21. Do., . . .	Do.,	Do.,	11	7	5	3
22. Erskine, . . .	Renfrew,	Feb'y., 1893,	11	6½	3	0i
23. Kilmahew, . . .	Dumbarton,	Sept., 1893,	10	6½	5	0
24. Milton-Lockhart, . . .	Lanark,	August, 1893,	10	0½	4	10
25. Mounteviot, . . .	Roxburgh,	July, 1893,	15	6½	3	9k
26. Dryburgh, . . .	Berwick,	July, 1894,	15	1	3	6
27. Ancrum Park, . . .	Roxburgh,	July, 1893,	14	11	5	3l

- a. Girth at 4 ft., 16 ft. 11 in. Bole, 20 ft.
New Statistical Account, dated 1839, gives girth as 16 ft. at 3 ft.
Highland and Agricultural Society's Transactions, 1864, gives height as 80 ft.
- b. Girth at 5 ft., October, 1891, 14 ft. 9¼ in.; October, 1894, 15 ft. 0½ in.
- c. 16 ft. 3½ in. at 6 ft.
- d. These three trees are in an avenue at the side of the Clyde, said to have been planted about 1721. Mr. Hutchison, in *Highland and Agricultural Society's Transactions*, 1881, mentions one at Dalziel with a girth of 12 ft. 4 in. at 5 ft.
- e. 12 ft. 8 in. at 7 ft.
- f. 12 ft. 4 in. at 7 ft. 3 in.
- g. Bole, 24 ft.
- h. *Highland and Agricultural Society's Transactions*, 1864, gives three beeches at Murdostoun—girth, 10 ft. 5 in., 11 ft. 6 in., 11 ft. 6 in.
- i. Branches at 4 ft.
- k. *History of Berwickshire Naturalists' Club*, 1887-89, gives girth 14 ft. 10 in. at 5 ft. in 1889.
- l. *History of Berwickshire Naturalists' Club*, 1887-89, gives girth 14 ft. 9 in. at 5 ft. 3 in. in March, 1889.

BIRCH—*Betula alba*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Erskine, . . .	Renfrew,	Feby., 1893, }	7	2	5	10
2. Dougalston, . .	Dumbarton,	March, 1893,	7	2	3	0
3. Newton Don, . .	Berwick,	July, 1893,	6	3	2	7
4. Do., . . .	Do.,	Do.,	13	0	1	7 α
			10	3	4	3

α . Divides into two at 3 ft., the respective stems being 8 ft. 11 in. and 7 ft. 10 in. at base.

“Height, 80 ft.; branch spread, 70 ft. (September, 1893).”—Dr. D. Christison, *Transactions of the Botanical Society*, Vol. XIX., p. 502.

CEDAR OF LEBANON—*Cedrus Libani*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Erskine, . . .	Renfrew,	Feby., 1893,	9	2 $\frac{1}{2}$	1	5
2. Do., . . .	Do.,	Do.,	9	1 $\frac{4}{8}$	1	6
3. Newton Don, . .	Berwick,	July, 1893,	10	2 $\frac{1}{2}$	4	3

HORSE CHESTNUT—*Æsculus Hippocastanum*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Castlemilk, . . .	Lanark,	May, 1893,	11	3	3	4
2. Mauldslie, . . .	Do.,	March, 1893,	10	2 $\frac{1}{2}$	2	6
3. Milton-Lockhart,	Do.,	August, 1893,	8	8	2	11
4. Merton House, .	Berwick,	July, 1894,	14	6 $\frac{1}{2}$	4	5 α

α . Bole, 6 ft.

SPANISH OR SWEET CHESTNUT—*Castanea vulgaris*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Erskine, . . .	Renfrew, .	Feby., 1893,	14	8 $\frac{1}{2}$	4	3
2. Near Rossdhu, . .	Dumbarton,	Sept., 1893,	13	1 $\frac{1}{2}$	5	0
3. Ardgowan, . . .	Renfrew,	April, 1894,	12	5 $\frac{1}{2}$	5	4
4. Tullichewan, . .	Dumbarton,	June, 1894,	12	4	5	4 α
5. Dougalston, . . .	Do.,	March, 1893,	11	10 $\frac{1}{2}$	6	3
6. Ardgowan, . . .	Renfrew,	April, 1894,	11	0 $\frac{1}{2}$	4	10
7. Floors Castle, . .	Roxburgh,	July, 1893,	15	11 $\frac{1}{2}$	4	3
8. Do., . . .	Do.,	Do.,	15	5 $\frac{1}{2}$	4	6

α . 14 ft. 1 in. at 2 ft. 9 in.

ELM (WYCH OR SCOTCH)—*Ulmus montana*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Tullichewan, .	Dumbarton,	June, 1894,	19	1	2	5 <i>a</i>
2. Woodbank, .	Do.,	Do.,	14	9	5	8
3. Do., .	Do.,	Do.,	14	5½	3	3
4. Edinbarnet, .	Do.,	May, 1893,	14	6	2	0 <i>b</i>
5. Mauldslic, .	Lanark, {	August, 1891,	14	1	5	2
		March, 1893,	14	3	5	2 <i>c</i>
6. Woodbank, .	Dumbarton,	June, 1894,	13	4½	5	0 <i>d</i>
7. Baldernock, .	Stirling, {	March, 1888,	13	0	Narrowest.	
		March, 1893,	13	3	4	10
8. Mauldslic, .	Lanark, {	August, 1891,	13	1½	4	3
		March, 1893,	13	2	4	3 <i>c</i>
9. Garscube, .	Dumbarton,	June, 1893,	12	9	5	4
10. Baldernock, .	Stirling, {	March, 1888,	12	4	Narrowest.	
		March, 1893,	12	6½	3	6 <i>f</i>
11. Garscube, .	Dumbarton,	June, 1893,	11	4½	3	2
12. Ancrum Park, .	Roxburgh,	July, 1893,	18	1½	4	6 <i>g</i>
13. Near Roxburgh Castle, .	Do., {	July, 1891,	16	11	3	9
		July, 1893,	16	11	3	9
14. Dull, .	Perth,	April, 1893,	15	10	5	7 <i>h</i>
15. Do., .	Do.,	Do.,	15	1	6	11 <i>h</i>
16. Do., .	Do.,	Do.,	12	10	5	9 <i>h</i>
17. Dryburgh Abbey	Berwick,	July, 1894,	12	1	3	8

a. Trunk covered with protuberances.

b. *Highland and Agricultural Society's Transactions*, 1864, gives girth as 14 ft., but at what height is not stated.

c. Spread of foliage, 85 ft. 9 in.

d. Bole, 15 ft.

e. Girth at ground, 14 ft. 11. in. Spread of foliage, 98 ft. 4 in.

f. Girth, 11 ft. 10 in. at 6 ft.

g. *History of Berwickshire Naturalists' Club*, 1887-89, gives girth of largest Elm in Ancrum Park in March, 1889, as 16 ft. 4 in. at 5 ft., 20 ft. at 1 ft.

h. Bole—No. 14, 14 ft. ; No. 15, 13 ft. ; No. 16, 22 ft.

New Statistical Account, December, 1842, gives circumferences at 2 ft. as 14 ft., 13 ft., and 11 ft.

In *Hunter's Woods, &c., of Perthshire*, 1883, the girth of the largest is given as 15 ft. 2 in. at 5 ft.

ENGLISH ELM—*Ulmus campestris*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Milton-Lockhart,	Lanark,	August, 1893,	14	1½	5	4
2. Do., .	Do.,	Do.,	10	5	5	4

SILVER FIR—*Picea pectinata*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Rosneath, . . .	Dumbarton, }	Sept., 1890,	21	7	} 4	6
2. Do., . . .		April, 1895,	21	10 $\frac{1}{3}$		
	Do.,	April, 1895,	21	7 $\frac{1}{2}$		6

New Statistical Account, 1839, gives girth about 19 ft. at 5 ft.

Highland and Agricultural Society's Transactions, 1864, gives girth of both as 24 ft.

Mr. Hutchison, in *Transactions*, 1885, gives the following particulars:—

	(1) "Adam."		(2) "Eve."	
	Ft.	In.	Ft.	In.
In 1817, girth at 5 ft.,	16	2	15	7
„ 1833, „ „ „ „ „	18	2	17	7
„ August, 1882, girth at 5 ft.,	22	0	21	8
„ „ „ height of tree,	130	0	125	0
„ „ „ bole,	90	0	90	0

GEAN—*Prunus Avium*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
Mauldslie, . . .	Lanark, }	August, 1891,	12	7 $\frac{1}{2}$	} 2	9
		Mar., 1893, a	12	8		

a. Spread, 68 ft. 4 in.

HOLLY—*Ilex Aquifolium*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Edinbarnet, . . .	Dumbarton,	May, 1893,	9	0 $\frac{1}{2}$	1	8
2. Castlemilk, . . .	Lanark,	May, 1893,	8	6 $\frac{1}{2}$	5	0
3. Edinbarnet, . . .	Dumbarton,	May, 1893,	5	4	2	5

HORNBEAM—*Carpinus Betulus*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Tullichewan, .	Dumbarton, Do.,	June, 1894,	8	1 $\frac{1}{2}$	5	3
2. Mains, .		April, 1893,	8	0	5	3

LIME—*Tilia vulgaris*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Milton-Lockhart,	Lanark, Roxburgh,	August, 1893,	11	9	4	9
2. Ancrum Park, .		July, 1893,	17	3 $\frac{1}{2}$	5	0

LARGE-LEAVED LIME—*Tilia grandifolia*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Milton-Lockhart,	Lanark, Do.,	August, 1893,	11	8 $\frac{1}{2}$	3	5
2. Do., .		Do.,	9	0 $\frac{1}{2}$	4	8
3. Ancrum Park, .	Roxburgh, Do.,	July, 1893,	24	0	6	4
4. Do., .		Do.,	19	0 $\frac{1}{2}$	4	3
5. Do., .	Do.,	Do.,	15	4	4	4

History of Berwickshire Naturalists' Club, Vol. XII., gives girth on 12th March, 1889, of the four largest Limes standing in Ancrum Park as 24 ft. 0 in., 19 ft. 9 in., 16 ft. 7 in., 15 ft. 10 in., all at 5 ft., probably the same trees as those given above as 24 ft. 0 in., 19 ft. 0 $\frac{1}{2}$ in., 17 ft. 3 $\frac{1}{2}$ in., 15 ft. 4 in., at various heights. In *Transactions of the Botanical Society of Edinburgh*, Vol. XIX., Dr. D. Christison gives Lime at Ancrum House—"Bole, 12 ft.; girth, 20 ft. at 5 ft., the narrowest. Sir R. C. about 1877."

OAK—*Quercus Robur*.

Place.	County.	Date.	Girth.		At
			Ft.	In.	Ft. In.
1. Renton, . . .	Dumbarton, }	Feb'y, 1890,	20	8	2 0
		April, 1893,	20	10	2 0 <i>a</i>
2. Dalziel House, .	Lanark,	May, 1893,	19	0	3 6 <i>b</i>
3. Bargaran, . . .	Renfrew,	Feb'y., 1893,	18	9	1 3 <i>c</i>
		About 1795,	15	0	—
4. Blairquhosh, . .	Stirling, }	„ 1841,	15	8	4 0
		Feb'y., 1888,	16	8	3 5 <i>d</i>
		Oct., 1891,	16	8 $\frac{3}{4}$	3 5
		Oct., 1894,	16	9	3 5
		Oct., 1891,	17	1	5 2
		Oct., 1893,	17	1 $\frac{1}{2}$	5 2
5. Between Crossford and Dalserf, . . .	Lanark,	Oct., 1894,	17	1 $\frac{1}{2}$	5 2
		August, 1893,	14	8 $\frac{1}{2}$	5 0
6. Blairquhosh, . .	Stirling,	About 1841,	11	0	4 0
7. Woodbank, . . .	Dumbarton,	Oct., 1893,	12	10	4 7 <i>e</i>
		June, 1894,	11	4 $\frac{1}{2}$	4 6
8. Milton-Lockhart,	Lanark,	August, 1893,	10	2 $\frac{1}{2}$	4 10
9. Jedburgh, . . .	Roxburgh,	July, 1893,	22	6 $\frac{3}{4}$	5 9
					3 9
10. Do., . . .	Do.,	July, 1891,	14	2	4 9 <i>g</i>

- a. Spread of branches, 85 ft. 5 in.
- b. "The Covenanters' Oak"—19 ft. 2 in. at 2 ft. 3 in.; branches at 4 ft. *Highland and Agricultural Society's Transactions*, 1865, gives girth 24 ft., but does not say at what height; spread of branches, 54 ft. on each side; height, 60 ft. Mr. Hutchison, in *Transactions*, 1881, gives girth at 1 ft., 21 ft. 4 in.; at 5 ft., 19 ft. 3 in.; spread, 70 ft.
- c. "The Witches' Tree." Divides at 1 ft. 6 in.
- d. "The Meikle Tree," or "The Trysting Tree." A "march" tree in 1493. *Statistical Account*, 1795, gives girth as 15 ft.; spread of branches, 90 ft. *New Statistical Account*, 1841—girth, 15 ft. 8 in. at 4 ft.; the branches diverge at 9 ft., and cover a circle of 281 ft. In October, 1893, diameter of spread of branches was 80 ft. Now decaying.
- e. "The Smiddy Oak." "4 ft. from the ground, 11 ft. in circumference."—*New Statistical Account*, 1841. Spread of branches in 1893, 83 ft.
- f. "The Capon Tree." Spread, 97 ft. 2 in. *New Statistical Account*, 1834: "Circumference at 3 ft. is 21 ft."
- g. "The King of the Woods." Girth at 4 ft. 9 in. on upper side. *New Statistical Account*, 1834, gives height, 99 ft.; circumference of trunk at 3 ft., 14 ft. Mr. Hutchison, *Highland and Agricultural Society's Transactions*, 1881: Circumference, upwards of 17 ft. at 4 ft., with a trunk 43 ft. in height.

EVERGREEN OAK—*Quercus Ilex*.

Place.	County.	Date.	Girth.	At
			Ft. In.	Ft. In.
1. Ardgowan, . . .	Renfrew, {	May, 1889,	4 6	—
2. Castle-Kennedy, .	Wigtown,	April, 1894,	4 9	3 10
3. Do., . . .	Do.,	July, 1892,	13 5½	2 0
4. Do., . . .	Do.,	Do.,	11 4	3 6
5. Do., . . .	Do.,	Do.,	10 11	2 0
		Do., a }	9 2 }	2 ft. to
			5 7½ }	3 ft.
				3 0

a. Two stems of one tree.

TURKEY OAK—*Quercus Cerris*.

Place.	County.	Date.	Girth.	At
			Ft. In.	Ft. In.
Finlayston, . . .	Renfrew, {	May, 1889,	11 7	—
		Oct., 1893,	11 9	3 4

Spread, 76 ft.

SCOTCH PINE OR FIR—*Pinus sylvestris*.

Place.	County.	Date.	Girth.	At
			Ft. In.	Ft. In.
1. Erskine, . . .	Renfrew,	Feb., 1893,	9 1½	6 3
2. Mains, . . .	Dumbarton,	April, 1893,	8 2	6 4
3. Milton-Lockhart,	Lanark,	August, 1893,	7 10	5 0
4. Drummond Hill,	Perth,	April, 1893,	10 7	6 0

BLACK POPLAR—*Populus nigra*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Dalziel, . . .	Lanark,	May, 1893,	16	0	3	3 <i>a</i>
2. Do., . . .	Do.,	Do.,	12	6	5	3
3. Do., . . .	Do.,	Do.,	12	2 $\frac{1}{2}$	4	0
4. Tullichewan, . . .	Dumbarton,	June, 1894,	12	2 $\frac{1}{2}$	5	3 <i>b</i>
5. Garscube, . . .	Do.,	June, 1893,	11	11	4	4
6. Do., . . .	Do.,	Do.,	10	10 $\frac{1}{2}$	4	5
7. Kelso, . . .	Roxburgh,	July, 1893,	19	9	6	3 <i>c</i>
8. Bonjedward, . . .	Do.,	Do.,	13	8 $\frac{1}{2}$	4	6 <i>d</i>

a. Stump ; bark off.

b. 13 ft. 8 $\frac{1}{2}$ in. at 2 ft. 5 in.

c. Girth at 2 ft., 21 ft. ; at 10 ft., 18 ft.—*New Statistical Account*, 1838.

d. 13 ft. 2 in. at 5 ft. 0 in. in 1889.—*History of Berwickshire Naturalists' Club*, 1887-89.

WHITE POPLAR—*Populus alba*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Mauldslic, . . .	Lanark, <i>a</i>	August, 1891,	18	0	} 2	6 on N.
		March, 1893,	18	2 $\frac{1}{2}$			} 1	8 on S.
2. Do., . . .	Do., <i>b</i>	August, 1891,	15	4	} 3	6
		March, 1893,	15	4 $\frac{1}{2}$		

a. Branches at 3 ft. Girth of branch in 1891, 8 ft. ; in 1893, 8 ft. 1 $\frac{1}{2}$ in.

Girth of main stem above branch, 1891, 17 ft. ; 1893, 17 ft. 1 $\frac{1}{2}$ in.

Diameter of spread of branches in 1893, 102 ft. 3 in.

b. Spread in 1893, 94 ft. 7 in. ; height of tree, above 80 ft.

ROWAN—*Pyrus Aucuparia*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
Edinbarnet, . . .	Dumbarton,	May, 1893,	11	4	2	6

Divides at 3 ft. ; eastern stem, 6 ft. 2 in. at 1 ft. above base.

SYCAMORE, GREAT MAPLE, or PLANE—*Acer pseudo-platanus*.

Place.	County.	Date.	Girth.		At	
			Ft. In.	Ft. In.	Ft. In.	Ft. In.
1. Erskine, . . .	Renfrew,	Feby., 1887,	18	10	—	—
		April, 1893,	19	0	2	3 ^a
		May, 1841,	15	3	—	c
2. Loganswraes, . . .	Do., b	April, 1889,	17	11 $\frac{1}{2}$	—	—
		Nov., 1893,	18	1 $\frac{1}{2}$	3	6
		Dec., 1894,	18	1 $\frac{1}{2}$	3	6
3. Erskine, . . .	Do.,	May, 1890,	15	3 $\frac{1}{2}$	6	0 ^d
		Feby., 1893,	15	3 $\frac{1}{2}$	6	0
4. Mains, . . .	Dumbarton,	April, 1893,	14	10 $\frac{1}{2}$	6	1
		Sept., 1894,	14	11	6	1
5. Garnkirk, . . .	Lanark,	June, 1894,	14	10 $\frac{1}{2}$	1	6 ^e
6. Murdostoun, . . .	Do.,	Sept., 1893,	14	8	3	8 ^f
7. Ardgowan, . . .	Renfrew,	May, 1889,	14	5 $\frac{1}{2}$	—	—
		April, 1894,	14	5 $\frac{1}{2}$	1	6
8. Do., . . .	Do.,	May, 1889,	13	0	4	4
		April, 1894,	13	4 $\frac{1}{2}$	4	4
9. Blythswood, . . .	Do.,	March, 1894,	13	3 $\frac{3}{4}$	5	4
		April, 1893,	11	5 $\frac{1}{2}$	4	0 ^g
11. Murdostoun, . . .	Lanark,	Sept., 1894,	11	6 $\frac{1}{2}$			3	5
		Sept., 1893,	11	2		
12. Mains, . . .	Dumbarton,	April, 1893,	10	11	5	0 ^h
		Sept., 1894,	10	11 $\frac{1}{2}$		
13. Castlemilk, . . .	Lanark,	May, 1893,	10	10	3	3
		Sept., 1893,	10	3	5	8 ⁱ
14. Darnley, . . .	Renfrew,	Sept., 1893,	10	3	5	8
		Dec., 1894,	10	3 $\frac{1}{2}$	5	8

- a. Divides at 7 ft. into four stems.
 b. First branch goes off at 5 ft.
 c. Mr. J. R. Notman.
 d. 15 ft. 4 in. at 7 ft. 10 in; 16 ft. 4 $\frac{1}{2}$ in. at 3 ft. 9 in.
 e. Divides at about 2 ft. into four stems.
 f. "Cromwell's Tree." Decaying. *Highland and Agricultural Society's Transactions*, 1865, gives girth of a tree at Murdostoun as 14 ft. 7 in.; height, 65 ft.; age, 450 years.
 g. Bole fully 20 ft.
 h. Bole, 25 ft.
 i. Spread, 68 ft. 6 in.

TULIP TREE—*Liriodendron tulipifera*.

Place.	County.	Date.	Girth.		At	
			Ft. In.	Ft. In.	Ft. In.	Ft. In.
1. Rosneath, . . .	Dumbarton,	June, 1894,	6	6	4	0
2. Finlayston, . . .	Renfrew,	Oct., 1893,	6	2 $\frac{1}{2}$	3	0
					6	0
3. St. Mary's Isle,	{Kirkcud- bright, }	July, 1892,	10	9	to	
					6	6

WALNUT—*Juglans regia*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Strathleven, . . .	Dumbarton,	Sept., 1890, ^a	11	3½	3	0
2. Erskine, . . .	Renfrew,	Feb'y, 1893, }	8	1½	2	7
			7	9¼	3	0
			7	2½	4	6

^a. In March, 1895, 11 ft. 4½ in. at 3 ft.

WELLINGTONIA—*Sequoia gigantea*.

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
1. Mauldslic, . . .	Lanark,	{ August, 1891, March, 1893, Do.,	10	2½	1	0
			10	9	1	0
			12	2½	Ground.	
2. Milton-Lockhart,	Do., ^a	August, 1893,	{ 5	11	Ground.	
			{ 3	8½	2	0
			{ 3	1¼	4	0

^a. Planted in spring, 1871; then 1 ft. 6 in. high.

WILLOW—*Salix* sp. (*fragilis*?).

Place.	County.	Date.	Girth.		At	
			Ft.	In.	Ft.	In.
Eastwood, . . .	Renfrew,	Dec., 1890,	17	11	3	0
Tree blown down December, 1894, and only stump, 7 ft. 8 in., left.						
<i>Salix alba</i> .						
Weem,	Perth,	April, 1893,	17	2½	1	4
<i>Salix cinerea</i> .						
Blackburn, Jedburgh,	Roxburgh,	July, 1893,	8	2½	3	10

YEW—*Taxus baccata*.

Place.	County.	Date.	Girth.		At
			Ft.	In.	Ft. In.
1. Rossdhu, . . .	Dumbarton,	Sept., 1893,	13	2	3 8 <i>a</i>
2. Dougalston, . .	Do.,	March, 1893,	11	8	Ground <i>b</i>
3. Finlayston, . .	Renfrew, {	May, 1889,	9	0	} 1 6
		Oct., 1893,	9	1	
4. Do., . . .	Do., {	May, 1889,	8	10	} 2 0
		Oct., 1893,	8	10 $\frac{3}{4}$	
5. Do., . . .	Do., {	May, 1889,	8	0	} 1 9
		Oct., 1893,	8	0	
6. Dalziel, . . .	Lanark,	May, 1893,	7	9 $\frac{1}{2}$	5 6 <i>c</i>
7. Dougalston, . .	Dumbarton,	March, 1893,	6	2 $\frac{1}{2}$	3 6 <i>d</i>
		1828,	10	0	6 0 <i>e</i>
8. Dryburgh, . .	Berwick, {	July, 1894,	11	3	6 0
		Do.,	10	11	3 3

- a.* Female. Bole, 6 ft. 10 in., but tree is surrounded by a mound 4 ft. high, making bole 10 ft. 10 in., and the height at which girth was taken 7 ft. 8 in. from original surface of ground.
- b.* Tree stood at side of a small burn, now covered over, and hollow filled up to height of 2 or 3 ft. Female tree.
- c.* In a glen. Bole fully 25 ft.
- d.* 6 ft. 8 $\frac{1}{2}$ in. at 1 ft. 3 in. Male tree.
- e.* Sir D. Erskine, *Annals of Dryburgh*.

A Word about Wasps. By JAMES CAMPBELL, C.M.

[Read 30th April, 1895.]

THE Wasp is usually looked upon as an enemy, and inducements are often offered for its destruction. From time to time a thrust is had at it through the press, and many a grudge is aired against the creature's natural means of defence. We never live long without fresh incidents. At Ayr, last summer, a woman who licked the jelly off a knife with which she had killed a wasp paid the penalty by severe suffering for some days. About four years ago I had special attention from a nest of wasps myself. Taking a near cut, I slid down a bank over an unobserved "byke," and it might be easier to describe than it was to experience the connection between myself and the wasps for the next few moments. After sufficient interval, one can take a philosophical view of his defeat; and if I at that time met the race in war, I rejoice to say that I have frequently since been with them in peace.

Having occasion to sit much in the open air in summer, I have frequent opportunities of watching the habits of wasps, and I find that, while their behaviour depends much on one's treatment of them, their familiarity varies according to the place where they are found. Near houses or by roadsides an insect readily visits one, cautiously at first, but, when it is not molested, it soon gathers confidence, and shows itself willing to accept kindness. Its experience and memory help it to success. The first day it is some time in finding its way to the lunch-bag, but next day it knows the person and it knows the bag, and wasps may be clustering on the bag before there is time to undo the strap. Sir John Lubbock has some interesting notes on a tame wasp, but all wasps near human dwellings are in a way tame, if they are allowed to be so. For our own comfort and that of the wasps, we hung on the hedge a paper bag with a small bit of bacon and butter and a piece of bread well smeared with jelly. On exposure to the air, the jelly became mildly fermented, and this seemed to please the wasps all the better. When they had struggled over it and gorged themselves, they began to rest, and calmly survey their entertainer.

They get on one's hat, the collar of the coat, and I have even felt them on my ear. If the left arm is at rest, holding the colour-box, there is likely to be a wasp upon it, and, if so, it does not resent attention, but even enjoys being gently stroked on the back by the finger. By next day the food placed for the wasps was all removed, except a fragment of hard bread. Left to themselves, the jelly would have quickly developed fungal spores, and the bacon and butter would have produced their attendant microbes. These would have added to the already impregnated air, and pointed, in a small way, to the fact that the wasp is busy over wide areas under the summer sun curtailing the environment suitable for the production of the denizens of the "unseen kingdom," and thus contributing its quota to maintain the balance of nature.

For two weeks in August last I sat at work near a wood by the banks of the Ayr, and it chanced that there was a wasp's nest quite near. During fine days it was a pretty sight to see the busy community like a furnace all aglow, and sending its sparks hither and thither. I visited the same spot at the end of September, and found a great difference. The cold finger of nature had begun to make itself felt, and to indicate that it would by-and-bye put an end to all except those destined to be the mothers of next spring. But even at this time there was life in the camp. On the bare ground in front, a wasp which I watched kept carefully walking round till it saw a long-winged insect, at which it suddenly made a dart. From the oak tree overhead there had been blown a twig with the leaves still fresh. A wasp got on a leaf, walked over both surfaces and down the stalk to the twig-stem, then up the next leaf-stalk, and so on till it had examined the whole, stopping to suck and sip as it went. On one leaf-stalk I noticed what appeared a little speck of putrid matter, and this the wasp removed as thoroughly as if it had been scraped away by a knife. A wasp can masticate loose material, but has no power to pierce an unbroken surface, or at least it does not appear to do so till an opening, however small, is found.

It is an interesting fact that, away from human dwellings, wasps act differently towards people from those we meet near houses or by roadsides. In the wood the lunch-bag was no attraction. The wasps there had not learned to look for such

things. I sat quite near the nest, but found no attempt by the wasps to get on familiar terms with me. A like experience awaited me when sitting in a field on Smith's Farm at Crossford. Here I was approached by only one wasp, which clung for an instant to the limb of my easel. But at each of the patches of long grass left uncropped by the cows there were many wasps, attracted by the smell of cow-dung, and the food they found there. Round about the rank grass, too, where wild flowers were growing, plenty of wasps were to be seen from time to time sallying out from the shadow to visit the honey-glands, and sip their sweets. But in all such places wasps are shy, as if they wanted none of our company, or had not learned that some good is at times to be had from us.

Although bees, butterflies, and moths have come in for far more attention than wasps, great observers do not leave us without testimony in favour of the wasp as an agent in plant-fertilization. Mr. Darwin was of opinion that *Epipactis latifolia*, Sw., was so dependent on wasps that the disappearance of the insect would cause the extinction of this orchid; and he quotes the authority of Mr. Oxenden as to the attendance of wasps upon *E. purpurata*, Sm. Dr. Müller says that a considerable number of flowers depend entirely on wasps for pollination, and that such are seldom pretty and never sweet-scented, but attract the wasps by meat-like odours. Sir John Lubbock mentions that *Scrophularia nodosa*, L., is much frequented and fertilized by wasps. Mr. Grant Allen states that wasps are principally drawn to flowers by heavy and fetid odours. From all evidence, it is clear that the wasp is largely guided by smell, and that its choice is none of the sweetest. But perhaps its love for what we call bad smells determines its best sphere of usefulness. Not only the flowers, but often the habitats, supply this attraction. The wet rubbish heap, the emptying drain, the oozing cesspool, are evils that cry aloud for redress, and their cries are all the louder till vegetation comes to clothe them. On sewage-laden river banks the herbage covers much that is unsightly, and lessens the effects of the hurtful odours. If it is better to have such places clothed with a mantle of green, and if we know that the wasp is a willing worker among the flowers that graciously cover places so uninviting, we cannot well fix a limit to the work it is doing, both openly and out of sight.

Reports on Excursions.

CASTLE WEMYSS, 5th May, 1894.—By invitation of Sir John Burns, Bart., a life member, the Society visited the policies of Castle Wemyss. On arrival, the party, numbering 32, was received by Sir John, and proceeded on a round of inspection, under the guidance of Mr. Henderson, head gardener. Much interest was excited by a splendid example of one of the New Zealand Tree-ferns, *Cyathea dealbata*, Swartz, brought to this country twenty years ago. It had grown so rapidly and luxuriantly that soon a house had to be built for its reception. It is now one of the finest in the country, and continues healthy and vigorous.

In the grounds were numerous hybrid Rhododendrons in bloom, and some fine bushes of *Berberis Darwinii*, Hook., entirely covered with blossom. This latter shrub might, with advantage, be cultivated more frequently, as its orange-coloured flowers make a fine appearance at this season.

Before leaving, Sir John Burns entertained the party to tea, after which Professor King, in a few words, thanked the host for inviting the Society, and for his kind reception. Sir John expressed the pleasure it had given him to meet with the members, and only regretted that the weather had interfered somewhat with the afternoon's enjoyment.

ROSS HALL, CROOKSTON, 15th May, 1894.—This evening several members of the Society visited Ross Hall, permission having been kindly granted by Mr. James Cowan, the proprietor. The chief attraction here was the fine rock-garden, devised so as to imitate a little rocky glen. Many alpine plants have quite established themselves, and seem at home on the ledges and in the crevices of the rocks. It would make too long a list to name all the plants observed, but a few in bloom may be mentioned.

Saxifrages were numerous and luxuriant, and the following were in flower:—*Saxifraga cordifolia*, L., *S. crassifolia*, L., *S. hypnoides*, L., *S. Wallacei*, M'Nab, *S. Geum*, L., and *S. granulata*, L., *flore-pleno*. *Aubretia purpurea*, DC., *Alyssum saxatile*, L., *compactum*, and several alpine species of *Phlox*, planted in crevices, and hanging over the rocks, formed masses of rich colouring against the darker background. *Gentiana acaulis*, L., one of the most beautiful of alpinas, arrested the attention, as it always does, with its brilliant deep-blue tubular flowers, relieved against the carpet of shining leathery leaves. *Lithospermum prostratum*, Buckl., was another striking alpine, with flowers measuring half-an-inch across, and of a colour similar to the gentian. *Arabis alpina*, L., one of the earliest spring flowers, was still in bloom. Of the well-known native, *Trollius europæus*, L., many luxuriant examples were in blossom. *Meum athamanticum*, Jacq., found a place in the collection, cultivated on account of its graceful leaves. *Triteleia uniflora*, Van Houtte (the spring Star-flower), a native of Central and South America, with its solitary bluish-white flowers, was extensively grown. Its bulb is egg-shaped, and exhales an odour of garlic when bruised. Another North American plant was *Trillium grandiflorum*, Salisb. (the white Wood-lily), belonging to the *Trilliaceæ*, and so allied to our *Herb-paris*, which it resembles in the arrangement of its leaves, while its flowers are white, with 3 sepals and 3 petals.

Amongst shrubs, Rhododendrons of the larger-growing species were conspicuous, many varieties being in flower. *Azalea pontica*, L., was also plentiful, its yellow blossoms exhaling their delicate perfume.

WEST KILBRIDE, 19th May, 1894.—On arrival at West Kilbride, the party entered the Kirktonhall grounds, to which access had been kindly granted by Mr. T. Alston Robertson, son of the ex-president of the Society. Near the house were observed specimens of Tulip-tree (*Liriodendron tulipifera*, Willd.), just coming into leaf, and *Garrya elliptica*, R.Br., with last year's catkins still pendent from the branches. The policies extend along the side of the Kilbride Burn almost to Seamill, a distance of about a mile, and although the walk through the wooded glen

was much appreciated, no flowering plants worthy of record were observed. Among the mosses gathered were *Fissidens incurvus*, Schw., and *Barbula aloides*, Koch, on clayey banks; *Tetradontium Brownianum*, Dicks., and *Eurhynchium Teesdalii*, Sm., on moist sandstone rocks; and *Hypnum resupinatum*, Wilson, on trunks of trees. Fungi were numerous, and among the species observed were *Panus stipticus*, Fr., on an oak stump; *Nematelia virescens*, Cda., on dead branches of whin; *Lycogala epidendrum*, Bux., on a decayed stump; *Æcidium albescens*, Grev., on leaves of moschatel; *Puccinia glomerata*, Grev., on leaves of ragwort; *Stigmatea robertiani*, Fr., on leaves of herb-Robert; *Diaporthe inæqualis*, Curr., on dead branches of whin; and *Ovularia primulana*, Thüm., on leaves of primrose.

Leaving the glen, the party turned into the upper road to Chapelton. Near the mill-dam a fine specimen of *Hypericum Androschemum*, L., was gathered, which bore on its leaves bright yellow clusters of the uredospores of *Melampsora hypericorum* (DC.) Wint.; while dock-leaves by the road-side were spotted with groups of perithecia of *Sphaerella rumicis* (Desm.) Cke. In a ditch adjoining the roadside was found abundance of *Sium erectum*, Huds., which is not known to occur elsewhere in the district. On the sandy turf between the road and the sea-shore, millions of flowers of *Ranunculus bulbosus*, L., raised their golden heads. Lichens were abundant on the walls, the most notable species being the yellow *Physcia parietina* (L.) D.N., and pale grey *Parmelia scortea*, Ach.; but among others observed were *Lecanora parella* (L.) Ach., *L. atra* (Huds.) Ach., and *Lecidea aromatica*, Sm.—the last-named being remarkable for the fragrant odour which it emits when rubbed while in a moist condition.

Leaving the road-side, a visit was made to a grassy slope on the Glenhead Braes, where *Ophioglossum vulgatum*, L., was found in abundance; while the adjoining woods yielded several interesting plants, such as *Carex pendula*, Huds., with its graceful tassels of flowers; æcidiospores of *Puccinia primulæ* (DC.) Wint., on leaves of primrose; and *Hymenoscypha cyathoidea* (Bull.) Phil., and *Mollisia sphaerioides* (Desm.) Gill., on dead stems of red campion.

The party now returned to the shore, where fine specimens of *Botrychium Lunaria*, Sw., were gathered on the turf. Decaying fronds of sea-weed, stranded by the storms of early spring, yielded

Calloria marina, Phil., *Phoma laminariae*, C. & M., and *Heterosporium algarum*, C. & M., three microfungi originally described from specimens gathered in the West Kilbride district. The black weevil *Otiorhynchus atro-apterus*, De G., was observed on sand among the roots of mat-grass, and several specimens of the carnivorous *Brosicus cephalotes*, L., were found in their burrows under stones. *Lophodermium arundinaceum* (Schrad.) Chev., and *Diplodina ammophila*, Trail, two microfungi, were found on dead leaves of mat-grass; while the mosses *Tortula ruralis*, Hedw., var. *arenicola*, Braith., and *Brachythecium albicans*, Neck., grew abundantly on the dry sand.

At Chapelton Point some time was spent in examining the various forms of animal life which are there represented. The promontory is protected on either side by a trap-dyke, which forms a natural wall resisting the inroads of the tide; and part of the enclosed space consists of salt-marsh, with shallow turfy pools. In some of these were obtained living specimens of the large bivalve *Mya arenaria*, L., and the curious amphipod *Corophium longicorne*, Latr., remarkable for the great length of its antennæ; while other pools yielded *Ruppia rostellata*, Koch, not yet in flower. The moss *Pottia Heimii*, B. & S., with young capsules, the lichen *Physcia aquila* (Ach.) Nyl., and luxuriant fronds of the sea-weed *Fucus ceranoides*, L., were also noticed.

During the afternoon 80 plants were observed in flower, a considerable proportion of these being species found in sandy situations, and which bloom in early summer.

ROSENEATH, 2nd June, 1894.—The fifth afternoon excursion of the season was to the Roseneath Castle policies. The company included three members of the Greenock Natural History Society. Mr. Gillespie, head-keeper, was in waiting at the entrance-gate to conduct the party over the grounds.

The well-known Silver Firs were first visited, and measurements taken. Proceeding in the direction of the Castle, *Ornithogalum umbellatum*, L., was noted in abundance in flower, and, nearer the avenue, *Lastræa dilatata*, Presl., grew plentifully. By the side of the avenue leading to the Castle were many fine trees—one,

a Tulip-tree, girthing 6 ft. 6 in. at 4 ft.; and another, a Beech, measuring 14 ft. 10 in. at 5 ft. *Petasites albus*, Gærtn., *Ranunculus bulbosus*, L., *Cardamine amara*, L., were observed as the party proceeded up the approach. In the shrubbery near the Castle was a large *Arbutus Unedo*, L., which, as stated by the gardener, bears its crop of scarlet fruit year after year.

Some of the party desired to see the famous Heronry on the estate, and, under the guidance of Mr. Gillespie, a hurried visit was paid to it, the rest of the party returning in the direction of the pier, in order to see the remarkable avenue of Yews near the Clachan of Roseneath.

The Heronry is in the "Green-Isle" wood, and it was estimated by the keeper that there were over seventy nests this season. The trees selected by the birds were, in every case, Scotch Firs. Many herons were seen, and Mr. Gillespie remarked that it was no uncommon thing for a hundred or more to be observed feeding on the beach at low tide in the evening. The young birds—few only of which were fledged—kept up a loud chattering as the parents flew backwards and forwards.

DOUGALSTON LOCH, 5th June, 1894.—This was an evening excursion, and there was little to call for notice excepting that the fresh-water Alga, *Aphanothece stagnina* (Spr.), was met with.

TULLICHEWAN CASTLE, 16th June, 1894.—Permission to visit Tullichewan was courteously granted by Mr. James Campbell, who sent his gardener and forester to Balloch Station to meet the party, which numbered twenty.

A visit was first made to Woodbank, where, in the park in front of the house, there are three handsome Elms—one particularly fine, of which a photograph was taken. A double Scarlet Thorn also attracted attention by its brilliant blossom. Proceeding towards Tullichewan, interest was taken in the fine Conifers and shrubs, arranged here with taste. Among the trees *Picea Pinsapo*, Loudon (the Pinsapo Fir), and *Abies Mertensiana*, Lindley (the Californian Hemlock Spruce), were worthy of note, while the Rhododendrons and Guelder-roses, in abundant bloom, were

unusually fine. On entering the park Mr. Campbell met the party, and accompanied them in their walk through the policies and gardens. The park is of considerable extent, and very picturesque. It is overlooked by the Castle, and contains numerous fine trees, chiefly Oaks, Beeches, and Elms. Several of the largest were measured, viz. :—

- (1) Beech : girth, 13 ft. 4½ in. at 5 ft. on south side, or 9½ ft. on north (the ground not being level).
- (2) Elm : girth, 19 ft. 1 in. at 2 ft. 5 in.
- (3) Hornbeam : girth, 8 ft. 1½ in. at 5 ft. 3 in. on south-east side.
- (4) Ash : girth, 10 ft. 10½ in. at 5 ft. 2 in. on north side.

The policies of Broomley (also the property of Mr. Campbell) were likewise visited.

Mr. Campbell takes great interest in his trees, and pointed out many of the best. Among them was *Abies Douglasii*, Lindley, a species which thrives well until it rises above the shelter of the trees surrounding it, when its top becomes injured by frost and high winds. The *Wellingtonia gigantea*, Lindley, of which two fine trees, planted thirty years ago, were seen near the Castle, is a species which has adapted itself to our climate, and large examples are now to be seen in many places.

While refreshments were being supplied to the party at the Castle, Mr. Campbell expressed the pleasure he had had in receiving the Society, and Professor King, on behalf of the members present, thanked him, and, at same time, asked permission for members to visit the policies later in the season for Fungi, which Mr. Campbell readily granted.

As there was still a part of the grounds to be gone over, a start was again made. Several specimens of *Picea Webbiana*, Loudon, were noted. This, a native of the Himalayas, is one of the most beautiful of Silver Firs. As it starts into growth in early spring, it is frequently injured by frost, and the Tullichewan specimens formed no exception. *Picea Nordmanniana*, Loudon, and *Pinus Coulterii*, Don, were also observed. A fine Spanish Chestnut was measured, and found to be 12 ft. 4 in. at 5 ft. 6 in., and 14 ft. 11 in. at 2 ft. 9 in. on south-east side ; and an Italian Poplar, near the lodge, girthed 12 ft. 2½ in. at 5 ft. 3 in. on west side.

Among the wild plants observed were—*Galium Mollugo*, L., *Veronica montana*, L., *Listera ovata*, L., and *Luzula albida*, DC. Leaving Tullichewan, the road was taken to the banks of the Leven, where the following plants were noted:—*Ranunculus peltatus*, Fries., *Utricularia vulgaris*, L. (which it was hoped might have been in flower), *Alisma ranunculoides*, L., *Eleocharis acicularis*, Sm., and *Carex vesicaria*, L.

GARNEKIRK, 26th June, 1894.—See page 282.

MONKTON, 7th July, 1894.—See page 283.

BOTANIC GARDENS, 3rd August, 1894.—See page 283.

BALFRON, 11th August, 1894.—See page 284.

AUCHENHARVIE and MONTGREENAN, 25th August, 1894.—At this excursion, which was taken jointly with the Geological Society of Glasgow, the interest was mainly geological. In the Montgreenan policies the following plants were observed:—*Vicia sylvatica*, L., *Lythrum Salicaria*, L., *Campanula latifolia*, L., *Listera ovata*, R.Br., *Epipactis latifolia*, auct., *Carex pendula*, Huds., *Cortinarius bolaris*, Pers.

ARDEER SANDHILLS, 8th September, 1894.—The ground visited lay in the vicinity of the Explosives' Works. A number of interesting plants were gathered, and among them the following, viz.:—

Phanerogamia—

Radiola linoides, Gmel.; *Peplis Portula*, L.; *Filago germanica*, L.; *F. minima*, Fr.; *Pyrola minor*, Sw., var.; *Erythraea Centaurium*, Pers.; *Gentiana campestris*, L.; *Polygonum amphibium*, L.

Filices—

Botrychium Lunaria, Sw. ; *Lycopodium inundatum*, L.

Musci—

Aulacomnium palustre, Schw. ; *Bryum annotinum*, Hed., fruit ;
Climacium dendroides, W. & M. ; *Brachythecium albicans*,
Dill.

Fungi—

Owing to previous dry weather, the larger forms were scarce, and only three species — *Cortinarius collinitus*, Fr., *Paxillus involutus* (Batsch) Fr., *Lactarius vellereus*, Fr., call for mention. The latter, a var. with salmon-coloured gills, and white milk, which becomes yellow, was verified by Dr. Keith, who says—"I can suggest no other species to which your specimen could be assigned."

Microfungi—

Peronospora densa, Rabh.—On *Euphrasia officinalis* and *Bartsia Odontites*.

Tilletia decipiens (Pers.) Winter.—On *Agrostis vulgaris*.

Uromyces trifolii (A. & S.) Winter.—Teleutospores on *Trifolium repens*.

Puccinia galii (Pers.) Winter.—Teleutospores on *Galium verum*.

P. violæ (Schum.) Winter.—Teleutospores on *Viola sylvatica*.

P. suaveolens (Pers.) Winter.—Teleutospores on *Cnicus arvensis*.

P. hieracii (Schum.) Mart.—Teleutospores on *Hypochaeris radicata*.

P. oblongata (Link) Winter.—Uredospores (*Trichobasis oblongata*, Berk.) on *Luzula campestris*.

Coleosporium euphrasie (Schum.) Winter.—Uredospores (*Uredo rhinanthacearum*, DC.) on *Euphrasia officinalis*.

Mollisia (*Pyrenopeziza*) *arenevaga* (Desm.) Phil.—On *Ammophila arundinacea*.

Claviceps purpurea (Fr.) Tul.—Sclerotium (*S. clavus*, DC.) on seeds of *Ammophila arundinacea*.

STRATHLEVEN, 30th March, 1895.—This estate is in the parishes of Dumbarton and Bonhill, in the vale of Leven, the mansion-house being about two miles from the town of Dumbarton. It

belonged to James Ewing, Esq. (1774-1853), once a well-known merchant in Glasgow, who, on acquiring it, changed the name from Levenside to Strathleven. His widow is life-rented in the estate. At one time he had a house in Glasgow, at the head of what is now Queen Street, where the N.B. Railway Station is. It was surrounded by tall trees, in which were a number of rooks', or, as they are locally called, "crows'" nests. This fact was brought to our notice by the sight of a number of rooks' nests in some fine beech trees to the front of Strathleven House. At this early season, and after a winter so severe, there is not much of biological interest to be seen except the trees, but with fine examples of these Strathleven is well supplied. On the bank of the river is an old Oak in a decaying condition, with many small lateral branches springing from the lower part of the trunk. These and the rough and uneven nature of the trunk render it difficult to measure the girth with exactness. The tape cannot be passed round on a straight line. The narrowest part of the trunk seems to be at a height averaging about $2\frac{1}{2}$ ft. from the ground, but as the tree grows at the top of a slope the tape at one point is only a foot from the ground, while at another it is about 4 ft. The girth reaches the respectable figure of 23 ft. and half-an-inch, and is exceeded only by the "Pease" tree at The Lee—23 ft. $7\frac{1}{2}$ in. in 1890. It is larger even than the "Capon" tree near Jedburgh, which two members of the Society measured in 1893, and found to be 22 ft. $6\frac{3}{4}$ in. at the narrowest part of the trunk. But the "Capon" tree, though slightly less in girth, is really a grander tree than this venerable monarch of the "Vale." On our former visit to Strathleven, in June, 1890, we found the girth to be 23 ft. 5 in. at an average height of $2\frac{1}{2}$ ft. There is thus an apparent decrease of $4\frac{1}{2}$ in., which is to be accounted for by the fact that near the ground, and for about a foot up, the trunk is decaying, and large pieces of the bark and outer wood have fallen off. In the *Transactions of the Highland and Agricultural Society* for 1865 this tree is recorded as girthing 23 ft., but at what height from the ground is not stated. The height of the tree is said to be 60 ft., spread of branches, 78 ft., and it is supposed to be above 200 years old—probably a very moderate estimate. In his lists of Old and Remarkable Trees of Scotland, published in the *Highland and Agricultural Society's*

Transactions in 1879 and succeeding years, Mr. R. Hutchison, of Carlowrie, does not mention any of the Strathleven trees, although there are several well worthy of notice. The next largest tree is an Oak in a field between the house and the highway. It girths 20 ft. $3\frac{1}{2}$ in. at the narrowest, being on a line varying from 2 to 4 ft. up. The bole is short, branching at 4 ft. 8 in. To the east of the house are two Oaks with grand boles, of about 20 ft. each, one girthing 13 ft. 10 in. at 5 ft., and 13 ft. $3\frac{3}{4}$ in. at 6 ft., this latter showing scarcely any increase in five years; the other girthing 13 ft. 9 in. at 5 ft. To the north-west is another Oak with a girth of 13 ft. 4 in. at 5 ft., an increase of one inch since 1890. In the field to the front of the house there is a long row of fine Beeches, already referred to, that nearest the house appearing to be the largest, girthing 14 ft. $10\frac{1}{2}$ in. at 6 ft., an increase of $\frac{1}{2}$ in. since 1890. Another, a tree or two further away, girths 14 ft. 2 in. at 6 ft. A grand Ash to the east of the house has a circumference of 14 ft. $5\frac{1}{2}$ in. at 5 ft. 8 in., with a diameter of spread of branches, 81 ft. 9 in., the first branch going off at 8 ft. A Lime girths 16 ft. $4\frac{1}{2}$ in. at the narrowest, an apparent increase of $2\frac{1}{2}$ in. since 1890. This, however, is not a solid trunk, but much fluted or corrugated. In a field to the north of the house is a Sycamore girthing 12 ft. 2 in. at 4 ft. 7 in. from the ground. Near the lodge on the side of a farm road is another good Sycamore, girthing 12 ft. 11 in. at 3 ft. up. On the side of the approach to the house is a fine Walnut with a girth of 11 ft. $4\frac{3}{4}$ in. at 3 ft., an increase of $1\frac{1}{4}$ in. since September, 1890. Near this tree is an Oak clasped by a huge Ivy with two stems, the larger measuring 2 ft. 5 in. at 3 ft. 10 in. from the ground—the narrowest part within reach—it being thicker both below and above this point. The only other tree measured was a Gean, 7 ft. $0\frac{1}{2}$ in. at 6 ft. 6 in., and 7 ft. 11 in. at 3 ft., showing an apparent increase at the latter point of 2 in. since September, 1890.

COCHNO, 27th April, 1895.—The second excursion this year was to Cochno, in the parish of Old Kilpatrick. Train was taken to Kilbowie, the old name of which was Cultbuie—yellow woods. Proceeding thence past the Faifley, the oldest part of Duntocher,

the party visited the remains of what was at one time an extensive smithy driven by water-power. Here, it is said, the first iron sternpost was made and sent to Greenock. The fireclay used was obtained from a 6-foot seam, 150 yards further up the burn. On the banks of this stream were found the two species of *Chryso splenium*. The little valley through which the burn flows was ascended to the more open moorland. Here the cup and ring markings, whose existence was made known some years ago, were visited. They are less distinct than four years ago, and even those recently laid bare show signs of weathering, while all are suffering from the trampling of visitors over the bared sandstone out of which they have been carved. Leaving these mysterious markings, the party entered the policies of Cochno. This estate belongs to Claud Hamilton, Esq., and is tenanted by William Donaldson, Esq., Iron Merchant, Glasgow, who has twice kindly given the Society permission to visit it. The former visit was made on 6th September, 1890. The Hamiltons of Cochno are allied to the ducal family. About the middle of the 16th century, Andrew Hamilton of Cochno was Provost of Glasgow. Seven centuries ago the second Earl of Lennox confirmed a "gift to the Church of Kilpatrick of the lands of Cochnach, Edinbarnet, and Cultbuie."

In the policies a number of the larger trees were measured. To the east of the house is a fine Beech with a girth of 12 ft. $2\frac{1}{2}$ in. at the narrowest part of the stem, $3\frac{1}{2}$ ft. from the ground, showing an increase of 3 in. since our former visit. The special feature of this tree is the great size of two branches which go off on opposite sides at 5 ft. 6 in. from the ground, and extend far out. The western branch girths 6 ft. $1\frac{1}{2}$ in. at 2 ft. from the main trunk, and the eastern 5 ft. 6 in. at 1 ft., while the diameter of the spread is $99\frac{1}{2}$ ft. In Mr. R. Hutchison's list in the *Highland and Agricultural Society's Transactions*, 1881, of Old and Remarkable Beeches in Scotland, he notes somewhere about 224 trees, and of those of which the spread is given only 13 exceed this. Another Beech, in a little plantation to the north of the house, has a circumference of 12 ft. 9 in. at 3 ft., an increase of 5 in. since our last measurement. The first branch goes off at 5 ft. A Yew, a female tree, with a bole of 9 ft., girths 7 ft. 1 in. at 4 ft. 6 in., an increase of $1\frac{1}{2}$ in. An Oak has a circumference of 10 ft. 2 in. at $2\frac{1}{2}$ ft. up, an increase of 1 in. The bole is 9 ft. in

length. A Scotch Fir, with a girth of 7 ft. 5 in. at 5 ft., has a fine clean bole of 40 to 45 ft. A Gean tree has a circumference of 7 ft. 6½ in. at 3 ft. 6 in., an apparent increase of 1½ in., but, as the stem is much twisted, it is difficult to make a satisfactory comparison with former measurement. In the little plantation already mentioned is a remarkable example of two trees, an Ash and a Sycamore, united at the base. Were they of the same species, it might be argued that it was one tree dividing into two about a couple of feet from the ground. On one side the line of division can be traced down for a foot or so, but on the other it is distinguishable for a few inches only.

Many of the Sycamores are being slowly killed by insects. Other trees are also attacked, but none so much as this species, nor do the trees in other parts of the district seem so badly affected as those on this estate. The flower-shoots of a Horse-chestnut tree were lying plentifully on the ground, and, on examination, it was seen that the peduncle had been eaten through at the base by an insect. None of the trees were in bloom. The following mosses were observed:—*Barbula levipila*, Brid., *Zygodon viridissimus*, Dicks, *Hypnum elodes*, Spruce.

Proceedings of the Society.

SUMMER SESSION, 1894.

22ND MAY, 1894.

Professor Thomas King, President, in the chair.

The Hon. Secretary, Mr. John Cairns, Jun., submitted reports on recent excursions to Castle Wemyss on 5th May, and to Ross Hall on 15th idem. (See page 268.)

The Chairman exhibited *Amelanchier vulgaris*, Lindl., an alpine plant received by him from Switzerland. He did not look on the species as a native of Switzerland, as it is not mentioned in Bennett's Flora, while Loudon says it is a native of Southern Europe. It was introduced into England in 1596.

Mr. R. D. Wilkie showed, under the microscope, *Botrydium granulatum*, L., a fresh-water Alga from Polmadie.

Mr. William Stewart showed *Corticium incarnatum*, Fr., and *Hydnum ochraceum*, Pers., two Fungi from West Kilbride.

Mr. D. A. Boyd sent for exhibition *Vicia lathyroides*, L., *Viola canina*, L., *Cerastium tetrandrum*, Curt., *Sium erectum*, Huds., *Carex pendula*, Huds., *Agaricus (Entoloma) clypeatus*, L., *A. (Pholiota) durus*, Bolt., *A. (P.) mutabilis*, Schæff., gathered at an excursion of the Society, on 19th inst., to West Kilbride.

Mr. D. Pearson exhibited, on behalf of Mr. C. P. R. Ritchie, London, a former member of the Society, *Alcyonella fungosa* (Pallas), a fresh-water Polyzoon, from the Brent reservoir. Owing to the drought of last summer, the shores of the basin had been laid bare, exposing these Polyzoa, and killing them. They were attached to stones and wooden posts in the water, coating them with their repulsive-looking substance. It is not yet known how the eggs or statoblasts, from which the creature is propagated, are distributed, or whether they escape from the parent mass before it breaks up.

Rev. G. A. Frank Knight, M.A., read a paper entitled "Anchor Work in the Laminarian Zone." After mentioning the

four zones into which the ocean bed has been divided, he described a method he had found of service in carrying on conchological work when the sea is too rough to permit of dredging. The plan was to row out some yards and cast anchor—the anchor most suitable being a five-hooked grapnel. He then paid out sufficient rope to let the anchor scratch along the bottom as the boat drifted with the wind, sometimes rowing backwards, anchor down, to obtain a good grip; then up anchor, with the mass of tangle attached, which was carefully lifted into the boat. This operation was repeated till the boat was laden. The cargo, having been carried ashore, often yielded good results. Mr. Knight exhibited a number of specimens of what had been obtained in the manner described, including—

Terebratula caput-serpentis (L.)—Loch Fyne.

Anomia ephippium, L., var. *cylindrica*, Gm.—Loch Fyne, 27 fms.

Pecten pusio (L.)—Loch Leven.

„ *varius* (L.), var. *nivea*, Macg.—Oban Bay.

„ *septemradiatus*, Müll.—Firth of Clyde.

„ *tigrinus*, Müll.—Loch Fyne.

Circe minima (Mont.)—Loch Leven.

Saxicava rugosa (L.), var. *arctica* (L.)—Loch Fyne.

19TH JUNE, 1894.

Mr. D. A. Boyd, Vice-President, in the chair.

The Hon. Secretary, Mr. Cairns, submitted reports on excursions to West Kilbride (19th May), Roseneath (2nd June), Dougalston Loch (5th June), and Tullichewan Castle and the banks of the Leven (16th June). (See pp. 269-272.)

The Chairman showed branches of Black Currant having their buds swollen and rendered abortive by the grub of a Gall-mite, *Phytoptus ribis*, Nalepa, and he stated that in gardens in West Kilbride considerable injury had been caused by this pest. Mr. Boyd also showed the following Microfungi from West Kilbride, viz. :—

Cenangium (*Encelia*) *furfuraceum* (Pers.) De Not., on dead branches of *Alnus*.

Calonectria *Plowrightiana*, Sacc, on dead stems of *Arctium*.

Diaporthe pulla, Ntke., on dead twigs of *Hedera*.

„ *inequalis*, Curr., on dead branches of *Ulex*.

Stilbospora macrosperma, Pers., on dead bark of *Quercus*.

Steganosporium pyriforme (Hoffm.) Corda, on dead bark of *Acer*.

Spores of the five last mentioned were shown under the microscope by Professor King.

Mr. R. S. Wishart, M.A., showed the rare Holy-grass *Hierochloa borealis*, R. & S., from Thurso.

Mr. R. D. Wilkie exhibited *Galium Mollugo*, L., *Luzula albida*, DC., and *Carex vesicaria*, L., obtained at an excursion to Tullichewan, also *Paris quadrifolia*, L., from Braidwood.

Mr. T. B. Wilkie exhibited the Fungi, *Boletus luteus*, L., and *Lycogala epidendrum*, Fr., also from Braidwood.

Mr. C. Sherry showed a number of interesting exotics from the Botanic Gardens, including *Colletia ferox*, Gill and Hooker, a native of Peru; *Passiflora edulis*, Sims, in flower and fruit; *Fuchsia cylindracea*, Lindl., a small-flowered species; and the Guava, *Psidium cattleianum*, Weinw., in fruit.

Mr. Frank L. Grant, M.A., exhibited specimens of the following spiders:—

<i>Lycosa amentata</i> , Clk.,	- -	Dalry.
„ <i>annulata</i> , Thor.,	- -	Corrie.
„ <i>pullata</i> , Clk.,	- -	Dalry.
„ <i>riparia</i> , C. L. Koch,	-	Corrie.
„ <i>monticola</i> , C. L. Koch,		Corrie.
<i>Meta segmentata</i> , Clk.,	- -	Corrie.
<i>Tegenaria derhamii</i> , Scop.,	-	Corrie and Dalry.
<i>Bathyphantes concolor</i> , Wid.,		Dalry.

Until found by Mr. Grant, *Lycosa riparia* and *L. annulata* had not been recorded from Scotland. The *Lycosæ* are small species, fond of sunshine, and they occur in many situations.

On behalf of Mr. Alexander Sweet, Mr. John Renwick exhibited a Tulip, with fasciated scape, bearing two flowers.

7TH AUGUST, 1894.

Professor Thomas King, President, in the chair.

Mr. R. S. Wishart, M.A., reported on an excursion on 26th June to Garnkirk Glen and the policies and gardens at Garnkirk

House. Dogwood and Rhododendrons were abundant, planted as cover for game, as rabbits do not eat their bark.

Mr. R. M'Kay reported on an excursion to the links and shore between Monkton and Prestwick on 7th July, when *Calystegia Soldanella*, R.Br., and *Eryngium maritimum*, L., were met with.

Mr. C. Sherry reported on a visit to the Botanic Gardens on 3rd inst., and submitted an interesting list of growing plants observed on the occasion.

Mr. W. Craibe Angus read a short paper descriptive of the Buzzard, *Buteo vulgaris*, Leach, an example of which had recently been shot near Carradale.

Mr. John Smith sent for exhibition *Lactuca muralis*, L., growing on sandy road-side between Kilwinning and Irvine, a new record for Ayrshire. He also sent specimens of *Pyrola minor*, L., var. *arenaria*, L.B., from Ardeer sandhills, where he has known it to grow for over twenty years. Mr. Arthur Bennett, F.L.S., says of the plant—"I have no doubt it is the form that L. Benys called *arenaria*, from the East Frisian Islands." It has not been hitherto reported from Scotland.

Mr. Johnston Shearer showed *Mertensia maritima*, Don, from the west coast of Bute, and *Lamium maculatum*, L., from Seamill, Ayrshire.

Mr. Peter Ewing exhibited *Gentiana nivalis*, L., from Cam Creag; *Encalypta streptocarpa*, Hedw., from Killin; and *Leskea rufescens*, Hall., in fruit, from Glen Lochay.

Professor King showed a number of plants from Lochwinnoch Parish. Among these were—*Thlaspi arvense*, L., and *Nasturtium sylvestre*, R.Br., the latter not mentioned in Henedy's Flora, but now found in several quarters; *Lysimachia vulgaris*, L., *L. thyrsiflora*, L., and *L. Nummularia*, L. This last is scarcely native, but has established itself, and is growing luxuriantly. *Meum athamanticum*, Jacq., and *Sedum villosum*, L., were found on the way to Cock-my-lane. *Typha latifolia*, L., *Aconitum Napellus*, L., and *Cnicus heterophyllus*, Willd., and *Linaria Cymbalaria*, Mill, were observed within the policy of Castle Semple. *Trisetum flavescens*, Beauv., said by Henedy to be very rare, was found, apparently wild, near Barfod. The commonest Sedge in the Barr meadow, and on the edges of the loch, is *Carex aquatilis*, Wahl., var. *Watsoni*, Syme, known locally as

“black star.” Mr. D. A. Boyd sent for exhibition several species of Microfungi from Killin, viz., *Uromyces fabæ* (Pers.) Cooke, occurring on *Lathyrus macrorrhizus*, Wimm.; *Puccinia ægra*, Grove (as *Æcidium depauperans*, Vize), on *Viola lutea*, Huds., var. *amaena*, Syme; *Pyrenopeziza rubi* (Fr.) Rehm, on dead stems of *Rubus Idæus*, L.; and *Trochila lauro-cerasi* (Desm.) Fr., on dead leaves of *Prunus Lauro-cerasus*, Loisel.

Mr. E. M. Holmes, F.L.S., sent for exhibition four species of Lichens, viz.:—*Sphinctrina turbinata*, Pers., from Killin; *Lecidea cupularis* (Ehrh.) from Swanage, Dorset; *L. carneo-lutea* (Turn.) Nyl.; and *Ricasolia latevirens* (Lightf.) from Loch Awe.

Mr. James Steel exhibited *Argulus foliaceus* (L.), a parasite on diseased Grayling, from the upper reaches of the Clyde, sent by Mr. N. Wilson, Lanark. It is an entomostracan parasitic on fishes, chiefly in fresh water, though sometimes found also in brackish. It is possibly new to Scotland, but has been recorded from England, the Continent of Europe, and America. Investigations are being made to ascertain whether the Grayling infested by it are also diseased organically.

Mr. T. B. Wilkie exhibited a number of plants from a waste-heap at Crossmyloof, including—

Trigonella purpurascens, Lam.

Medicago denticulata, Willd., var. *apiculata* (Willd.).

Melilotus parviflora, Lam.

Bupleurum rotundifolium, L.

Anthemis Cotula, L.

Cnicus arvensis, Hoffm., var. *setosus* (Bess.).

Polypogon monspeliensis, Desf.

A paper by Mr. D. A. Boyd, entitled “Sea-side Jottings,” was read, in which were described a number of the shore forms of life inhabiting the belt between high and low water marks.

4TH SEPTEMBER, 1894.

Professor Thomas King, President, in the chair.

Mr. John Renwick reported on a joint-excursion with the Geological Society, on 11th August, to Balfron, which proved interesting geologically, but afforded little for the biologist.

Mr. John Smith reported on an excursion, on 25th ult., to

Auchenharvie and Montgreenan. This also had been jointly with the Geological Society, and, to the geologists who attended it, had been interesting.

Mr. R. S. Wishart, M.A., exhibited the Goat's-beard, *Tragopogon pratensis*, L., infested by the smut, *Ustilago receptaculorum*, Fr., from Holy Island, where, and along the coasts of Berwick and Northumberland, the plant is common. When attacked by the fungus the inflorescence remains diminutive, and the involucre eventually encloses nothing but dust (conidia). Patches of the plant on Holy Island had become a prey to the parasite.

Mr. C. Sherry sent for exhibition three kinds of tropical fruits, accompanied by notes, viz. :—

- (1) The Avocado or Alligator Pear, fruit of *Persea gratissima*, Gærtn., a tall South American and West Indian tree. The pear contains a large quantity of firm pulp, which has a buttery or marrow-like flavour, and is much esteemed.
- (2) The Mango, fruit of *Mangifera indica*, Blume, a tree abundant in India, where many varieties are cultivated, as also in Brazil, the West Indies, and Mauritius. It is a drupe, containing a large flattened oval "stone," and is esteemed the most delicious of Indian fruits. There are, however, numerous kinds, differing, not only in flavour, but in shape. Most have more or less of a turpentine flavour, the best having least of this, while inferior sorts are little better in texture and taste than "a mixture of tow and turpentine." The wood, soft and porous, and of a grey colour when young, eventually becomes brownish and harder, and is used with sandal-wood by the Hindoos in burning their dead.
- (3) The Yam. Under this name the large fleshy tuberous roots of several species of the same genus are used for food in various tropical and sub-tropical countries, where they are cultivated, and take the place of the potato with us. *Dioscorea sativa*, L., the species shown, is a native of the western coast of India, but is now introduced into the West Indies. The Yam contains much starch, and a meal used for making cakes, puddings, &c., is made from it in the West Indies, where it is also sliced and sun-dried.

Professor King showed a large series of fresh wild plants from Gullane, near North Berwick, various of them rare or wanting in Clydesdale. He also exhibited a number of plants collected in the Channel Islands by Mr. Robert King, among which were:—*Polycarpon tetraphyllum*, L., *Lotus angustissimus*, L., *Antirrhinum Orontium*, L., *Scilla autumnalis*, L., and *Lagurus ovatus*, L.

Mr. T. B. Wilkie exhibited a second series of plants from the waste-heap at Crossmyloof, viz. :—

- Phalaris paradoxa*, L.
Eragrostis poacoides, PB.
Apera Spica-venti, Beauv.
Cynosurus echinatus, L.
Poa compressa, L.
Bromus tectorum, L.
 „ *maximus*, Desf.
 „ *macrostachys*, Desf.
Hordeum jubatum, H.K.

He also showed the following thalloid *Hepaticæ*, from Aikenhead; *Fossombronia pusilla*, L. Dum., *Anthocerus levis*, L., *Blasia pusilla*, L., and *Riccia glauca*, L.

Mr. Johnston Shearer exhibited, from Lecropt Moss, Stirlingshire, *Ledum palustre*, L., an ericaceous plant he had previously brought before the Society. He had revisited the station for it, and had observed that it was now much less plentiful, occasioning the fear that the species may ere long become extinct at the station.

A continuation of the paper by Mr. D. A. Boyd at last meeting, entitled “Additional Notes on the Maritime Fauna and Flora of the Littoral Zone,” was read, in which the author referred more particularly to the plants of the zone in question.

A paper by Messrs. Richard M'Kay and John Renwick, entitled “Records of Measurements of Trees made in 1893 and 1894,” was read. (See page 246.)

WINTER SESSION, 1894-95.

25TH SEPTEMBER, 1894.

Professor Thomas King, President, in the chair.

Mr. R. D. Wilkie reported on a recent excursion made to the Ardeer Sandhills (see page 274), and the Chairman on one to Mains, Milngavie.

Mr. A. Somerville, B.Sc., F.L.S., exhibited fronds of *Cystopteris montana*, Bernhardtii, the Mountain Bladder Fern, gathered by him in August (1894) near the summit of Ben Lomond. This has hitherto been an unrecorded species for Stirlingshire, and its present discovery makes that county the sixth in Britain claiming to possess it. (See page 215.)

Mr. Somerville also showed *Erebia blandina*, Fab., the Scotch Argus Butterfly, from Glen Iorsa, Island of Arran, where he had met with it last month in abundance.

Mr. Joseph Sommerville exhibited specimens of the wood of *Pinus Lambertiana*, Douglas, and *Dimorphandra Mara*, Benth. and Hook., the former being a Californian tree, and the latter a native of New Zealand, and he referred to their respective peculiarities.

On behalf of Rev. Dr. Keith, Forres, Corresponding Member, there was shown a leaf-fungus, *Puccinia ribis*, DC., new to Britain, which he had met with in August in his own district.

Professor King laid on the table a series of plants gathered at the excursions of the Scottish Cryptogamic Society at Stranraer last week.

Mr. R. D. Wilkie exhibited, under the microscope, *Beggiatoa alba*, Trev., the sewage fungus of engineers, and referred to its action in decomposing sulphur compounds in the water in which it lives.

Mr. Peter Ewing submitted a large series of flowering plants collected during the past summer in Kent, among them being *Lycium barbarum*, L., *Marrubium vulgare*, L., and *Aristolochia Clematidis*, L.

Mr. James Whitton showed a specimen of *Rhus cotinus*, L., and pointed out its peculiarity of having always a number of its

flowers abortive, and also of its pedicels, after flowering, lengthening and becoming hairy, finally assuming a rich brown colour. Mr. Whitton also showed *Lilium candidum*, L., the flowering branches of which had developed leaves instead of flowers.

Professor King read a paper entitled "Notes on the Scottish Cryptogamic Society's Meetings at Stranraer."

THE FORTY-THIRD ANNUAL GENERAL MEETING.

30TH OCTOBER, 1894.

Professor Thomas King, President, in the chair.

REPORT OF THE COUNCIL.

Membership.—During the past year we have lost 7 Ordinary Members by death, 8 have resigned, while 4 have been struck off the roll through default. Of new Members, 11 have joined during the year. The Membership is now as follows:—

Honorary, - - - - -	14
Corresponding, - - - - -	42
Ordinary—Life, - - - - -	32
Annual, - - - - -	180
Suspended, - - - - -	18

Total Membership, - - - - - 286

Associates.—Of Associates, there are now 16 on the roll.

Obituary.—The obituary record for the year contains the names of Mr. Robert Turner, Mr. Robert M'Lellan, Dr. George Leslie, Mr. Alex. Stewart, Sir William M'Onie, and Mr. G. M. Cruikshank.

Winter Session, 1893-94.—Eight Monthly Meetings were, as usual, held during the Session, at which many interesting and valuable papers were read, and numerous exhibits, illustrative of a wide range of biological research, were brought forward.

Summer Session, 1894.—Four Meetings were held, at all of which the attendance was good, while much interesting material was exhibited.

Excursions.—Eleven Saturday-afternoon Excursions took place during spring and summer, three of these being jointly with the Geological Society of Glasgow, while five Tuesday-evening Excursions were made to places in the near neighbourhood of the city. The Summer Committee are again to be thanked for having arranged an attractive programme, and for their successful efforts in obtaining access to various estates visited.

In connection with the work of the Summer Session, the Council regret that they have to accept the resignation of Mr. John Cairns, Jun., as Joint Hon. Secretary. It is well known that the success of the Summer Meetings and Excursions has been largely due to Mr. Cairns's efforts, and to his tact in perfecting the arrangements. It is only because business now takes him so much from home that he is compelled to resign his office; the Summer Committee, however, are, fortunately, still to retain him as one of their number.

Library.—The Council believe that the Library has never been in a more efficient state than at present, and it is still progressing. The monthly circulars have shown what additions have from time to time been made to the Society's shelves. The arrangement by which books can be got out any day proves of great advantage, and increases the usefulness of the Library.

Proceedings and Transactions.—No publications have been issued during the past year, but a portion of the Transactions of the last two Sessions has been printed, while the MS. of the remaining portion is nearing completion. For years past the Society has been placed at a disadvantage through inability to publish the Transactions of any Session until, at soonest, well on in the following year. On the present occasion the Publishing Committee has arranged that the forthcoming Part shall include the Proceedings and Transactions of the last two Sessions. This will pave the way to the material relating to the present and future Sessions being dealt with more promptly after each meeting, and will help, if possible, to its earlier publication than hitherto found practicable. The Committee has entered into a new contract for printing, which will enable both improvements and economies to be effected.

British Association.—The Society continues to be enrolled on the Corresponding List of the British Association; no Delegate,

however, was appointed to attend the meetings of this year on behalf of the Society.

The Hon. Treasurer (Mr. John Renwick) submitted an audited Statement of Accounts for the year ended 31st August, 1894, which showed a balance of £68 19s. 4½d., exclusive of—(1) £100, Life Members' Fund, invested on Debenture; (2) £26, Life Members' Fund, invested in National Security Savings Bank; and (3) value of books and other property insured for £300. Out of the above balance (£68 19s. 4½d.), there will fall to be paid the cost of the Transactions of the last two Sessions (1892-93, 1893-94) when these have been published.

The Hon. Librarian (Mr. James Mitchell) reported on the state of the Library and the circulation of books.

The Reports were all unanimously approved and adopted.

The Society then proceeded to fill up the vacant offices in the Council, when Mr. D. A. Boyd was elected a Vice-President; Messrs. John Cairns, Jun., Peter Ewing, J. Bruce Hunter, and Johnston Shearer, Members of Council. The Council being as follows:—President, Professor Thomas King; Vice-Presidents, Peter Ewing, Robert Kidston, F.R.S.E., F.G.S., D. A. Boyd; Secretary, R. S. Wishart, M.A.; Treasurer, John Renwick; Librarian, James Mitchell; Members of Council, Robert Dunlop, Alexander Hill, Duncan M'Kenzie, James Steel, W. A. Dobie, David Pearson, William Stewart, Robert D. Wilkie, John Cairns, Jun., J. Bruce Hunter, Richard M'Kay, and Johnston Shearer.

Messrs. Thomas G. Bishop and F. N. Sloane, C.A., were appointed Auditors for the ensuing year.

Dr. Robert Brown, Belhaven House, 1 Leslie Road, Pollokshields, was elected an Ordinary Member; and the following ladies were admitted as Associates:—Misses Alberta, Elma, and Wanda Zamorska, 32 Rupert Street, and Miss Annie Arthur, 7 Finlayson Place, Kelvinside.

Mr. James Campbell, C.M., exhibited the fruit of the cocoa plant, *Theobroma Cacao*, L., and the nutmeg, *Myristica moschata*, Thunb., the latter showing the developed aril known as mace. Mr. Campbell also showed a series of shells of great beauty from the South Sea Islands.

Mr. Oswald Fergus, D.D.S., exhibited a collection of Lepidoptera from British Central Africa.

Mr. D. A. Boyd showed a number of Microfungi, including *Elaphomyces variegatus*, Vitt., with *Cordyceps ophioglossoides* (Ehrh.) Link., parasitic upon it. The parasite possesses some interest. It belongs to the genus now named *Cordyceps*, formerly known as *Torrubia*. Most of the species occur on insects, such as moth pupæ, ichneumons, and scale-bugs, but two on different species of *Elaphomyces*. There were also shown *Ustulina vulgaris*, Tul., *Craterium minutum*, Leers, and *Tapesia fusca* (Pers.) Fekl., all being from West Kilbride.

Professor King showed *Claviceps purpurea*, Tul., parasitic on *Ammophila arundinacea*, Hort., and he gave an account of their joint life-history. He also showed fresh specimens of *Scrophularia umbrosa*, Dum., and *Lagurus ovatus*, L., grown in a garden at Stepps.

Mr. C. Sherry exhibited *Woodsia ilvensis*, R.Br., and *W. hyperborea*, R.Br., from the neighbourhood of Perth, and *Ophioglossum lusitanicum*, L., from Guernsey.

Rev. G. A. Frank Knight, M.A., read a paper entitled "A Day with the Dredge on the West Coast of Arran," and illustrated it by numerous specimens, including, among the rarer species:—*Nucula sulcata*, Brown; *Axinus croulinensis*, Jeff.; *Cardium minimum*, Phil.; and *Rissoa proxima*, Ald. (See page 169.)

A paper by Mr. J. Ballantyne, Rothesay, was read on "The Discovery of *Cladium germanicum*, Schrad., in Bute," a new and interesting county record for that sedge. (See page 167). In connection with this paper, a communication from Mr. Arthur Bennett, F.L.S., was read, furnishing details of the known distribution of *Cladium* in Scotland.

27TH NOVEMBER, 1894.

Professor Thomas King, President, in the chair.

Mr. Robert Thomson, Aldersyde, Uddingston, and Mr. George S. Goold, 9 Hillside Gardens, Partickhill, were elected Ordinary Members. Miss Janet M'Carron, 41 Albert Drive, and Miss M. R. Niven, 3 Margaret Street, S.S., were admitted Associates.

Mr. A. Somerville, B.Sc., F.L.S., made a statement with regard to the Marine Station at Millport, Cumbrae, hitherto housed in the "Ark," the property of Dr. John Murray, of the "Challenger,"

and he conveyed to the Society the invitation of Mr. David Robertson, F.L.S., F.G.S., to members to visit the Station, and avail, free of charge, of the facilities there afforded for the study of Marine Invertebrates, Algæ, &c. The President moved a vote of thanks to Mr. Robertson for his kind proposal.

Mr. Somerville exhibited *Coronula diadema*, L., a Barnacle infesting whales in northern seas, and he read a short paper on the *Cirripedia*, to which Crustacean group *Coronula* belongs. He also showed *Gnaphalium undulatum*, L., a Cudweed, from Jersey, where it is now establishing itself, though originally a Cape plant. Specimens of all the British Cudweeds were shown with it for comparison.

Mr. Robert Grierson exhibited the arm of a mummied child from Egypt, and the gigantic pod of *Entada scandens*, L., a leguminous plant of Assam.

Mr. James N. Thomson laid on the table a series of natural objects from the West Indies, and offered remarks thereon.

Mr. George Russell showed, from the Redlands Conservatories, flowering shoots of *Cissus discolor*, L., a plant which rarely flowers in this country; also two remarkable ferns, *Acrostichum peltatum*, L., and *Drymoglossum piloselloides* (Presl.), both bearing fertile fronds.

Mr. L. Watt showed a collection of plants from various districts in Scotland. These included *Campanula rotundifolia*, L., var. *lancifolia*, Koch, and *Saxifraga sponhemica*, Gmel., from the Kilpatrick Hills; *Euphrasia officinalis*, L., var. *gracilis* (Fr.), *Eriophorum angustifolium*, Roth, var. *minus*, Koch, and *Lycopodium alpinum*, L., var. *decipiens*, Syme, from Koch Hill, Banffshire; *Utricularia neglecta*, Lehm, *U. intermedia*, Hayne, and *Isoetes lacustris*, L., from Loch Sloy.

A report, prepared by Professor King and Mr. D. A. Boyd, on the Fungi observed at the Society's excursion to Mains, was read by the President.

26TH DECEMBER, 1894.

Professor Thomas King, President, in the chair.

At the opening of the meeting the President made special reference to the loss the Society had sustained through the recent death of two of its members, Messrs. Donald Farquhar and John

Stewart. Mr. Farquhar had been a member since 1882, and was well known to many by his welcome presence both at meetings and excursions. He knew the Phanerogamic and Moss Flora, and took a lively interest in the researches made by the Society. Of late years he had not been equal to bearing the fatigue of long walks, and so had attended few recent excursions. Mr. Farquhar was an obliging, kindly, unobtrusive man, highly esteemed by all who knew him. Mr. John Stewart joined the Society in 1880. He had for years previously taken an interest in Botany, and was one of the founders of the East End Botanical Society. Later he became a member of the Cryptogamic Society of Scotland. Mr. Stewart was for some time a Director of the Mechanics' Institute, and was instrumental in inducing Professor King to open a class of Botany there in 1878. About eleven years ago Mr. Stewart removed from Glasgow to "The Hillocks," Rutherglen, near the edge of the old quarry so well known to Glasgow botanists. He passed away at the mature age of 73, and is held in remembrance by all who knew him as an upright, amiable, and public-spirited man. On the motion of Mr. James Steel, it was agreed that excerpts from this minute, with the condolence of the Society, be sent to Mrs. Farquhar and Mrs. Stewart.

Mr. Alexander Mitchell, 22 Belhaven Terrace, was elected an Ordinary Member.

Mr. L. Watt exhibited two forms of a Willow, *Salix nigricans*, Sm., and pointed out that what had been regarded as two "forms" were really only two different stages of the same tree.

Mr. R. S. Wishart, M.A., showed the first set of a collection of flowering plants gathered at Berwick-on-Tweed in July last, to contrast the general flora of the lower Tweed with that of Clydesdale. The set included *Glaucium flavum*, Crantz, *Althaea officinalis*, L., *Scandix Pecten-Veneris*, L., *Caucalis nodosa*, Scop., *Plantago media*, L., and others.

Mr. Peter Ewing, F.L.S., exhibited *Equisetum arvense*, L., var. *alpestre*, Wahl., and other alpine forms of *Equiseta*.

A paper by Mr. David Robertson, F.L.S., F.G.S., was read on *Bonnemaisonia asparagoides*, C. Ag., an Alga that gave a blue stain to paper.

Mr. A. Somerville, B.Sc., F.L.S., read a paper on *Senecio Jacobaea*, L., the Ragwort. The paper was of a popular nature,

and elicited some discussion, with diversity of opinion on the two points examined, viz:—(1) Does abundance of this plant in pastures indicate poorness of soil or the reverse? and (2) is it of benefit to have it rooted out where it occurs as a pest?

29TH JANUARY, 1895.

Professor Thomas King, President, in the chair.

Mr. J. Ballantyne, Stuart Villa, Bellevue Road, Rothesay, was elected an Ordinary Member.

Mr. Peter Ewing, F.L.S., submitted a Supplementary List of records of Flowering Plants for the West of Scotland. (See page 199.)

Mr. C. Sherry exhibited and read notes on the "Cruickston Dollar," a coin struck in the reign of Queen Mary, which has on its reverse the representation of what is supposed by some to be a yew tree, with a tortoise creeping up the stem. Over the tree is placed the Scottish Crown, surmounted by a thistle, these two objects being figured a second time in the centre of the plate. Round the margin is the Latin inscription, "*Exsurgat Deus et dissipentur inimici ejus;*" and in the centre of the medallion, "*Dat gloria vires,*" with the date 1565.

A different opinion with regard to the tree on the above coin is expressed in "Ramsay's Views in Renfrewshire" (Edin., 1839), where the author says:—"Connected with the old tree there is a popular error which some writers of good repute have followed. In the reign of Queen Mary there was struck a silver coinage of three sizes, bearing on the reverse the figure of a tree crowned with the motto 'Dat gloria vires.' It is generally believed that this tree represents the Crookston Yew, and that it was put upon the coin in order to commemorate the meeting of Mary and Darnley under its branches: accordingly the coin of the largest size goes under the name of 'The Crookston Dollar.' Now to shew the groundlessness of this story it is only necessary to refer to the order of the Privy Council for the formation of the coinage in question, dated 22nd December, 1565. By that order it is expressly enjoined that the coinage shall bear 'on the ane side, ane palm-tree crownit,' and in conformity to this, the tree upon the coin is found to resemble a palm and not a yew."

Mr. David Anderson, Gorebridge, exhibited and presented to the Society a number of water-colour sketches of Fungi, executed by himself.

Professor King exhibited a short series of Flowering Plants from Switzerland, including *Trifolium alpinum*, L., *Hedysarum obscurum*, L., *Saponaria ocymoides*, L., and *Dianthus sylvestris*, Wulf.

Mr. David Robertson, F.L.S., F.G.S., sent for exhibition, *Halicystis ovalis*, Areschoug, an Alga, from Lamlash, and contributed notes on its occurrence and peculiarities. (See page 172.)

A list of Wigtownshire Plants by Mr. James M'Andrew, Corresponding Member, was presented to the Society by the author, and, after being shown to the meeting, was made over to the care of the Librarian.

Mr. George M'Crie had on the table for exhibition a series of small marine aquaria, and gave an interesting account of their living contents.

A paper on "The Marine Mollusc, *Lima hians*, Gmel.," by Mr. J. D. F. Gilchrist, M.A., B.Sc., Ph.D., communicated by Mr. M'Crie, was read, in which the author dealt very fully with the adaptations of this creature to its mode of life.

26TH FEBRUARY, 1895.

Professor Thomas King, President, in the chair.

Mr. John Paterson, 82 Cumming Drive, Mount Florida, was elected an Ordinary Member.

The Rev. Hugh Macmillan, D.D., LL.D., F.R.S.E., &c., Greenock, a Corresponding Member, author of "Holidays on High Lands," "The Ministry of Nature," and many other works, read a paper entitled "A brief passing glance at the Flora of Palestine," which country he had visited last year. Dr. Macmillan, whose knowledge of the flora of his own country is perhaps unrivalled, derived much pleasure from seeing for himself the trees and flowers of Palestine, a land interesting to us from reasons so numerous. The being one of a party, however, and on horseback, together with the fatiguing nature of each day's work, were not conducive to botanising, but Dr. Macmillan used his eyes, and his retentive memory enabled him to delight his audience

with a story racy and idyllic, abounding in references, historical and sacred, and interspersed with touches of humour. The flora of Palestine has borrowed from that of the countries around, and has a connection also with that of the African lake system. It embraces some 3,500 vascular species, of which 500 are common to Britain. The vegetation of the western portion is largely European, and differs from that of the eastern, where the type is mainly Asiatic, and, especially near the Dead Sea, of desert character, thorny and hairy. Then the Jordan valley has a flora largely its own, rank and luxuriant, *Lythrum Salicaria*, L., attaining there a height of 14 feet. Dr. Macmillan described the fields of brilliant red anemones, extending for miles over the plains of Sharon, as a gorgeous spectacle. This wild flower is now considered to have been the "lily" referred to by our Lord, and, as scarlet was the then royal colour, He could very well say that "even Solomon, in all his glory, was not arrayed like one of these." The fruit trees of Palestine are fewer than one would expect, partly owing to the tax imposed on them. In consequence of the dryness of the atmosphere and soil, the cryptogamic flora of the country is but scant, ferns being scarce, and mosses and lichens almost absent. (See page 175.)

Mr. A. Somerville, B.Sc., F.L.S., exhibited specimens of the five British species of the Molluscan genus *Lima*, and read a descriptive paper, illustrated by diagrams, giving particulars of the distribution of these elegant shells within and beyond our own seas, and of their bathymetrical range. He made special reference to *L. hians*, Gmel., common in the Clyde estuary, which constructs a "nest" out of fragments of nullipore, &c., fastened together by byssal threads, and which it attaches to the roots of large seaweeds.

On behalf of Rev. Canon Norman, F.R.S., Honorary Member, and Mr. J. T. Marshall, Torquay, specimens were also shown of the huge *Lima excavata*, Fabr., from the Norwegian fiords, and of *L. Sarsii*, Lovén, from Norway and the Mediterranean.

On behalf of Mr. H. M'Culloch, there was exhibited a specimen, shot at Campbeltown, of the Little Auk (*Mergulus alle*, L.), an inhabitant of the polar area of the Western Palearctic and Eastern Nearctic regions. During the recent excessively severe weather this bird arrived in considerable numbers, not only on the

eastern, but, what was remarkable, on the western coast of Scotland, all seen being in a more or less starved condition. It was stated that Mr. McCulloch had had some thirty in all sent to him to be stuffed.

26TH MARCH, 1895.

Professor Thomas King, President, in the chair.

Mr. John Stephen, Domira, Partickhill, was elected a Life Member, and the following gentlemen Ordinary Members of the Society, viz.:—Mr. David Maclean, 10 Somerset Place; Mr. A. M. G. Kidston, Helensburgh; Mr. Robert Blackie, 7 Great Western Terrace; Mr. Hugh Brown, Lord Dean of Guild; Dr. John Paterson, 27 Berkeley Terrace; Mr. N. Phillips, 18 Melrose Gardens; Mr. John A. Roxburgh, 15 Lynedoch Crescent; Rev. Dr. William Boyd, 6 Park Circus Place.

On the motion of Mr. James Steel, seconded by Mr. Peter Ewing, F.L.S., the Secretary was instructed to convey the hearty congratulations of the Society to Mr. David Robertson, F.L.S., F.G.S., the veteran "Naturalist of Cumbrae," its late President, on the occasion of the honour of LL.D. about to be conferred on him by the University of Glasgow.

Dr. Robert Brown laid on the table a series of dried plants from Mount Pilatus and Grindelwald, gathered by himself, including *Carex atrata*, L., *C. capillaris*, L., *Hutchinsia alpina*, R.Br., *Thlaspi rotundifolium*, L., *Petrocallis pyrenaica*, R.Br., *Gentiana excisa*, Presl., *G. lutea*, L., *G. purpurea*, L., and *Primula integrifolia*, L., and he made reference to the richness and variety of the flora of Switzerland.

Mr. A. Somerville, B.Sc., F.L.S., exhibited specimens of the Rush, *Juncus tenuis*, Willd., from seven of the nine counties in which, since 1883, it has been found to occur, and read a paper discussing the footing on which the plant can claim admission into the British flora. The home of *Juncus tenuis* seems to be North America, where it extends from Hudson's Bay to Mexico, while throughout Western Europe, where it occurs but sparingly, it is more or less sporadic.

In connection with the foregoing, Mr. Arthur Bennett, F.L.S., Corresponding Member, sent for exhibition a specimen of *Juncus tenuis* from the spot in Herefordshire where the species was, in

1884, re-found in this country after an interval of 88 years from the date of the reputed discovery of it in Britain by the late Mr. George Don, Forfar.

Mr. Peter Ewing, F.L.S., laid on the table a series of interesting Willow-hybrids which he had gathered on the Breadalbanes, and which had been carefully examined by the late Dr. F. Buchanan White, F.L.S. These included *Salix Dicksoniana*, Sm. (*Arbuscula* \times *phylicifolia*), *S. Stephania*, F. B. White (*lanata* \times *herbacea*), *S. spuria*, Willd. (*Arbuscula* \times *Lapponum*).

Mr. James Campbell showed well-preserved specimens, from the Straits Settlements, of the Two-streaked Lace Lizard (*Hydrosaurus salvator*, Laurenti), and the Indian Crocodile (*Crocodylus porosus*, Schneider), and offered remarks on the occurrence and habits of these reptilians. He also showed the Thorny Lobster (*Palinurus quadricornis*, Latr.) from same quarter.

Mr. John Paterson read a paper entitled "Notes on the Irruption of Little Auks (*Mergulus alle*, L.) in the Winter of 1894-5, on the West of Scotland, Oban to Ayr," in which he had carefully gathered up all the known facts in connection with the recent presence of these birds on this side of Scotland. The circumstances specially drawn attention to were (1) their almost total absence from the Outer Hebrides; (2) their great scarcity in Ayrshire; (3) the large numbers occurring in the line of the Great Glen (from Oban to Islay); and (4) the scattered occurrences in the Clyde area. (See page 195.)

On behalf of Mr. John Smith, Corresponding Member, a communication was read on "The Distribution of *Plantago maritima*, L., in Ayrshire." (See page 226.)

A paper by Mr. James Whitton, Superintendent of the City Parks, entitled "Meteorological Notes and Remarks upon the Weather during the Year 1894, with its general effects upon Vegetation," was held as read. (See page 229.)

30TH APRIL, 1895.

Mr. Robert Kidston, F.R.S.E., F.G.S., Vice-President, in the chair.

Professor M'Kendrick, M.D., F.R.S., was elected an Honorary Member. Dr. R. Broom, B.Sc., Taralga, New South Wales, and

Mr. J. T. Marshall, Torquay, were elected Corresponding Members. The following were admitted as Ordinary Members, viz. :— Messrs. David Andrew, Arthur Briggs, Daniel R. Gardner, James Goldie, James Guttridge, J. D. Maclaren, M.D., William Macleod, James B. Mirrlees, John Robertson, John Jas. Robertson, Richard G. Ross, R. Cooper Rundell, David R. Somerville, Alexander Sweet, and John Torrance. The following were admitted to Associateship, viz. :—Messrs. Alexander Cameron, Allan Gray, Robert F. Linn, Donald F. Nicol, J. C. Oliver, and Nicholas G. Reid.

The Hon. Librarian, Mr. James Mitchell, laid on the table a newly-prepared catalogue of the Society's Library, and a hearty vote of thanks was accorded to Mr. Mitchell and his committee for their labours in preparing this catalogue, and to Mr. Duncan Mackinnon, London, a Life Member, for his great kindness in defraying the whole cost, £7, of printing 500 copies for free distribution to members.

Gifts to the Library of scientific works were intimated from Mr. Macfie of Airds, Mrs. George Crichton, and the Misses Harvie.

On the motion of Mr. A. Somerville, B.Sc., F.L.S., seconded by Mr. James Mitchell, it was agreed to start an Illustration Fund to aid in defraying the cost of plates for the Transactions, and so to relieve the ordinary funds. Mr. Somerville handed to the Hon. Treasurer a cheque for £1 10s., being the amount of two subscriptions he had received towards such a fund.

Mr. Somerville moved that a Standing Committee, to be called the Finance Committee, be appointed, and added to the other Committees of the Society, to which shall be remitted for consideration all matters of intended outlay; and he moved further that no engagement shall be entered into pledging the Society's credit without the matter having first of all been referred to this Committee for their approval. This was agreed to.

Mr. Somerville intimated that a Life Member of the Society had offered to hand over to the Society railway stock, such as trustees can hold, to the issued value of £100, to be held by the Society in security for the loan to him of the £36 of the Society's capital now lying in the Savings Bank, and to pay to the Society 4 per cent. interest on the said sum until such time as the

uninvested balance of capital should be increased to an investible sum, say to £50. Mr. Somerville moved that the newly-appointed Finance Committee be empowered to do what would seem to them safe and expedient as the Society's representatives. On this motion being seconded by Mr. William Stewart, it was agreed to.

Professor Thomas King, the President, exhibited specimens, in spirit, of the Gulf-weed, *Sargassum bacciferum*, Agardh, from the North Atlantic. This remarkable floating Alga, observed by Christopher Columbus four centuries ago, is found in the Gulf Stream, principally after its deflection in the direction of the Azores, and in such abundance that the area of its chief occurrence—where it actually impedes navigation—is known as the "Sargasso Sea." It belongs to the *Fucaceæ*, its globular air-bladders leading to the specific misnomer *bacciferum*, and it forms the home of countless marine animals of remarkable habits.

Colonel J. S. Stirling of Gargunnoch exhibited, on behalf of the Chairman and himself, specimens from Stirlingshire of the newly-determined Pond-weed, *Potamogeton Bennettii*, Fryer, considered to be a hybrid between *crispus* and *obtusifolius*, and he offered some remarks on this difficult genus.

Mr. A. Somerville, B.Sc., F.L.S., submitted specimens of the scarce Bur-reed, *Sparganium affine*, Schnizl, obtained by him near Lag, in the Island of Arran, and not previously recorded as occurring in the county of Bute.

Mr. James Campbell, C.M., read a paper on the habits of Wasps, as observed by himself while painting in the open air. Wasps living near roads or dwellings act differently from those in fields or woods, becoming familiar, and, if encouraged, coming daily to share your lunch. They will sit on your easel or arm, and, after confidence is established, will not resent being stroked with the finger. Everywhere, under the summer sun, wasps are at work removing what is offensive to man, and they, besides, play an important part in plant-pollination. A discussion on the subject was opened by Mr. James Whitton, Superintendent of Parks, and continued by Mr. L. Watt, Mr. James Steel, and others, who gave interesting reminiscences. (See page 265.)

A popular paper, entitled "Jottings from my Note-Book—the Gulls and their Neighbours," by Dr. David Robertson, F.L.S., F.G.S., was read, in which that gentleman gave the results of his

observations on the behaviour of gulls, starlings, and other birds on Great Cumbrae in their mutual distress during the recent period of severe cold, when food was scarce. (See page 244.) The reading of this paper also was followed by an interesting discussion, in which Mr. John Paterson, Mr. Alexander Sweet, and others took part.

Two papers, viz., "On the Anatomy of a Four-winged Chick," by Dr. R. Broom, B.Sc., and "A Note on *Mergulus alle*, L.," by Mr. W. Craibe Angus, were held as read. (See page 241.)

Intimation was made of the Excursions of the Society to take place during May, and that Rev. G. A. Frank Knight, M.A., had accepted office on appointment as Summer Secretary. After remarks from the President, and a vote of thanks to him and to the Chairman of the evening (Mr. Kidston), the Winter Session was declared closed.

Natural History Society of Glasgow.

SESSION XLV.—1895-96.

LIST OF OFFICE-BEARERS.

President.

Professor THOMAS KING, Anderson's Medical School.

Vice-Presidents.

ROBERT KIDSTON, F.R.S.E., F.G.S., 24 Victoria Place,
Stirling;

PETER EWING, F.L.S., The Frond, Uddingston.

WILLIAM STEWART, Violetgrove House, St. George's Road.

Hon. Secretaries.

R. D. WILKIE (Acting), 302 Langside Road.

Rev. G. A. FRANK KNIGHT, M.A., at 11 South Park Terrace,
Hillhead.

Hon. Treasurer.

JOHN RENWICK, 49 Jamaica Street.

Hon. Librarian.

JAMES MITCHELL, 222 Darnley Street, Pollokshields.

Hon. Editor of Transactions.

ALEX. SOMERVILLE, B.Sc., F.L.S., 4 Bute Mansions,
Hillhead.

Members of Council.

W. A. DOBIE.	JOHN CAIRNS, JUNR.	JOHN PATERSON.
JOHN FLEMING.	J. BRUCE HUNTER.	JAMES WHITTON.
DAVID PEARSON.	RICHARD M'KAY.	ROBERT M. MORTON.
R. D. WILKIE.	JOHNSTON SHEARER.	ROBERT DUNLOP.

LIST OF MEMBERS.

HONORARY.

1851. William Ferguson of Kinmundy, LL.D., F.L.S., F.G.S., F.S.A.Scot., 21 Manor Place, Edinburgh, and Kinmundy, near Mintlaw, Aberdeenshire.
1880. Professor Gustav Mayr, 75 Haupt Strasse, Vienna.
1880. Rev. John Stevenson, LL.D., F.R.S.E., The Manse, Glamis, Forfarshire.
1881. James Murie, M.D., LL.D., F.L.S., F.G.S., F.Z.S., Canvey Cottage, Leigh, Essex.
1881. Osbert Salvin, M.A., F.R.S., F.L.S., F.Z.S., Hawksfold, Fernhurst, Haslemere, Surrey.
1884. David Sharp, M.B., C.M., Hon. M.A., F.R.S., F.L.S., F.Z.S., F.E.S., Hawthorndene, Hills Road, Cambridge.
1884. Robert M'Lachlan, F.R.S., F.L.S., F.Z.S., F.R.H.S., F.E.S., West View, Clarendon Road, Lewisham, London, S.E.
1885. John Murray, LL.D., Ph.D., F.R.S.E., F.L.S., F.G.S., F.S.A.Scot., Director of the *Challenger* Expedition Commission, 45 Frederick Street, Edinburgh.
1887. William Carruthers, F.R.S., F.L.S., F.G.S., Central House, Central Hill, London, S.E.
1887. Sir Joseph Dalton Hooker, M.D., R.N., K.C.S.I., C.B., D.C.L., LL.D., F.R.S., F.L.S., F.G.S., F.R.G.S., etc., The Camp, Sunningdale, Berks.
1888. Rev. Canon A. M. Norman, M.A., D.C.L., F.R.S., F.L.S., Burnmoor Rectory, Fence Houses, Co. Durham.
1889. The Duke of Argyll, K.G., K.T., D.C.L., LL.D., F.R.S., F.R.S.E., F.G.S., Inveraray Castle, Argyllshire.
1890. M. C. Cooke, M.A., LL.D., A.L.S., 146 Junction Road, Upper Holloway, London, N.
1895. Professor John G. M'Kendrick, M.D., F.R.C.P.E., LL.D., F.R.S., The University, Glasgow.

CORRESPONDING.

1866. The Earl of Haddington, F.S.A.Scot., Tynninghame, Prestonkirk.

1867. John Buchanan, F.L.S., Botanist to the Geological Survey, Wellington, New Zealand.
1868. Rev. Paton J. Gloag, D.D., Edinburgh.
1869. George Stewardson Brady, M.D., F.R.S., C.M.Z.S., Sunderland.
1869. Rev. James Keith, LL.D., The Manse, Forres.
1869. Major W. H. Feilden, C.M.Z.S., West House, Wells, Norfolk.
1869. Rev. John Fergusson, M.A., The Manse, Fearn, Brechin.
1870. James Hardy, LL.D., Old Cambus, Cockburnspath.
1871. Peter Cameron, F.E.S., Olive Mount, Sale, Cheshire.
1873. Sir George Hector Leith-Buchanan, Bart., Ross Priory, Dumbartonshire.
1877. Robert Etheridge, F.R.S., F.R.S.E., F.G.S., Geological Department, British Museum (Natural History), Cromwell Road, London, S.W.
1879. John Smith, Monkredding, Kilwinning.
1879. Thomas Scott, F.L.S., F.R.Ph.S.E., Naturalist to the Fishery Board for Scotland, 14 Lorne Street, Leith.
1884. W. Anderson Smith, Ledaig, Argyllshire.
1885. J. T. Cunningham, B.A., Marine Biological Laboratory, Plymouth.
1885. John Rattray, M.A., B.Sc., F.R.S.E., Dunkeld.
1885. John R. Henderson, M.B., C.M., F.L.S., Professor of Biology, Christian College, Madras.
1885. Frederick G. Pearcey, The Museum, The Owens College, Manchester.
1885. James M'Andrew, New Galloway.
1887. Arthur Bennett, F.L.S., 143 High Street, Croydon, Surrey.
1887. Henry Boswell, 109 Woodstock Road, Oxford.
1887. D'Arcy W. Thompson, B.A., F.R.S.E., F.L.S., Professor of Natural History in University College, Dundee.
1887. Rev. David Landsborough, Kilmarnock.
1888. William Abbott Herdman, D.Sc., F.R.S., F.R.S.E., F.L.S., Professor of Natural History in University College, Liverpool.
1888. Rev. Hugh Macmillan, D.D., LL.D., F.R.S.E., F.S.A.Scot., 70 Union Street, Greenock.

1888. Edgar A. Smith, F.Z.S., British Museum (Natural History),
Cromwell Road, London, S.W.
1888. James W. H. Trail, M.A., M.D., F.R.S., F.R.S.E., F.L.S.,
Professor of Botany in the University of Aberdeen.
1888. William Carmichael McIntosh, M.D., LL.D., F.R.S.,
F.R.S.E., F.L.S., C.M.Z.S., Professor of Natural
History in the University of St. Andrews.
1888. George R. M. Murray, F.R.S.E., F.L.S., Keeper of the
Botanical Collection, British Museum (Natural History),
Cromwell Road, London, S.W.
1888. Edward Morell Holmes, F.L.S., Ruthven, Sevenoaks,
Kent.
1888. William Phillips, F.L.S., Canonbury, Shrewsbury.
1888. Sir Thomas D. Gibson-Carmichael, Bart., M.A., M.P.,
F.L.S., Castlecraig, Dolphinton.
1889. James Edmund Harting, F.L.S., F.Z.S., M.B.O.U.,
Librarian and Assistant Secretary of the Linnean
Society, Burlington House, Piccadilly, London, W.
1891. R. J. Harvey Gibson, M.A., F.R.S.E., F.L.S., Professor
of Botany in University College, Liverpool.
1895. Robert Broom, M.D., B.Sc., Taralga, New South Wales.
1895. John T. Marshall, M.C.S., Sevenoaks, Torquay.
1895. Frederick J. Hanbury, F.L.S., F.E.S., Stainforth House,
Upper Clapton, N.E.
1895. Edward E. Prince, B.A., F.L.S., 2 Willow Grove Road,
Leeds.
1896. Robert H. Read, 80 The Grove, Ealing, London.

ORDINARY.

** Life Members.*

1887. *Alexander, W. P., 203 West George Street.
1895. Andrew, David, Gavinburn School, Old Kilpatrick.
1868. Angus, William Craibe, 159 Queen Street.
1883. Arbuckle, Andrew, 4 Farme Loan Road, Rutherglen.
1887. Armour, John, 16 Craigmore Terrace.
1880. Bain, Andrew, 17 Athole Gardens.
1862. Bain, Sir James, F.R.S.E., F.R.G.S., 3 Park Terrace.
1888. Baird, J. G. A., of Muirkirk, M.P., 168 West George Street.

1887. Balfour, D. D., Sheriff-Substitute of Lanarkshire, 2 North Park Terrace, Hillhead.
1884. Ballantine, Matthew, 101 Buchanan Street.
1895. Ballantyne, J., Stuart Villa, Bellevue Road, Rothesay.
1863. Balloch, Robert, 131 St. Vincent Street.
1882. Baxter, William R., 64 Great George Street, Hillhead.
1893. Beard, Miss M. S. M., 14 Ruthven Street, Hillhead.
1888. Beith, Gilbert, 15 Belhaven Terrace, Kelvinside.
1893. Bell, Sir James, Bart., The Hon. The Lord Provost, 7 Marlborough Terrace.
1869. Bennett, Robert J., 50 Gordon Street.
1896. Bennett, William, Struan Cottage, Airdrie.
1883. Bishop, Thomas G., Dalmore, Helensburgh.
1879. Black, Malcolm, M.B., C.M., 5 Canning Place.
1895. Blackie, Robert, 7 Great Western Terrace.
1888. Bock, O. F., 1 Eton Terrace, Hillhead.
1888. Borland, John, jun., Navara, London Road, Kilmarnock.
1888. Bowe, C. S., 14 Glasgow Street, Hillhead.
1885. Bower, Frederick O., M.A., D.Sc., F.R.S., F.R.S.E., F.L.S., Regius Professor of Botany in the University of Glasgow; 45 Kersland Terrace, Hillhead.
1882. Boyd, D. A., Seamill, West Kilbride.
1895. Boyd, Rev. William, LL.D., Lochbrae, New Kilpatrick.
1879. Boyle, Thomas, care of D. Bell, 339 London Road.
1895. Briggs, Arthur, Royal Bank, Springburn.
1895. Brown, Hugh, 9 Clairmont Gardens.
1894. Brown, Robert, M.D., 1 Leslie Road, Pollokshields.
1881. *Buckley, T. E., B.A., F.Z.S., M.B.O.U., Rossal, Inverness.
1895. Burden, Miss Elizabeth Raymond, 153 Greendyke Street.
1895. Burnett, George, 276 Dumbarton Road.
1878. Burns, George A., 30 Jamaica Street.
1888. *Burns, Sir John, of Castle Wemyss, Bart., F.R.A.S., F.R.G.S., Wemyss Bay.
1886. Bütler, George, 189 Pitt Street.
1887. Cairns, John, jun., 151 Renfrew Street.
1894. Calder, Marcus, 12 Union Street, Greenock.
1888. Cameron, Sir Charles, Bart., M.D., LL.D., Balclutha, Greenock.
1886. Campbell, James, 1 Florentine Place, Hillhead.

1870. Campbell, J. M., F.Z.S., F.R.S.G.S., Kelvingrove Museum.
1893. Campbell, William, 1 Seafield Cottages, Jordanhill.
1882. Christie, Joseph, 424 New Road, Parkhead.
1870. Clark, Henry E., M.R.C.S., Professor of Surgery in St. Mungo's College; 24 India Street.
1891. Clark, James, Chapel House, Paisley.
1889. Clavering, John M., 14 Woodside Terrace.
1888. Clerk, Iain, M.B., C.M., Joint Hospital, Knightswood.
1887. Colquhoun, Sir James, of Luss and Colquhoun, Bart., Duncloth^h, Ore, Hastings.
1883. Coulson, Frank, Greenhead Brewery, Glasgow.
1888. *Craig, William, M.D., F.R.C.S.E., F.R.S.E., 71 Bruntsfield Place, Edinburgh.
1888. Crichton, Mrs. George, 8 Montgomerie Crescent, Kelvin-side.
1887. *Cuthbertson, Sir John Neilson, LL.D., 25 Blythswood Square.
1877. *Dalglish, John J., F.S.A.Scot., M.B.O.U., Brankston Grange, Bogside Station, Stirling.
1893. Dewar, Daniel, Curator, Botanic Gardens.
1895. Dixon, Walter, 164 St. Vincent Street.
1889. Dobie, W. A., 5 Lynedoch Crescent.
1891. Dove, Hector, B.Sc., 197 St. Andrew's Road, Pollokshields.
1885. Dow, William, 165 Hospital Street.
1869. Drew, Alexander, jun., Holm Lodge, near Burnley, Lancashire.
1888. Drummond, Henry, LL.D., F.R.S.E., F.G.S., Professor of Natural Science, Free Church College; 3 Park Circus.
1888. Dunlop, John, 14 Queen Mary Avenue, Crosshill.
1890. Dunlop, Robert, Whiterigg, Airdrie.
1888. Eadie, Charles, Municipal Buildings, George Square.
1890. Edgar, Robert, M.A., 128 Woodlands Road.
1891. Edgar, Samuel C. B., 3 Radnor Terrace, Overnewton.
1888. Ewart, J. Cossar, M.D., F.R.C.S.E., F.R.S., F.R.S.E., F.L.S., Regius Professor of Natural History in the University of Edinburgh.
1879. Ewing, Peter, F.L.S., The Frond, Uddingston. VICE-PRESIDENT.
1878. Fergus, Freeland, M.D., F.F.P.S.G., 203 Bath Street.

1883. Fergus, Oswald, L.D.S., 27 Blythwood Square.
 1888. Fergusson, Alex. A., F.S.A.Scot., 11 Grosvenor Terrace.
 1888. Finlayson, William, 213 West George Street.
 1888. Fleck, Rev. William S., M.A., Free Church Manse, Fairlie.
 1872. Fleming, John, Wood Lane, Broomielaw.
 1887. *Fowler, John, 5 Derby Street, Sandyford.
 1895. Gardner, Daniel R., 4 Montague Terrace, Kelvinside.
 1895. Gemmell, Mathew, 75 Bath Street.
 1888. Gentles, Thomas, 338 Sauchiehall Street.
 1872. *Gilchrist, Archibald, 5 Montgomerie Crescent.
 1885. Gill, Robert, 63 West Regent Street.
 1885. *Gilmour, Thomas F., M.D., L.R.C.P.Ed., Port Ellen, Islay.
 1871. Girvan, James Graham, 186 West George Street.
 1895. Goldie, James, 40 St. Enoch Square.
 1881. Goodwin, William, 3 Lynedoch Street.
 1894. Goold, George S., 19 Blythwood Drive.
 1892. Grant, Frank L., M.A., 58 Kelvingrove Street.
 1889. Grierson, Robert, 186 West George Street.
 1875. Grieve, Henry, 10 Willowbank Crescent.
 1856. Grieve, John, M.A., M.D., F.R.S.E., F.L.S., care of W.
 L. Buchanan, 212 St. Vincent Street.
 1895. Guttridge, James, Botanic Gardens.
 1889. Harington-Stuart, Col. R. E. S., of Torrance, East Kilbride.
 1888. Hart, Mrs. P. C., 25 Hamilton Park Terrace, Hillhead.
 1888. Henderson, Miss C., 17 Belhaven Terrace, Kelvinside.
 1888. Henderson, John, Towerville, Helensburgh.
 1887. Henderson, Miss M., 17 Belhaven Terrace, Kelvinside.
 1879. Higgins, William, Douglas Place, Bearsden.
 1888. Hill, Alexander, 302B St. Vincent Street.
 1877. Hill, Thomas N., 140 Bath Street.
 1895. Hindle, Stephen, 105 Blythwood Drive.
 1879. Horn, George, 5 Bellgrove Street.
 1885. Houston, Robert S., Briar Villa, Greenlaw Drive, Paisley.
 1881. Hunt, John, Fingarry, Milton of Campsie.
 1888. Hunter, J. Bruce, 103 St. Vincent Street.
 1889. Jack, James, National Bank House, Queen Street.
 1895. Jamieson, Andrew, Hopetoun, Bearsden.
 1890. Johnston, A. F., 145 Buccleuch Street.
 1888. Johnston, James G., Crag Lodge, Carmunnoch.

1888. Kelvin, The Right Hon. Lord, LL.D., D.C.L., D.Sc., F.R.S., P.R.S.E., Regius Professor of Natural Philosophy in the University of Glasgow.
1889. Ker, Adam, 175 Trongate.
1895. Kidston, Adrian M. M. G., Helensburgh.
1886. Kidston, Robert, F.R.S.E., F.G.S., 24 Victoria Place, Stirling. VICE-PRESIDENT.
1887. King, Sir James, of Campsie, Bart., LL.D., F.R.S.E., F.S.A.Scot., 115 Wellington Street.
1878. King, Thomas, Professor of Botany in Anderson's College; 110 Hill Street, Garnethill. PRESIDENT.
1893. *Kirkpatrick, Andrew J., 179 West George Street.
1895. Kirkpatrick, Thomas, Jun., 6 Montgomerie Crescent, Kelvinside.
1881. Kling, Alfred, 146 Buccleuch Street.
1894. Knight, Rev. G. A. Frank, M.A., Rosenlauri, Bearsden. HON. SECRETARY.
1891. Knox, Adam, 10 Clayton Terrace, Dennistoun.
1893. Lang, Robert, Quarry Park, Johnstone.
1888. Lang, William, F.C.S., 73 Queen Street.
1895. Laurie, Professor Malcolm, D.Sc., B.A., F.R.S.E., F.L.S., St. Mungo's College.
1896. Leighton, William, 91 Union Street.
1885. Leitch, Alexander, 60 Rosebank Terrace.
1879. Ligat, David, Hillside, Barrhead.
1895. Lyle, James, The Academy, Lenzie.
1888. MacBrayne, David, Cardross Park, Dumbartonshire.
1887. M'Call, James, F.S.A.Scot., 6 St. John's Terrace, Hillhead.
1888. M'Crae, John, 7 Kirklee Gardens, Kelvinside.
1891. *M'Crie, George, 61 Sardinia Place, Hillhead.
1887. M'Culloch, Henry, 166 Sauchiehall Street.
1895. MacDowall, Alfred, National Bank of Scotland, Queen Street.
1895. Macfie, Johnstone, M.D., 45 Ashton Terrace, Hillhead.
1888. M'Ilwrick, William J., 98 High Street, Paisley.
1879. M'Intyre, John, M.B., C.M., F.R.S.E., F.R.M.S., 179 Bath Street.
1879. M'Kay, Richard, 113 M'Aslin Street.
1884. MacKenzie, Duncan, 12 James Watt Street.

1854. *M'Kinlay, David, 6 Great Western Terrace, Kelvinside.
 1887. *Mackinnon, Duncan, 23 Great Winchester St., London, E.C.
 1889. *Mackinnon, P., Rosemount, Campbeltown.
 1885. M'Laren, Duncan, 27 Jamaica Street.
 1895. M'Laren, J. D., M.D., 1 Newton Place.
 1879. Maclay, William, 7 Eildon Villas, Mount Florida.
 1888. Maclean, Sir Andrew, Viewfield House, Balshagray, Partick.
 1895. MacLean, David, 10 Somerset Place.
 1895. M'Lellan, Duncan, 7 Kelvingrove Terrace.
 1895. MacLeod, William, 4 Colebrooke Terrace, Hillhead.
 1888. Macmichael, N., 203 West George Street.
 1888. M'Murich, Malcolm, M.A., M.B., C.M., Newton Villa,
 Rutherglen.
 1886. Maconechy, Robert, Golf View, Prestwick.
 1895. Macvicar, Symers M., Invermoidart, Salen, Sunart.
 1895. Marlow, William J., Botanic Gardens.
 1889. Marshall, William, M.A., 27 Derby Street.
 1893. Martin, Francis, F.S.A.Scot., 207 Bath Street.
 1888. Marwick, Sir James David, LL.D., F.R.S.E., F.S.A.Scot.,
 19 Woodside Terrace.
 1888. *Matheson, Colonel Sir Donald, K.C.B., 6 Park Terrace.
 1858. *Miller, Gavin, 10 Windsor Terrace, Kelvinside.
 1888. Miller, Thomas, 12 Waverley Gardens, Crossmyloof.
 1895. Mirrlees, J. B., Redlands, Kelvinside.
 1894. Mitchell, Alexander, 22 Belhaven Terrace.
 1889. Mitchell, James, 222 Darnley Street, Pollokshields. HON.
 LIBRARIAN.
 1884. Moore, James Thomas, M.D., 144 Bath Street.
 1889. Morton, Robert M., 123 High John Street.
 1888. Muir, Sir John, of Deanston, Bart., 6 Park Gardens.
 1895. Napier, Norman D., 104 West George Street.
 1881. *Neilson, John A.
 1884. Orr, John, 12 Newhall Terrace.
 1887. *Overtoun, The Right Hon. Lord, M.A., F.R.G.S., 7 West
 George Street.
 1895. Paterson, John, 82 Cumming Drive, Mount Florida.
 1895. Paterson, John, L.R.C.P. & S., Ed., 27 Berkeley Terrace.
 1876. Paton, James, F.L.S., Corporation Galleries, 270 Sauchie-
 hall Street.

1883. Paul, James B., 96 Buchanan Street.
1895. Paxton, George, Richardland House, Kilmarnock.
1879. Pearson, David, 15 Carnarvon Street.
1895. Phillips, N., 18 Melrose Gardens, Kelvinside.
1894. Pirret, Miss Rachel, 9 Rosslyn Terrace, Kelvinside.
1888. *Pollock, Charles Frederick, M.D., F.R.C.S.E., F.R.S.E.,
1 Buckingham Terrace, Hillhead.
1888. Pollok, Robert, M.B., C.M., F.F.P.S.G., Laurieston House,
Pollokshields.
1891. Polson, John, West Mount, Paisley.
1894. Rankin, James, B.Sc., Zoological Laboratory, The
University.
1879. Renwick, John, 49 Jamaica Street. HON. TREASURER.
1895. Robertson, John, 2 Belmont Crescent.
1852. Robertson, David, LL.D., F.L.S., F.G.S., Fern Bank,
Millport.
1884. Robertson, James, 48 West Nile Street.
1876. Robertson, John, Endcliffe, Langside.
1895. Robertson, J. J., 22 Dixon Avenue, Crosshill.
1894. Ross, Alex., 2 Kennyhill Gardens, Claremont Drive,
Dennistoun.
1895. Ross, Richard G., Ravensleigh, Dowanhill Gardens.
1895. Roxburgh, John A., 15 Lynedoch Crescent.
1895. Rundell, R. Cooper, Underwriters' Room, Royal Exchange.
1888. Russell, George, The Gardens, Redlands, Kelvinside.
1880. Scott, John, 245 Sauchiehall Street.
1888. Service, Thomas, 79 Morrison Street.
1886. Shearer, Johnston, 29 Dixon Avenue, Crosshill.
1879. Sherry, Christopher, Botanic Gardens.
1884. Skirving, Alexander, I.A., 121 West Regent Street.
1888. Sloane, F. N., C.A., 187 West George Street.
1895. Smith, J. Parker, M.P., Jordanhill.
1895. *Smith, W. Macadam, Newhall, Dowanhill Gardens.
1881. *Somerville, Alex., B.Sc., F.L.S., 4 Bute Mansions, Hillhead.
HON. EDITOR OF TRANSACTIONS.
1895. Somerville, David R., 251 Renfrew Street.
1866. *Somerville, Rev. James E., B.D., F.S.A.Scot., Mentone,
France.
1876. Sommerville, Joseph, 5 Huntly Terrace, Kelvinside, N.
1880. Steel, James, 259 West George Street.

1889. Steel, John, 239 St. Vincent Street.
 1895. *Stephen, John, Domira, Partickhill.
 1868. Stewart, James, Williamwood, Cathcart.
 1879. Stewart, William, Violetgrove House, St. George's Road.
 VICE-PRESIDENT.
 1880. Stirling, Colonel J. S., of Gargunnoch, Stirling.
 1888. Sturrock, David, 95 Bath Street.
 1895. Sweet, Alexander, Braehead, Cathcart.
 1896. Taylor, R., 50 Lime Street, Oatlands.
 1888. *Tennant, Sir Charles, of The Glen, Bart., F.S.A.Scot.,
 Innerleithen, Peeblesshire.
 1889. *Tennant, Edward, yr., of The Glen, M.A., Innerleithen,
 Peeblesshire.
 1889. *Tennant, H. J., M.P., 195 West George Street.
 1892. Thearle, Samuel J. P., Brooklands Avenue, Uddingston.
 1879. Thom, R. Wilson, 8 Woodside Terrace.
 1877. *Thomson, James, I.A., 88 Bath Street.
 1894. Thomson, Robert, Aldersyde, Uddingston.
 1894. Thomson, William W., Pomona Cottage, Steps.
 1893. Todd, G. Bell, M.B., C.M., Professor of Zoology in
 Anderson's College; 7 Great Kelvin Terrace, Hillhead.
 1895. Torrance, John, 6 Morrison Drive, Cambuslang.
 1885. Trotter, John, 28 Gordon Street.
 1891. Turnbull, John A., M.A., LL.B., 11 India Street.
 1884. Walker, Robert, Institute of the Fine Arts, 175 Sauchie-
 hall Street.
 1888. Walker, Miss R., care of R. Walker, 175 Sauchiehall St.
 1887. Walters, Rev. Edward, 31 St. Vincent Crescent.
 1879. *Watson, William, Newfield House, Johnstone.
 1882. Watson, William, 245 Main Street, Rutherglen.
 1889. *Watson, Sir W. Renny, 16 Woodlands Terrace.
 1887. Wellwood, S. M., National Bank of Scotland (Limited),
 128 St. Vincent Street.
 1893. Whitton, James, Superintendent of Parks, 30 Derby Street.
 1883. Whyte, Alexander, L.D.S., 140 Mains Street.
 1889. Whyte, Rev. Alex., B.D., B.Sc., F.L.S., 69 Montgomerie
 Street, Kelvinside.
 1885. Whyte, Andrew C., L.D.S., 42 Dundas Street.
 1893. Wilkie, Robert D., 302 Langside Road. HON. SECRE-
 TARY (ACTING).

1879. Wilson, Rev. Alex. S., M.A., B.Sc., Free Church Manse,
North Queensferry.
1863. Wingate, John B., 7 Crown Circus, Dowanhill.
1885. Wishart, R. S., M.A., Meigle Cottage, Stepps.
1895. Workman, W. S., 5 Hanover Terrace.
1852. *Young, John, LL.D., F.G.S., Hunterian Museum, The
University.
1881. Young, John, F.Z.S., M.B.O.U., 64 Hereford Road,
Bayswater, London.

LIST OF ASSOCIATES.

1888. Anderson, John, 41 Dumbarton Road, Partick.
1894. Arthur, Miss Annie, 7 Finlayson Place, Kelvinside.
1895. Brown, Miss Mary, 105 Buccleuch Street.
1892. Buchanan, Rev. Gilbert, 17 Stanley Street.
1888. Dowell, Mrs. A., 13 Palmerston Place, Edinburgh.
1890. Gibson, William, 76 St. James' Road.
1895. Glass, Miss Margaret, 18 Walmer Crescent.
1895. Gray, Allan, 119 Paisley Road.
1895. Henderson, Miss Annie, 38 Berkeley Street.
1895. Hindle, Mrs. S., 105 Blythswood Drive.
1889. Jack, George, 19 Gardner Street.
1895. Linn, Robert F., 20 Richmond Street.
1894. M'Carron, Miss Janet, 41 Albert Drive.
1895. M'Culloch, Frank, 166 Sauchiehall Street.
1894. Niven, Miss Margaret R., 3 Margaret Street, S.S.
1895. Oliver, J. C., 2 Royal Terrace.
1895. Reid, Nicholas G., Holly Bank, Partick.
1888. Scott, Andrew, Fisheries Assistant, University College,
Liverpool; 14 Lorne Street, Leith.
1888. Smith, Robert C., 2 Golfhill Terrace.
1895. Todd, Alex. C., 206 Darnley Street, Pollokshields.
1889. Watt, L., 2 Alexander Street, Clydebank.
1888. Wilson, P., Fisheries Office, Girvan.
1894. Zamorska, Miss Alberta, 32 Rupert Street.
1894. Zamorska, Miss Elma, 32 Rupert Street.
1894. Zamorska, Miss Wanda, 32 Rupert Street.

Pres?



TRANSACTIONS
OF THE
NATURAL HISTORY SOCIETY
OF GLASGOW

(INCLUDING THE PROCEEDINGS OF THE SOCIETY).

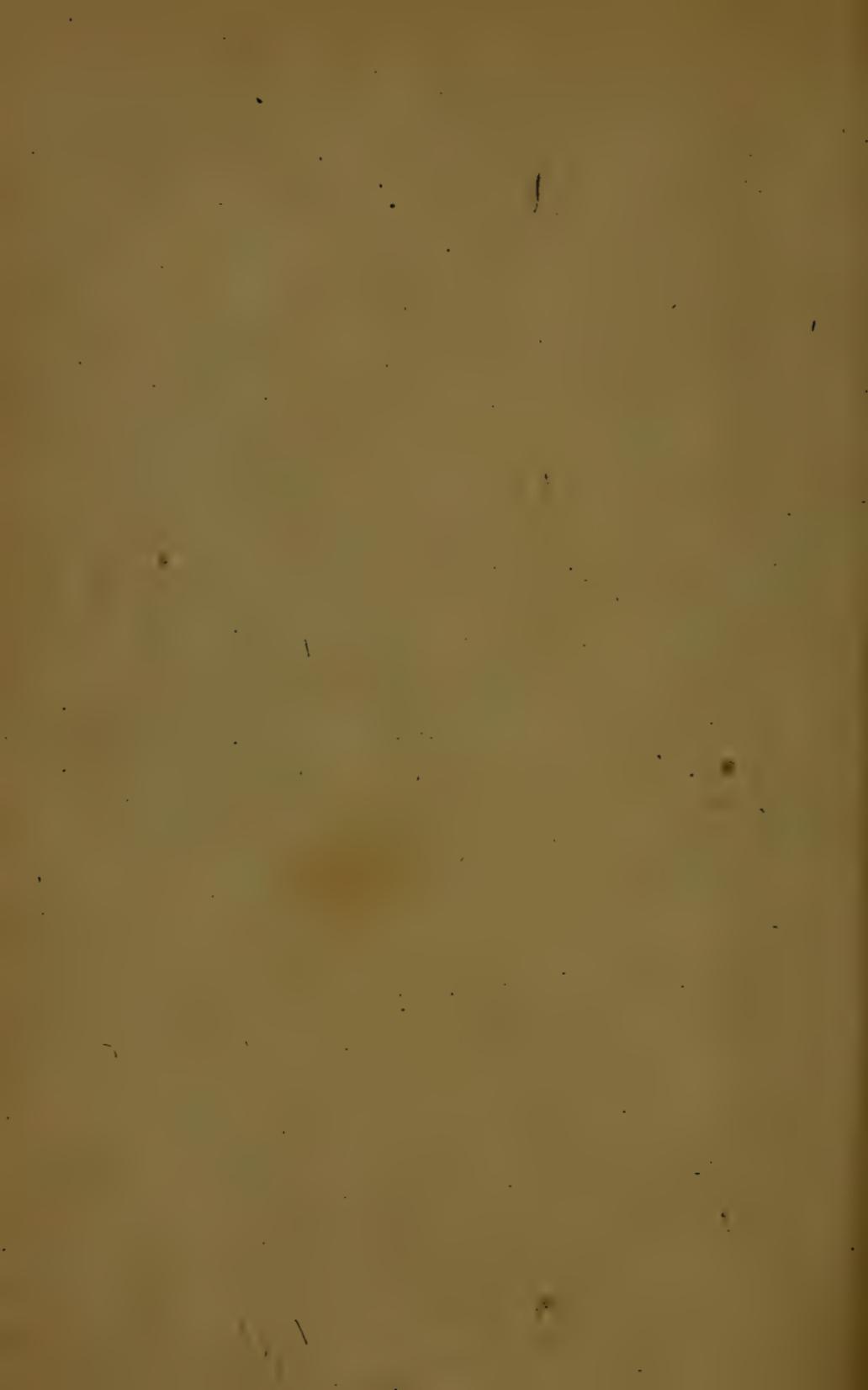
VOL IV. (NEW SERIES.) PART III.

1895-96.

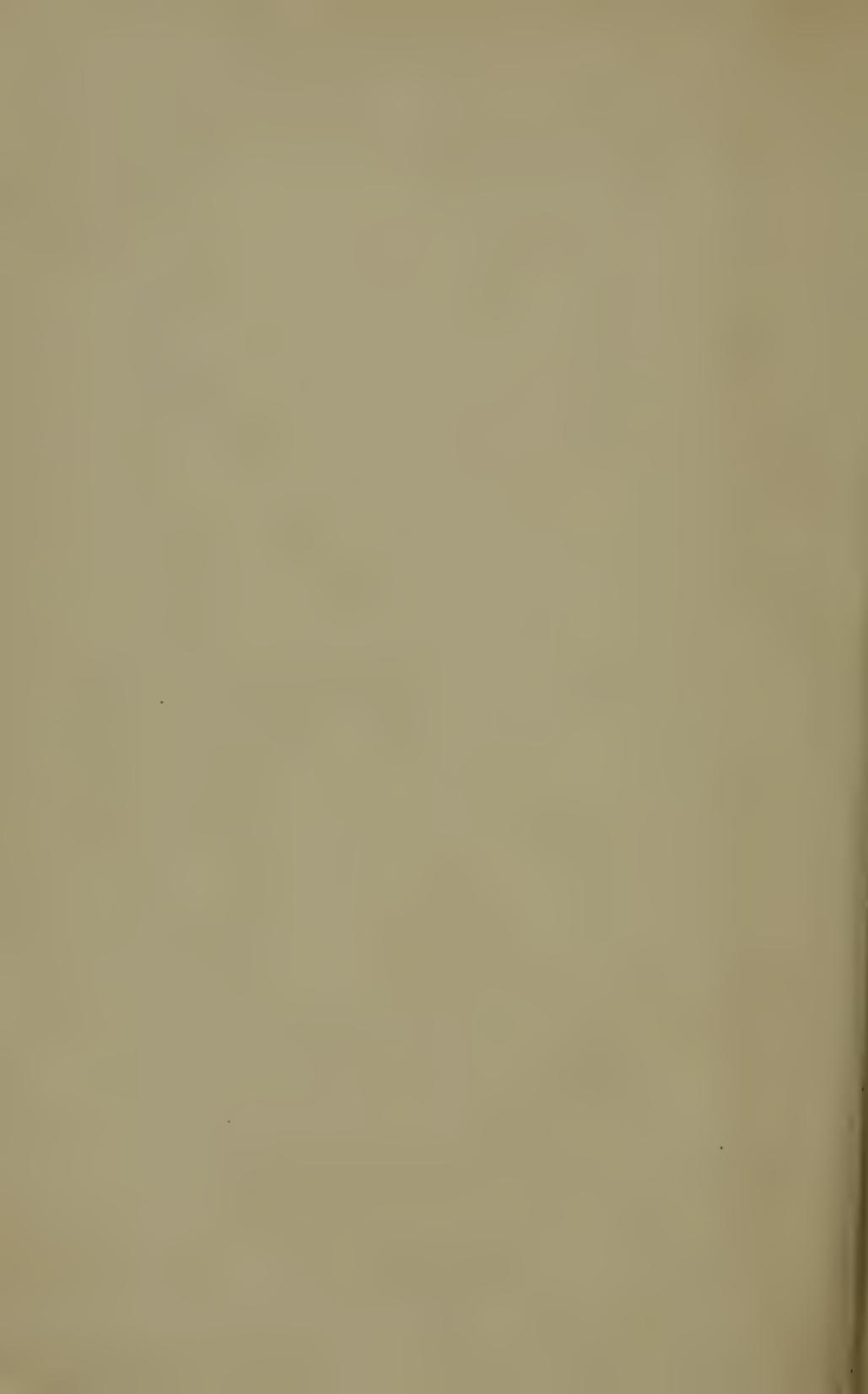
WITH THREE PLATES.



GLASGOW: PUBLISHED BY THE SOCIETY
AT ITS ROOMS, 207 BATH STREET.
MARCH, 1897.



TRANSACTIONS
OF THE
NATURAL HISTORY SOCIETY
OF GLASGOW.



TRANSACTIONS
OF THE
NATURAL HISTORY SOCIETY
OF GLASGOW

(INCLUDING THE PROCEEDINGS OF THE SOCIETY).

VOL. IV. (NEW SERIES.) PART III.

1895-96.

WITH THREE PLATES.



GLASGOW: PUBLISHED BY THE SOCIETY
AT ITS ROOMS, 207 BATH STREET.
MARCH, 1897.

CONTENTS.

TRANSACTIONS—	PAGE
On the Anatomy of a Four-winged Chick. By Robert Broom, M.B., C.M., B.Sc., Taralga, New South Wales, - - - -	315
Note on the Supposed Nasal Valves of Ornithorhyncus. By Robert Broom, M.B., C.M., B.Sc., Taralga, New South Wales, - - - - -	317
A Short Account of the Meeting of the Scottish Cryptogamic Society in Glen Urquhart, 1895. By Professor Thomas King, Observations on the Habits of Echidna (<i>Echidna aculeata</i> , Shaw). By Robert Broom, M.B., C.M., B.Sc., Taralga, New South Wales, - - - - -	319
Remarks on "The London Catalogue of British Plants," Ninth Edition, 1895. By Peter Ewing, F.L.S., - - - - -	324
Jottings from My Note-Book. By David Robertson, LL.D., F.L.S., F.G.S.—	
On <i>Lima hians</i> , Gmel., - - - - -	331
On <i>Cancer pagurus</i> , Linn., - - - - -	332
On <i>Amphidotus cordatus</i> , Penn., - - - - -	333
The Coloration of Fishes. By W. Anderson Smith, - - - -	335
Botanical Notes for 1895.—Wigtownshire. By James M'Andrew, Assoc. Bot. Soc. Edin., New Galloway, - - - - -	344
Notes on a "List of the Birds which have been observed in the district of Ardnamurchan, Argyllshire," with additions thereto. By John J. Dalgleish, F.S.A.Scot., M.B.O.U., -	347
Notes on Some Australian Mammals. By R. Broom, M.D., B.Sc., Taralga, New South Wales, - - - - -	351
<i>Bolbitius bulbillosus</i> , Fr., a Fungus new to Britain. By William Stewart, - - - - -	355
<i>In Memoriam</i> —John Grieve, M.A., M.D., F.R.S.E., F.L.S., -	357
Reports on Excursions—	
Redlands, Kelvinside, - - - - -	358
Lee Castle [Plate IV.], - - - - -	358
Botanic Gardens, - - - - -	359
Kilmalcolm, - - - - -	359
Maich Glen, - - - - -	360
Aikenhead, - - - - -	360
Tullich Hill and Ben Reoch, - - - - -	360
Ballagan; Botanic Gardens; Rowardennan, - - - -	360
Millport, - - - - -	361
Rowallan, - - - - -	361

	PAGE
Reports on Excursions (<i>Continued</i>)—	
Torrance, East Kilbride, - - - - -	361
Blair, - - - - -	361
Dumbarton, - - - - -	362
Howwood, - - - - -	363
Braidwood, - - - - -	364
Botanic Gardens, - - - - -	364
Brodick, - - - - -	365
Millport, - - - - -	366
Queen's Park, - - - - -	366
Toward, - - - - -	368
Kilmun, - - - - -	369
Manuel, - - - - -	369
Arrochar Hills; Ardentinny, - - - - -	370
Dalry, - - - - -	370
PROCEEDINGS—	
Gifts to the Society's Library, &c., - - - - -	372, 377, 379, 381, 383, 385, 386, 387, 389, 391
On <i>Argylia canescens</i> , D. Don. By Professor T. King, - - -	372
On <i>Crambe maritima</i> , Linn. By A. Somerville, B.Sc., F.L.S., -	374
<i>Equisetum arvense</i> , Linn., var. <i>alpestre</i> , Wahlenb., from Killin. By P. Ewing, F.L.S., - - - - -	374
Exhibit of Lepidoptera. By Mr. Robert Dunlop, - - -	375
Fungi from Tullichewan, - - - - -	376
<i>Carex fusca</i> , Allioni (<i>C. Buxbaumii</i> , Wahl.), and <i>Rhyncospora fusca</i> , R. & S., from Loch Shiel, near Arisaig, - - -	377
Report of the Council on Year 1894-95, - - - - -	378
Election of Office-Bearers, - - - - -	379
Great Snipe (<i>Gallinago major</i> , Gmel.) from Eaglesham, - -	380
<i>Ceterach officinarum</i> , Willd., from the "Isle" of Rosneath, -	381
Appointment of Editor of <i>Transactions</i> , - - - - -	382
Spotted Crake (<i>Porzana maruetta</i> , Leach) from Argyllshire, -	382
Alterations in Constitution, - - - - -	383, 384, 388
<i>Aquilegia alpina</i> , Linn., from Canlochan, Forfarshire. By P. Ewing, F.L.S., - - - - -	384
<i>Hedwigidium imberbe</i> , Smith, from Loch Trool, - - - - -	385
On an old notice of the Occurrence of the Sturgeon (<i>Acipenser sturio</i> , Linn.) in the Clyde. By Dr. John Grieve, M.A., F.R.S.E., F.L.S., - - - - -	385
Recent Work on Sporangia. By Professor F. O. Bower, D.Sc., F.R.S., - - - - -	386
On a Bittern (<i>Botaurus stellaris</i> , Linn.) from Stirlingshire, and a Buffon's Skua (<i>Stercorarius parasiticus</i> , Linn.) from Lanark- shire. By John Paterson, - - - - -	387
On a Common Scoter (<i>Edemia nigra</i> (Linn.)) from Campbeltown. By H. M'Culloch, - - - - -	387

CONTENTS.

vii
PAGE

On <i>Amblystegium radicale</i> , P. Beauv., and <i>Hypnum micans</i> , Wils., from Moidart. By Symers M. MacVicar, - - - -	387
On Fifty-eight Plants in Flower in Arran in the first week of April, 1896. By A. Somerville, B.Sc., F.L.S., - - -	389
On <i>Porcellio pictus</i> , Brandt & Ratz, from Great Cuabrac. By Dr. David Robertson, F.L.S., F.G.S., - - - -	390
<i>Volvox minor</i> , Stein., from Hogganfield Loch, - - - -	391
Photographs of the Bark of Trees. By George Paxton [Plates V. and VI.], - - - - - - - - - -	391
Amended Constitution of the Society adopted, - - - -	392
Fossils from the Bone-breccia Deposit near the Wombeyan Caves, N.S.W. By Dr. Broom, B.Sc., Taralga, New South Wales,	393
<i>Lentinus lepideus</i> , Fr., from Paisley, - - - - -	394
Abstract Statement of Accounts—Session 1894-95, - - -	396
List of Office-Bearers 1895-96, - - - - -	397
List of Societies, &c., with which publications are exchanged, -	398
 GENERAL INDEX, - - - - - - - - - -	 404
 TOPOGRAPHICAL INDEX, - - - - - - - - - -	 406
 INDEX to Names of Contributors, - - - - - - - -	 415
,, Popular Names, - - - - - - - - - -	417
,, Scientific Names, Zoology, - - - - - - - -	421
Botany, - - - - - - - - - -	425
 TITLE, CONTENTS, and ERRATA for Vol. IV., - - - - -	 Appendix.

On the Anatomy of a Four-winged Chick.

By ROBERT BROOM, M.B., C.M., B.Sc., Taralga, New South Wales.

[Read 30th April, 1895.]

A SHORT time ago I obtained, through the kindness of Mr. Beatty, Shellharbour, a newly-hatched abnormal chick, and, as it shows very clearly the nature of the supernumerary limbs, I think it worthy of description. The head is normal, and the body appears about natural size, but is possessed of four wings, four legs, and two tails. When examined on the underside, there is found a single umbilicus near the centre of the body, and on the same level, directly opposite each other, are the two tails. The four legs are normally placed relatively to the two tails, so that two knees are situated near the root of the neck, and the other two at the extreme anticephalad end. On the dorsal aspect, the spinal axis appears to cleave at the root of the neck, and the two branches, after running parallel for some distance, are seen to diverge to the two lateral tails. Near the root of the neck arise two wings, which appear normally placed relatively to the head. At the anticephalad end are another pair of wings, situated closely together in the cleft between the two diverging axes, with the elbows pointing outwards and the phalanges away from the head.

A little dissection reveals the exact nature of the abnormality. The vertebral axis becomes cleft in the upper cervical region, so that, although there is but one head, there are two complete spinal columns. For convenience, I will refer to the vertebral column to the right of the mesial line of the head as "Spine R.," that to the left as "Spine L." Though the spines run close together and almost parallel in the thoracic region, yet all the costal elements of both sets of dorsal vertebræ are developed. The right ribs of "Spine R." are approximately normal in shape and development, and, passing to the front, are joined to a normally developed sternum, which is on the left supported by the equally well-developed left ribs of "Spine L." It will thus be seen that there

is formed a fairly normal thorax. The left ribs of "Spine R." and the right ribs of "Spine L." are long and slender, and, passing backwards between the two spines, are normally inserted into a second well-developed sternum at the anticephalad end of the chick.

With regard to the legs little need be said, as the two tails being well apart and the pelves normally developed, the four legs are at once seen to comprise a pair related to each pelvis.

Each sternum supports two coraco-scapular arches with the attached wings.

The arrangement of muscles and nerves makes it perfectly evident that the anterior pair of wings belong, the right to "Spine R." and the left to "Spine L.;" while of the posterior pair, it is manifest that the wing to the right of the mesial plane is the left wing of "Spine R.," and the other the right wing of "Spine L."

As already stated, there is but one umbilicus, and an examination of the viscera shows, that in front of the vitelline duct the alimentary canal is single, and behind it double. In other words, cesophagus, gizzard, liver, and spleen are normal, and there is but one set; while from about two inches below the gizzard the alimentary canal is double. As there is a pair of pelves, there are, as one would expect, two sets of reproductive and urinary organs.

The heart and large vessels are normal, and the anterior pair of wings is supplied by brachials, as if they were a normal pair. The two branches of the aorta unite and immediately re-divide to form an abdominal aorta for each pelvic extremity. The brachials for the two anticephalad wings are derived from the aorta, about the place where it is single.

Perhaps the most interesting fact in the specimen is the fact of lungs, heart, liver, stomach, and spleen being single in their development, although the spinal cord is double from below the upper cervical region. These organs all derive their nervous supply from the tenth cranial or pneumogastric nerve, and in their being single we have further evidence that, morphologically, they belong to the head.

Note on the Supposed Nasal Valves of Ornithorhynchus.

By ROBERT BROOM, M.B., C.M., B.Sc., Taralga, New South Wales.

[Read 28th May, 1895.]

In a recent paper by Professor Symington,* he gives a short account of the peculiar structure of the anterior part of the nose of *Ornithorhynchus*, and describes the condition as seen in a series of vertical transverse sections. While in the main I can confirm the correctness of his observations, my examination enables me to come nearer a definite conclusion as to the function of the septa or valves found in the anterior part of the nasal cavities.

Professor Symington describes and gives figures of the three compartments of the nasal passage seen on section, but in his sections he finds the middle compartment always the larger, and regards the partitions as the walls of two cæcal pouches placed one above, the other below the air-passage. He opposes the view of Meckel † (the only other anatomist who appears to mention them) that the flaps form a nasal valve, and states that in his sections "they do not appear sufficiently large and free to meet one another so as to close the anterior part of the nose," and adds that "it is obvious that, were they to do so, they would constitute a serious obstacle to inspiration of air through the nose."

In making sections of the beak of *Ornithorhynchus* recently to study Jacobson's Organ, my preparations, I found, threw unexpected light on the valves. The *Platypus* had been shot in the head, and one small lead pellet had injured the outer wall of the nasal passage on one side, driving a little piece of cartilage into the middle of the passage. Here, on section, it was found firmly held by the two flaps of the valve. Not only had the flaps come together, but the contraction was further indicated by the walls

* Proc. Zool. Soc., 1891, p. 575.

† *Ornithorhynchi paradoxii* descrip. anatomica, Lipsiæ, 1826.

being thicker than on the other side where the valves were relaxed. Though I have been unable to detect involuntary muscular fibres, it is almost certain that such exist, and that the valves serve to prevent the entrance of water and solid particles into the nasal passage. Whatever be the mechanism by which the valves act, my preparations show that the flaps can, and do, meet in such a way as to occlude the air-passages. I trust to be soon in a position to unravel the working of the flaps from an examination of the live animal.

Addendum (17th September, 1896).—Although I have not had an opportunity of studying the action of the valve in the living animal, I have found, in a Platypus just recently killed, that the valve acts so perfectly that it is quite impossible to inject water with a syringe into the nasal passages from the external nasal openings.

R. B.

A Short Account of the Meeting of the Scottish Cryptogamic Society in Glen Urquhart, 1895.

By Professor THOMAS KING.

[Read 24th September, 1895.]

THE Cryptogamic Society of Scotland, which was formed twenty years ago, meets annually in some part of Scotland. This year the meeting was in Glen Urquhart, which opens into Loch Ness about fifteen miles south of Inverness. Most of the active members of the Society are mycologists, hence more attention is given to fungi than to any other division of the Cryptogams. Professor J. W. H. Trail, Aberdeen, was the president at this meeting.

Tuesday, 17th September, was to be a great day in the woods, but the unfavourable weather limited operations to short sallies with umbrellas. Dr. Stevenson of Glamis and I, seeing at one place good bare ground under some fir trees, we proceeded there, and found at once three interesting species—*Clavaria abietina*, Pers., a much-branched yellow species, which turns green when rubbed; *Spathularia flavida*, Pers. (one of the Discomycetes), a species which I have gathered only three or four times; and *Agaricus hæmorrhoidarius*, Kalchbr., which becomes red when cut, as if blood were oozing out, whence the name. The last-named has close affinity with the Common Mushroom.

Wednesday, 18th September.—The morning of this day was wet, like the previous one, but after noon we had a fine day, without a shower. We went first to the Falls of Devach, about two miles off. Here we set to work, and before five in the afternoon had found a good number of fungi, including *Hygrophorus cerasinus*, Berk., which gets its specific name from its smell, which resembles that of the leaves of *Prunus Laurocerasus*, the Common Laurel; *Craterellus cornucopioides*, Pers.; *Dædalea quercina*, Pers., on dead oak, the last-named with its pores arranged like a labyrinth, recalling Dædalus, the ingenious Athenian, who made a famous "maze" for Minos, King of Crete; *Agaricus sulphureus*, Bull., a

strong-smelling species; *A. vaccinus*, Pers., with a shaggy pileus, recalling a cow's hide; *A. hirsutus*, Lasch., a rare species; *Nyctalis parasitica*, Fr., which was frequent on dead Russulæ; *Lactarius uvidus*, Fr., an uncommon species, which is lilac in colour when cut; *L. vietus*, Fr., *L. volemus*, Fr., both uncommon; *Cantharellus infundibuliformis*, Fr., *Boletus pachypus*, Fr., the last-named uncommon; *B. versipellis*, Fr., *B. piperatus*, Bull., both frequent; *Polyporus igniarius*, Fr., which is used for burning; *P. perennis*, Fr.; *Trametes pini*, Fr., which before this occasion I had only seen at Rothiemurchus on Scotch Pine; *Elaphomyces granulatus*, Fr., a rare subterranean species, related to the truffle; and *Peziza macropus*, Pers.

Thursday, 19th September.—On this date, in fine weather, we did very well, although the party was breaking up. Among the species found I may mention—*Pavillus atrotomentosus*, Fr., which was rare; *Agaricus equestris*, Linn., was uncommon, and is very like *A. sulphureus*, Bull., but without the bad smell; *A. flammans*, Fr., a bright-yellow species, which was frequent, as were also *A. mappa*, Fr. (a white one), and *A. porrigens*, Pers. *Cortinarius armillatus*, Fr., which we do not find near Glasgow, was one of our discoveries; it is easily recognised by its vermilion ring. *Helvella lacunosa*, Afz., was found; and near the end of our search the two rarest we had yet come across—*Polyporus Schweinitzii*, Fr., a rare species, black in colour, and as large as a Kilmarnock bonnet, and *Sparassis crispa*, Fr. Dr. Stevenson says of the last-named in his "British Fungi," vol. ii., p. 289, "Like a large sponge, edible and delicious, but too rare to be of value as an article of food." I had never seen it before. It grew on the ground, at the root of a Scotch Fir.

Friday, 20th September.—On the forenoon of this date I visited Culloden, and returned to Glasgow in the afternoon, well pleased with my visit to the north.

Observations on the Habits of Echidna (*Echidna aculeata*, Shaw).

By ROBERT BROOM, M.B., C.M., B.Sc., Taralga, New South Wales.

IN the neighbourhood of Taralga, N.S.W., the Echidna is frequently found, and during my residence here I have had numerous specimens brought to me. Although the animal has a wide range in the Australian continent, it is probably nowhere very common, its scarcity being due probably more to the numbers killed by the blacks for food than to natural enemies. Now, however, that the aboriginal race is dying out, it is likely that the Echidna will become more numerous, and in the wild regions of the Blue Mountains it will probably long have a retreat which will be away from the track of advancing civilisation. Most of the specimens seen are those that have wandered from the wild regions of mountain and gully into the cleared sheep-pastures or cattle-paddocks.

When an Echidna is seen walking about its movements recall those of the tortoise. The gait is clumsy, and the limbs are moved with apparent mechanical deliberation. The animal has evidently little feeling of danger, as if conscious of its own superiority to all attacks. When undisturbed it walks with its head well forward and the spines quite flat along the back, occasionally lifting its snout high in the air, sniffing, as if to try and catch the scent of ants carried by the breeze.

When taken into captivity its bids for liberty are most persistent and rather annoying. A cage is perfectly useless, as the animal at once tries to force a passage through the wires. Unless the wires be firmly twisted together, as in wire netting, it is almost certain that ere long the Echidna, with its enormously powerful fore-limbs, will have torn the wires apart and made good its escape. Should the wires prove the stronger, the Echidna, apparently indifferent to pain, will continue hour after hour trying to force a passage, tearing the skin from the sides of its head and snout. One specimen I left in a box, with wooden spars nailed

across the top, in a few hours had wrenched off two of the spars and made its escape. After trying various sorts of boxes, I succeeded in finding a satisfactory means of keeping the animal, viz., a strong canvas bag. In this the Echidna is powerless, as he can get no foothold, and even though the bag be closed as tight as possible there is apparently enough air admitted to keep the animal alive.

When an adult Echidna is captured and placed in confinement, he will most probably refuse all food or drink for some days. Usually a week will elapse before he will condescend to take even water. So great is their power of endurance that they will keep in fairly good condition without food or drink for five or six weeks. When once the captive can be induced to take water, it can be comparatively easily tamed. Milk it becomes very fond of, and if finely minced raw meat be mixed with the milk, a diet can be provided which is apparently well relished, and on which the animal thrives. I have found it most suitable to give a good meal only once in the two days. A large adult will easily take an ordinary tea-cupful of milk and mince-meat.

If an Echidna be placed on an ant's nest it at once sets to work. Seated on a tripod, formed of the two hind legs well advanced and the little stumpy tail, it uses its front feet and its snout for opening up the various passages. The long sharp snout is thrust down one of the passages, and from it the long vermiform tongue sweeps out and in all the neighbouring passages, clearing them in a few seconds of all ants and eggs. The tongue can be put out about four inches, and has a curious power of following the exact curves and twists of the passages. When the snout is deeply pushed into a passage, the point of the tongue will be seen whipping out and in other passages two or three inches away. When the ants have been cleared out of all the passages, the long front claws are pushed in by the side of the snout, and the passage forcibly opened up, allowing the snout to go an inch or so deeper. The pupæ and larvæ seem to be especially relished, and seem always to be preferred to the ants themselves.

In the Taralga district the Echidna seems to breed about September and October—considerably later than in the warmer parts of Australia, where July is apparently the usual season.

One or two eggs are laid about twenty-seven days after copulation. When the egg is laid the degree of development of the embryo corresponds roughly to that of a third-day chick or a ten-days' rabbit. The amnion is not closed, and the allantois has apparently not begun to form. It is probably a couple of weeks later before the egg is hatched. During the period of incubation the egg is carried about by the mother, placed in the bottom of the temporary pouch, and secured by the abdominal hairs plastered across it. After hatching, the young is apparently carried about till it is a good size, and able to look after itself.

Remarks on "The London Catalogue of British Plants," Ninth Edition, 1895.

By PETER EWING, F.L.S.

[Read 26th November, 1895.]

IN recent years a good number of botanists have devoted much time to special orders of plants, and the result of this has been the splitting up of many species. Whether this will be for the general good of botanical study or not, time will tell. In my opinion it will be much against it.

That great strides have been made in nomenclature, and in the definition of species, in this branch of science since the year 1886, when the last edition of this Catalogue was issued, cannot be denied. Those reading botanical magazines have been led gently on with the particulars of one new form after another, so that it is only when you get the whole of the admissions laid before you at once, and compare them with the formerly admitted species, that you feel that this is being overdone.

In such a large matter as the British Flora, I think a description of the plants should have preceded the list. This would have kept many, like myself, right in the nomenclature, and prevented some irritation, although a little of this seems unavoidable in our search for finality. In nomenclature no sooner does one botanist change a name than another at once turns up with a proof that he is not right yet, and this goes on *ad infinitum*. Let us take one or two of the plants common in Clydesdale. For instance, in the 7th edition, published in 1874, we have *Nuphar lutea*, Sm.; in the 8th edition, published in 1886, *Nuphar luteum*, Sm.; in this (the 9th) edition, *Nymphæa lutea*, Linn.; while the plant formerly known as *Nymphæa alba*, Linn., is now known as *Castalia speciosa*, Salisb.; that formerly known as *Corydalis* now becomes *Neckeria*; *Capsella Bursa-pastoris*, Moench, now becomes *Bursa Bursa-pastoris*, Weber. In the 7th edition we have *Spergularia rubra*, Fenzl.; in the 8th, *Lepigonum rubrum*, Fr.; in the 9th, *Buda*

rubra, Dum. In the 7th edition we have *Convolvulus sepium*, Linn.; in the 8th, *Calystegia Sepium*, R. Br.; in this, *Volvulus sepium*, Junger. As to specific names I need not speak, the changes are too numerous to mention. Now, as there are some who question the accuracy of many of the changes made, there is no reason to believe that the next edition of the Catalogue will contain fewer changes than the present. The only consolation that collectors have in looking forward to the next edition is that a great many of the species, varieties, and forms presently admitted will be wiped out. The appropriation of the function of a Flora by this edition of the Catalogue is a feature that I consider objectionable. I look upon all forms of a species as varieties of that species, and if the plant is a form of a form, then it is the duty of a Flora to show that, and not that of a catalogue; and the same remark applies to hybrids of a plant. If a plant shows signs of hybridization, and is distinct from the others of the genus, then it deserves specific rank, as I believe it is through intercrossing that we have got our variation of species, and not by special creation; but be that as it may, it is not the duty of a list of plants to tell how they came into being. As to the Rubi, Rosæ, Hieracia, and Salices, during the last ten years, in my efforts to compile a list of West of Scotland plants, I have passed many hundreds of these through my hands. No doubt, Mr. A. Bennett, F.L.S., of Croydon, has got a decision on most of the forms for me, but, as a rule, one does not get a definite name for these plants. That being so, it is with qualified pleasure that one looks over the additions that have been made to the list since the 7th edition was published. My own feeling is that the work of splitting up has just begun. Rubus and Salix have got a fair start, Rosa is hardly begun; and as for Hieracium, I think it has been overdone. The last-named genus, in the 7th edition, contained 35 species and 14 varieties; the 8th edition, 40 species and 19 varieties; and now we have 104 species and 114 varieties, 2 hybrids, and 1 form, 5 of the species being represented only by varieties. This gives in the last three editions, 49, 59, and 221 names respectively. To the late Dr. F. B. White, of Perth, we are first of all indebted for our knowledge of such an extensive hybridization of the willows; and if the names of the varieties given in his list had been used and the parents stated in a Flora,

no objection could have been urged to the use made of his labours, but, in my opinion, it has been misapplied here. The numbers of species and the alphabetical characters for varieties as a medium of exchange were extremely useful for collectors; but now, so far as the willows are concerned, to convey an idea of your duplicates and desiderata is a very tedious process. The trouble in clearing up doubtful species must have been not only laborious, but thankless, in the majority of cases, as many have not been backward in expressing derogatory opinions of the splitting process. I think, however, that the collector may, not without reason, object to all these names being thrust on him until he is shown what they all mean.

Now let us have a look at what constitutes species, variety, or form, according to this catalogue. On looking over the list one is surprised at the number of forms that have got distinction because of the colour of their flowers varying, others because they have, generally owing to situation, their leaves more cut than others, or stems and leaves more hairy than others.

[27] About *Ranunculus Flammula*, Linn., and its forms I have perhaps said enough elsewhere, but these come first for remark here. The form *pseudo-reptans*, Syme, has given place to the *radicans* of Nolte, but for what reason we cannot guess. *Pseudo-reptans*, Syme, is a creeping form of *Flammula*, or at least one producing roots at the nodes, whereas *radicans*, Nolte, is a small creeping form of Boswell's *suberectus*, which itself is a form of *Flammula*. I think *reptans*, Linn., may be left as a species, as it seems impossible to get it established under artificial conditions, and certainly in the dried state it is a very different-looking plant from var. *radicans*, Nolte. As to the *R. petiolaris* of Marshall, I fail to see why this should come after the *reptans* of Linn., unless it be to add a little more weight to its specific rank. It is, to say the least of it, nearer *Flammula* than *reptans* is.

[55b] *Castalia speciosa*, Salisb., var. *minor*, DC. This, in my opinion, is a semi-aquatic form of the species. I have never seen it with its roots under water during the whole year, but it is common on the margins of hill tarns, where the species is found.

[113-117] No doubt Mr. Marshall has done a good deal to clear up the forms of *Cochlearia* as found in upland situations, but I feel confident that the last word has not been said about them

yet. I have long looked upon Watson's *alpina* as the alpine form of *officinalis*; the new species named *micacea* by Marshall as the alpine form of *anglica*; and *grænlandica*, Linn., as the alpine form of *danica*. All these forms I have sent to experts different times, but they did not happen to be splitters.

[548] *Alchemilla vulgaris*, Linn., and its forms have long troubled those of us who have paid the least attention to the species. I have tried many good botanists with them, but none seemed inclined to move until Mr. G. C. Druce, M.A., F.L.S., took them up in a paper on the species in the "Annals of Scottish Natural History," January, 1893. I made a few remarks on them myself in the *Transactions* of this Society for 1894 (Vol. IV., N.S., p. 40). After I had sent a short communication on the subject to the "Annals of Scottish Natural History," July, 1893, the Rev. E. F. Linton, M.A., took them up, and sent some specimens to M. Buser, of Geneva, who has cleared them up so far. The result is that we have our old friend *montana*, Willd., discarded, and three varieties put in its place. These are:—(a) *pratensis* (Schmidt), this is our common shady way-side and woodland plant with hairy stems and petioles, but no hairs on its calyx; (b) *alpestris* (Schmidt), having a light yellowish-green foliage, with very few hairs on any part, and often shining stems and ruby-coloured petioles, mostly confined to alpine rills and wet ledges, but I saw it in Dumfriesshire this year; and (c) *filicaulis* (Buser), which we all know by the name of *montana*. It has a hairy calyx, and is very common on exposed and dry places, being abundant about Milngavie, near Glasgow.

[723b] *Heracleum Sphondylium*, Linn., var. *angustifolium*, Huds., has been long kept out of the Catalogue. I do not consider that there would have been much harm done if it had been left out yet, as it is only a form that runs badly into the species, and it is only on the dry trap rocks in the East of Scotland, and in similar situations elsewhere, that it strikes one as being at all distinct, or worth passing notice.

[810b] The reason for still keeping in var. *radiata*, Sond., of *Bidens cernua*, Linn., and not including *Centaurea nigra*, Linn., var. *radians*, I cannot understand.

[1190b] *Rhinanthus Crista-galli*, Linn., var. *Drummond-Hayi*, F. B. White. I am glad to see, for the sake of these two old friends,

that this has got a place, but could have wished that they had both been associated with some other alpine plant more likely to stand, as this is only a very pubescent form of *Crista-galli*; its pubescence depending a good deal on its situation, in my opinion. It is nearly twenty years since Dr. F. Buchanan White first drew my attention to this plant on Ben Laoigh.

[1404] *Salix Arbuscula* + *phylicifolia*, (*Dicksoniana*, Sm.). This, so far as I know, is the only plant admitted into the Catalogue that no one has collected but myself, but, according to latest accounts, it is of doubtful value.

[1677b] *Carex ovalis*, Good., var. *bracteata*, Syme, has still got a place, so we may expect that the next Flora will give us the length of the bract in inches that constitutes the variety. As is well known, most plants of this species have a bract of some sort, and specimens with and without the bract can be got in the same tuft.

[1805] [1806] *Poa glauca*, Sm., and *P. Balfourii*, Parn., are bracketed together, but why I cannot tell. No doubt these alpine forms have got a help in the right direction; but the editor of the Catalogue must have seen that the form described as *glauca* by Smith and that as *Balfourii* by Parnell are two very different plants. At the same time our hill Poas and Festucas are in a poor way, and form a hopeless muddle.

[1911b] *Equisetum arvense*, Linn., var. *alpestre*, Wahlenb. I first sent this plant to Mr. Bennett, in 1882, from Ben Laoigh, and he named it with a ?, but Mr. Marshall got it in a barren state on Ben Laoigh a year or two ago, hence it appears in the list. I sent fresh specimens in fruit to Mr. Marshall from Ben Crubin, Killin, last year, but as they were sent by me they had to be cultivated, and although the Messrs. Linton were within a few yards of me on one occasion when I gathered it, they too wished to see it cultivated.

I now make a few remarks on some forms that have not got a place in this great list. I refer only to such as present distinctions readily appreciable.

[378] *Anthyllis Vulneraria*, Linn., var. *micacea*, Ewing. This species has up till now appeared with only one variety, *Dillenii* (Schultz). This has now been replaced by three varieties, and as I have no description of any of them, so far as I am aware, I labour under a disadvantage. The var. b. *coccinea*, Linn., I expect has

taken the place of *Dillenii* (Schultz); var. c. *ovata*, Bab., is a form found in Shetland with the terminal leaflet ovate. Mr. Bennett does not think that my plant will come under the last-named. Var. d. *Allionii*, DC., I know nothing about.

[727b] *Solidago Virgaurea*, Linn., var. *angustifolia*, Gaud. As variety b of the species has been omitted in this list, I do not suppose that any one could have proved that the variety *cambrica* (Huds.) had any better right to be left in. I would have left them both in; the one as (a) *angustifolia*, and the other (b) *cambrica*; as most botanists know *cambrica* is only the upland form of the species.

I would like now to say a word or two on the Carices.

[1688d] Variety *erythrostachys*, Hoppe, is a very well marked hill form of *Carex flacca*, Schreb., and not at all rare.

C. [1701] Variety *tumidula* (Laest.) is a very well marked form of *C. panicea*, Linn., and seems to prefer upland situations near the sea.

[] *C. sparsiflora*, var. *borealis*, Anders., is surely worthy of a place; the geniculate stem catches the eye at once on the summits of our higher mountains.

[1705] Forms of *C. capillaris*, Linn., have at last been admitted by English specialists, regarding which reference may be made to the "Scottish Naturalist," Vol. IV., p. 102. The paper of mine which is referred to there, I read before this Society, 29th March, 1887 (*Transactions*, Vol. II., N.S., p. 111). The variety *alpestris* of Andersson is very common in Aberdeenshire and Forfarshire, and also *major et robustior* of the Flora Danica. How these conspicuous forms have not been gathered by those responsible for the lists I cannot understand.

[1716] *C. flava*, Linn., has got quit of its two old friends, varieties *minor*, Towns., and *lepidocarpa* (Tausch), and in exchange has got other three varieties. This is an improvement, even although our old friend *Ederi*, Ehrh., has been reduced to one of them. This species is only in the transformation stage, and there appears no end to its nameable forms.

[1722] We have one or two very distinct forms of *C. rostrata*, Stokes. The form *brunnescens*, of Andersson, is one that deserves a place.

As to the species named *C. spiralis* by myself, I saw a number of plants of it this year, but must refer to the *Transactions* of this Society quoted above.

[1802] Varieties of *Poa alpina*, Linn., are, in my opinion, worthy of a place. I can only refer to the *Transactions* of this Society (Vol. II., N.S., p. 113), and the "Scottish Naturalist" (Vol. IV., N.S., p. 103).

I should have liked very well to have introduced a great many of my flowering plants, including Carices and Grasses, but I must defer this. I am not certain that I have given my Scandinavian forms of these plants the publicity which they deserve.

Jottings from my Note-book.

On *Lima hians*, Gmel.

By DAVID ROBERTSON, LL.D., F.L.S., F.G.S.

[Read 23rd December, 1895.]

I BEG to submit the following notes on a new departure, so far as I know, practised by *Lima hians* in nest building. I have long known the habits of these creatures, making "the readiest serve the needfulest" in constructing their nests. When suitable materials are not procurable the next best are taken. Where melobesia is plentiful they build with it freely; if such is *not* to be had, shells, stones, and other debris are used. Although they usually prefer small material, they sometimes contrive, in want of better, to use shells over $2\frac{1}{2}$ inches long, and nearly as broad. In other cases, where hard materials are not obtainable, soft filamentous algæ are utilised. In the absence of any of these, as when the animals were confined in a glass jar, they built in the angle between the sides and bottom of the vessel with their own byssus.

Lately, for the first time after many years' dredging, I found three of these animals on different parts of a frond of *Laminaria saccharina*, Lam., with the edge of the frond tucked over them, firmly tied down by their byssus into a very secure shelter. In this case the adoption of the frond is all the more remarkable, as it was lying over a bank of their favourite building material, melobesia. It may be a question whether the animals have the power to draw the edges of the bulky frond over themselves, or whether it is an irritation caused to the frond by the limas giving it a tendency to fold over—most likely the latter—as it is usual to find the fronds of sea-weeds and leaves of land plants crumpled over the lodgment of the infesting animals. On the other hand, the large shells and stones they use in making their nests, and the difficult position they are sometimes placed in, give support to the

possibility that they can bend the frond to serve their own wants. I may state that I have used the word *nest* of *Lima hians* only as a convenient word for nest-like structure.

I have examined hundreds of their nests, and never found more than one of these animals, old or young, in the same nest:—that is to say, if the nests were perfect; for two or three might readily get, by accident, into a torn or open nest. *Lima hians*, like most of her kind, sends adrift her thousands of ova to care for themselves in the open sea; and by the time they have obtained the size of little more than the quarter of an inch they build for themselves.

On *Cancer pagurus* (Linn.).

[Read 31st March, 1896.]

It is not unusual to find crabs parti-coloured, and resembling in some degree the materials among which they live, and there can be little doubt that this characteristic may afford them protection from their enemies. These markings often assume curious forms, and, with a little exercise of the imaginative faculty, marvellous likenesses of animated nature may be discovered. Some of the members of the Society may remember a paper read by the late Robert Gray, long its Secretary, describing the Shore Crab, *Carcinus mœnas*, Leach, as having the likeness of a balloon on the carapace, with a man in the car and a flag at each side. The markings represented the balloon, car, flags, and man so closely that some doubted if nature ever so imitated art in detail. *Cancer pagurus*, Linn., the common edible crab, the subject of the present short note, has nothing quite so remarkable about it. Bell, in his "History of the British Stalk-eyed Crustacea" (page 60), in referring to the species, says, "The colour above [is] reddish brown; in younger individuals with a purplish tint, the legs more red, the claws black." The singularity of the specimen now exhibited is that the carapace is white all over, together with

the first three joints of the first pair of legs. Change of colour in this species is the more remarkable in that it is seldom seen bearing parti-colours or adventitious matter of any kind. This may arise from the young at least being mostly under stones, and requiring no further protective device to elude their enemies.

On *Amphidotus cordatus*, Penn.

[Read 30th June, 1896.*]

THIS species is plentiful on all our sandy shores, burrowing in the sand to the depth of four or five inches, and communicating with the surface through a small opening about the diameter of a black-lead pencil. This hole is a good guide to where they lie. They are constant burrowers in the sand on the tidal belt, from half-tide to some distance below low water, but occasionally I bring the young up in the dredge from deeper water.

Captain Turbyne informs me that in Loch Striven, in a depth of ten to twelve fathoms, a large quantity of them came up in the trawl, none of them larger than an ordinary gooseberry. There can be no doubt that in both cases they were taken on the surface of the bottom. In searching for them at low water, it is a rare occurrence to find one of the young, which leads me to suspect that they do not burrow in their early stages.

Although I have not found adult live animals in deep water, it is quite likely that they may be there, as the young are, although the dredge may not reach them. The following circumstance gives some confirmation to the idea that this may be the case. Last winter, after a storm, a large number were thrown up on the sandy beach at Kames Bay, Millport. There would have been little difficulty in gathering a bushel of them. They were all without the spines, and empty, showing that they had been dead for some time, and most likely on the surface of the sand, as they were nearly all well bleached. Finding so many of their dead tests on the surface of

* *Vide Trans.*, Vol. I. (N.S.), pp. 290-293.

the sand goes far to prove that they came up out of their burrows to die. I have noticed that those I have had in confinement do the same.

What I wish chiefly to bring forward just now with regard to this species is its habit of travelling under the sand—a habit that I am not aware of having been hitherto noticed. In following out some other experiments on the animal, I placed one of them in a glass vessel, covering it with sand, and allowing only the tips of the long dorsal spines to remain bare. Leaving it for the night, I found in the morning that it had travelled under the sand eleven inches, and its course could be traced by the track the tips of the spines had made on the surface. No attention was paid to the animal during the day, further than to observe that it was still in its burrow. Next morning the test was half-exposed above the sand, and the fine undulations that it had made on the surface showed that it had travelled considerably further above than it had done the night before underground. We may assume that the greater progress it had made on the surface was because of the less resistance it had to encounter. When we consider the broad front of the animal we will have some idea of the energy required to push its way through the stiff sand. We can scarcely believe that the progress they make under the sand is accomplished by mere pressure, but rather by the mining action of the spines.

The Coloration of Fishes.

By W. ANDERSON SMITH.

[Read 31st March, 1896.]

THE question of the coloration of all animal and vegetable life is one that has occupied the minds of naturalists more and more of recent years, since Darwin brought so prominently forward the remarkable instances of colouring evidently for a special purpose, and directed inquiry into fresh channels.

If we reason from analogy, there are various groups of causes that produce marked colour effects on the animal and vegetable world; and as the dividing line between these two kingdoms is intangible, and the characters intercross, it is reasonable to suppose that similar causes are at work throughout the living world of Nature. It does not at all hold good, however, that the most common and apparent cause is the one that is always uppermost, and the most reasonable and readily suggested may also be far from the real one.

In this paper I neither pretend to pose as original or final, but seek to state succinctly my views on an interesting problem, in the hope that it may stimulate other workers in the same field, and perhaps prove suggestive or directive.

The first general principle we may safely accept is that of light. There is no question that tropical and inter-tropical fishes are more brilliantly coloured than those of the zones more temperate or less within the influence of the sun. No one acquainted with the brilliant hues of fishes from the warmer seas can question this, and the influence of light as a decorative agent consequently holds, in my opinion, the first place, however otherwise modified. There are some curious apparent exceptions to this, some of which I will refer to; but broad principles must be based on broad areas, and although we may not be able to explain the exceptions to our satisfaction that does not make them inexplicable. On the same

general lines I would place the fact that deep-sea fishes and bottom fishes are less highly coloured than those of shallow seas and surface swimmers. If we take our cod family as bottom swimmers, and the mackerel as surface, to an extent, we have a fairly good common set of examples. And again, on the same grounds, I should say that off-shore fishes are less highly coloured than those nearer the tangle zone, where light is more plentiful and accessible.

There are numerous side issues to this general principle, and although at first sight such principle may alone be responsible, yet it may not! Thus, although the upper portions of fishes are richer toned, and the bellies deficient in colour, if not entirely devoid of it in a general sense, the direct action of light may not really be the primary, and, still less, the sole cause. At the same time, when we take the flat-fish as an example, they would, as a group, prove that so soon as they turn one side away from the light that side loses its pigment and soon becomes non-coloured, however brilliantly the upper and exposed surface may be tinted or hued. The many individual instances to the contrary, in which our commoner flat-fishes are semi-coloured or, occasionally, even as richly parti-coloured on the lower as on the upper surface—and these are commoner than are generally supposed—are probably merely reversions to an original type, when both sides were equally illuminated. They can scarcely be looked upon as having anything to do with light in the special specimen captured. Even this, however, is not an impossibility, as was shown to an extent by Mr. J. T. Cunningham, in his interesting experiments in rearing flat-fish with lights thrown upon them from below as well as from above. I am more disposed to look upon the ordinary exceptions produced as merely reversions. Yet in the so far analogous instances of some of the Echinodermata, such as *Palmpipes*, which has often a brilliant band on the lower surface, usually hidden in the mud, they have a habit of occasionally curling up, which gives them a possible opportunity of colouring the outer fringe. In this position they much resemble a transition stage to the sea-urchin—which, indeed, they are supposed to be.

After the general principle of direct sunlight comes the secondary principle of surroundings and ground frequented. This may occasionally be attributable, either directly or indirectly, to the

same action of sunlight. The case of Trout (*Salmo fario*, Linn.) kept in a white basin losing their colouring, and approximating to the no-colour of the dish, is well known, and has been experimented upon by many since Stoddart proved it as a fact on Tweedside. Minnow (*Leuciscus phoxinus* (Linn.)) are frequently kept in this way by anglers, in order to brighten and clear them before using them as a bait. Fishermen are also well acquainted with the fact that flat-fish especially vary with the ground from which they are taken, and this may either be from the direct action of light or from *sympathy*. I use this term indefinitely, not with the intention of begging the question as to its mental, physical, or other cause. I have noticed such changes more rapidly and definitely in lower forms, or at least higher forms of a lower class, such as the Cephalopods. As these are intelligent and predatory, they may produce these changes by the sentiments of passion or fear, so that we must yet be careful not to jump to conclusions in regard to their changes resulting from the "sympathy" in question. There are, however, certain fishes amongst which individuals may be quoted as taking particular colouring under special and marked surroundings. Thus young Cod (*Gadus morhua*, Linn.) of a given development, caught towards the tangle zone, and commonly named Rock-cod, are markedly more brilliant in colouring than their fully-developed congeners, living in the deeper waters, and frequenting the bottom. Where cod can locally find nourishment in similar localities up to the full size, they retain the same colouring to a great extent, and almost look like a different species. Indeed, according to an admirable worker in this direction—Captain Dannevig, a Norwegian—the two classes of cod are very notable off the coast of Norway. Further, he finds that their colouring is distinct, even from the earliest stage, the ova of the one showing markedly tinted compared with the colourless globules of the other. This he has himself shown me. I do not believe this distinction, however, to be even varietal, but individual, and showing that the prevailing tint acquired is less evanescent than might have been anticipated. On the other hand, as all the frequenters of the same zone are more richly toned, the colouring may come in all reasonable likelihood from the food, and tint the growing ova along with the creature itself. We may reach a further step in this inquiry by examining the

young Coal-fish or Saithe (*Gadus virens*, Linn.). As is well known, this fish is so named from its dark flesh and generally dingy appearance in the adult stage. But a shoal of young Saithe, two or more inches in length, from the tangle area, are wonderfully richly coloured, and, in many cases, are beautiful creatures. Still more is this the case with the young Lythe or Pollock (*Gadus pollachius*, Linn.), a greater liver in and frequenter of tangle-covered areas than its congener. These are sometimes very gay indeed, and yet do not retain their external gaiety of appearance into the adult stage. If the Rock-cod were to live upon these bright youngsters, as they do to some extent, no doubt they might be influenced themselves, and the pigment absorbed might have its effect. Another, but less-known, member of the family—the little Five-bearded Rockling (*Motella mustela* (Linn.))—that dwells in-shore and amongst the tangle, becomes so much of a golden-syrup colour at times as to vie with the Gold Carp itself in glory, but removed from its locality it very soon loses this. This colouring, depending upon locality and surroundings, therefore, cannot be proved to be the result of any isolated cause, and may arise from a sudden “sentiment;” from the action of light as reflected from the rich tints around; from feeding, originally springing from the same vegetable colouring; or from what may be termed the third cause of colour, namely, protective colouring.

It is impossible to cover in any such paper the whole ground of the marvellous variations—apparently purely protective—in colour and in form that take place in fishes as in other departments of nature, but only to refer to it in so far as it comes specially within our argument. Certain broad facts tend to protection, and yet may not be in any degree dependent upon the effort after concealment, or even accentuated by its tendency towards the security of the species. Thus, if we look down on a shoal of Herring (*Clupea harengus*, Linn.) or Mackerel (*Scomber scomber*, Linn.), they so assimilate to the greenish-blue of the sea that no better colour could be devised to ensure them against even the keen sight of sea-fowl. Again, predatory fish looking up from under such a shoal will only meet the colourless under-surface between them and the entering light. But it can scarcely be supposed that in either case any real advantage thereby accrues either to the species or individuals. The deepest colour is on the surface, where the light

strikes strongest, and it tapers away to the under-surface, where the light does not directly strike at any time. Could it be that even if herring swam with their gleaming sides uppermost it would matter much, or expose them more to the onslaught of enemies from above or below? Yet why is all the beauty and glamour on the sides? And can any ordinary Darwinian reason be advanced for the glorification of a gregarious fish, that cannot now desire to do more than keep close to its brilliant neighbour, with the chance of escaping in the *mêlée*, if attacked by the larger marine Carnivora? Yet it is a significant fact that when a herring is most on its own responsibility and engaged in the struggle for existence—in the gut-poke stage—it is least brilliant and least notable! This points, perhaps, more to the effect of rich feeding than to any other cause of brilliance, and we will find this determining cause also in other instances. Meantime, this brings us to the fourth cause of brilliance and colouring—sex selection, or the sentiment and excitation of sex.

The idea of sex and its consequences, so vital as a ruling influence in the animal world, does not generally appeal to the ordinary intelligence as a matter of special importance amongst the finny tribe. Only where animals mate, whether as monogamists or polygamists, would sex be reasonably expected to exercise any special influence; and the fishes of commerce, at any rate, with the exception of the Rays (*Raiidæ*), are not under either category. But yet there is an interesting class of fishes that is amongst the highest in intelligence and the most charming in colouring of any in the temperate zones, which vie with terrestrial animals in attention to their mates, and care of their offspring up to a certain stage. The best known of this class of fishes is the little Stickleback (*Gasterosteus*), the male of which is so pugilistic, so be-crimsoned in the mating season, so careful in the construction of a nest, and so heroic in its defence. It has been so often described in this capacity that it is sufficient now to refer to it. But it is really only a type of the shore fishes. The Gunnel Fish (*Centronotus gunnellus* (Linn.)), with its row of brilliant spots along the dorsal edge, is monogamous apparently, and watches over its sickening mate and her walnut of expanding ova with attentive care. The Blennies (*Blenniidæ*) are another group that demands closer study in this connection, and so far as

I have had an opportunity of watching them in the breeding season they are equally domestic, as they are undoubtedly intelligent. The fact that one is viviparous points to closer relations between the sexes in this genus, and supplies fresh reasons for the gay and attractive ornamentation of some species, such as would hardly have been anticipated. Perhaps the gayest of the whole shore group, however, is that comprising the various Sucker-fishes (Gobiesocidæ), and it may be worth while examining them more particularly in case they may throw some light on the whole question of coloration.

In the first place, then, Sucker-fishes differ from gregarious and most deep-water fishes in a distinct difference in appearance between the male and female. This in itself is a great advance in differentiation, and allows for the development of the sexual affections and sentiments in a way that may be said to "civilise" the possessors. Along with this, there is a great variation in individual appearance, such as results from the domestication of terrestrial animals, but is not commonly found amongst any wild animals whatever. This differentiation has made the elucidation of species exceedingly difficult, so much so that no two works agree in these, and I cannot quite find myself in agreement with any of our standard works. Here, then, we have a charming group of fishes, trusting mainly to its inshore habitat and concealment under stones for escape, and displaying its charms to the best advantage, and the colouring of which, in all reasonable probability, is the result of sexual stimulation. One of these taken in deeper water, the dainty little Two-spot Sucker (*Lepadogaster bimaculatus* (Donov.)), that specially haunts scallop-beds, and chooses an empty and partially open scallop-shell for its ordinary nursery, presents fewer variations than its more tangle-zone congener, the Cornish Sucker (*Lepadogaster Decandolii*, Risso). Yet we have taken specimens decidedly different from the ordinary type, and the most brilliant and charming little creatures we have ever seen emerge from the water. They are extremely domestic, and watch over their ova with assiduity. The same may be said of *L. Decandolii*, Risso, the male of which displays unwonted brilliance in the breeding season, and gives great prominence to the row of spots along the dorsal fin. It is probable that these, as in the similar case of the Gunnel Fish, are

a protection, and may simulate eyes, or by some other means, not apparent, deceive their hereditary foes, or otherwise assist them to their own food supply. A variety, of which I have only taken one brilliant specimen, has developed the idea of "eyes" still more prominently and boldly; even to a more prominent and decided extent than in the case of the Two-spot Sucker, if the spots in this case are really protective, situated where they are. The specimen from Canna, where, no doubt, these delicate fishes are more exposed to enemies than in the protected lochs, had developed two large and brilliant "eyes" on the surface of the body, just behind the eyes proper. It thus presented quite a formidable appearance when first exposed to view, the great unwinking circles appearing to gaze defiantly at the spectator. These ocellated spots appear to be the type mark in Cornwall, yet are not present in our ordinary Scottish specimens, where the species is most plentiful. Are they developed in the presence of special danger? The little dainty Montagu's Sucker (*Liparis Montagui* (Donov.)) is as varied as its fellows, and jerks along from tangle frond to frond, to which it sticks, by its sucker, in the swiftest current, in varied tints of brown, or yellow, or chocolate, barred, or occasionally with network marking.

Of the largest of the class, the Lump Sucker (*Cyclopterus lumpus*, Linn.), I know little in the adult state, although I have taken myriads of the young, and hatched out the brilliant coral-tinted ova, so well known along our shores, but in the adult state it requires little protection in its ordinary habitat, and the male can afford to be known as the Cockpaddle, in which condition it is brilliant in orange and green. Where protection is desirable, it is forthcoming in the rough tubercles, with which it is covered, when it looks from above like an algæ-covered, barnacle-coated stone itself, when affixed to a stone with its powerful sucker. I have elsewhere called attention to the young, jerking along amid the capsules of sea-weeds, and so closely resembling them in size, and form, and colouring, as to require their occasional movement to indicate their presence.

There is one other fish, by far the most brilliant of our northern seas, whose glory of colouring is in keeping with his splendour of appointments. The male of the Skulpin (*Callionymus lyra*, Linn.) is so different from his sober-hued and dull-looking mate

that they were long considered separate species. The bold dorsal standing aloft, and the general rakish-looking style of the male, seem to assure him a certain security, as he is seldom found, where the female frequently is, in the stomach of the cod! He is, therefore apparently permitted to roam the seas—the outer seas too—in a burst of opalescent splendour, in comparative safety, to the admiration of the quiet lady, who is, no doubt, supremely proud of his attention. His protection is in *form*, his colouring is meant for his lady love! He is the one brilliant exception amongst the pelagic fishes, at least of the temperate waters, to the rule I have sought to explain as to the greater beauty, because of the greater domesticity, of the shore-fishes.

Returning to the shore, the common “Shoemaker” (*Cottus scorpius*, Linn.), especially that variety termed *Grœnlandicus*, is also a brightly coloured and knowing fellow; and the Wrasses and Sea-perches generally are finely coloured and varied, although with somewhat uncultivated tastes and tropical aspirations. Their habits, as a rule, enable them to indulge in the luxury of display, and the smaller domestic virtues and vices!

I am disposed to believe that the beautiful Herring has degenerated through over-population, and that its glory may have originally developed under quite different conditions. Its ova is deposited like that of an inshore fish; it is mainly through human persecution *when over-abundant* that it has been driven steadily seaward to spawn in deeper water, and it may once have charmed its mate by its glowing sea tints, as the flashing Skulpin or the dainty Sucker-fishes do to-day. It may even have been a fresh-water fish until stress of numbers drove it into a wider area, better supplied with provender. For over-population does not improve the domestic virtues, or stimulate monogamy. And there is a superficial resemblance, too, between the Herring and the Salmon (*Salmo salar*, Linn.). The silver sheen of both is readily removable and stimulated by feeding! The grey of the scales thus thrown out may be largely protective, as I find that the common Burn Trout covers its gay livery with silver when it has been but a short time in the sea. The Powan (*Coregonus clupeioides*, Lacépède), could it be gradually brought to exist there, would doubtless do the same. It has probably been found to be a protection, as well as esteemed a beauty. The

ordinary Burn Trout (*Salmo fario*, Linn.) I believe to be comparatively domestic. The Salmon at home is of a distinctly domestic tendency. But to the Salmon at sea, as to the other fishes congregating together in multitudes in the spawning season in the great deep, domesticity is a luxury that has been rendered impossible. These have either retrograded from, or have not advanced, and cannot afford to advance, to the civilisation of the shore fishes, when special sex coloration can be indulged in.

All the causes indicated are therefore at work colouring the fishes of the seas and rivers; sunlight pre-eminent, surroundings and habitat in its train, protective colouring in many instances, and sexual desire for display and self-glorification to a greater extent perhaps than we know. There is here a wide field for interesting observation, and our shore fishes lend themselves readily to the investigation.

Botanical Notes for 1895.—Wigtownshire.

By JAMES M'ANDREW, Assoc. Bot. Soc. Edin., New Galloway.

[Read 28th January, 1896.]

IN addition to remarks on the Flora of Wigtownshire in former short papers, I beg to submit the following notes, which may prove interesting.

For several years I have devoted the greater part of my holidays to the Flora of Wigtownshire. As the result of my labours I have compiled a list of the flowering plants of that county—a copy of which I sent your Society about a year ago. In addition to the plants therein given, during last summer I added the following as new records, chiefly from New Luce:—

1. *Hieracium gothicum* (Fr.), Backh. Luce Water.
2. *Hieracium auratum* (Fr.), Backh. Luce Water.
3. *Galium Mollugo*, Linn., var. *Bakeri*, Syme. New Luce Railway Viaduct.
4. *Centaurea nigra*, Linn., var. *radians*. Frequent at New Luce and Portpatrick.
5. *Melampyrum pratense*, Linn., var. *montanum*, Johnst. New Luce.
6. *Utricularia intermedia*, Hayne. Near New Luce.
7. *Barbarea stricta*, Andrz. New Luce (Mr. R. C. Lupton).
8. *Potamogeton perfoliatus*, Linn. Lochna Loch.
9. *Calamagrostis epigeios*, Roth. Knock Bay, Portpatrick.
This is, I think, the first record of this grass in the three south-western counties of Scotland.
10. *Hymenophyllum unilaterale*, Bory. Water of Luce.

To show that much still remains to be done in the botany of this somewhat out-of-the-way county, I may mention that as yet no record has been made of finding such rather common plants in Wigtownshire as the following, which are found either in Kirk-

cudbrightshire or Dumfriesshire, and most of them in both of these counties, and nearly all of them in the adjacent county of Ayr:—*Ranunculus Lingua*, Linn.; *Ranunculus auricomus*, Linn.; *Stellaria glauca*, With.; *Stellaria nemorum*, Linn.; *Geranium sylvaticum*, Linn.; *Chrysosplenium alternifolium*, Linn.; *Knautia arvensis*, Coult.; *Leontodon hispidus*, Linn.; *Carduus heterophyllus*, Linn.; *Vaccinium Vitis-Idæa*, Linn.; *Galeopsis versicolor*, Curt.; *Scirpus sylvaticus*, Linn.; *Cardamine amara*, Linn.; *Milium effusum*, Linn.; *Melica nutans*, Linn.; and many others. There is a singular absence of alpine and sub-alpine plants in Wigtownshire—the results of its low elevation. The two geraniums, *Geranium pratense*, Linn., and *G. sylvaticum*, Linn., so plentiful in some districts, are in Wigtownshire almost entirely absent. I have never seen the latter in the county, and of the former only a few plants at High Drummore, near the Mull of Galloway. *Brassica monensis*, Huds., is another plant which is plentiful at Ayr, and at Southernness in Kirkcudbrightshire, but which I have never gathered in Wigtownshire, though Prof. Balfour recorded it for this county. The same remark applies to *Genista anglica*, Linn., and *Galium Cruciata*, Scop., and a few others. *Avena pubescens*, Huds., and var. *radians* of *Centaurea nigra*, Linn., and the three forms of *Alchemilla vulgaris*, Linn., as given in the “Annals of Scottish Natural History,” for January, 1895, viz., (a) *pratensis* (Scop.); (b) *alpestris* (Schmidt); and (c) *filicaulis* (Buser), are found frequently in Wigtownshire and Kirkcudbrightshire.

The following are good plants for Wigtownshire:—*Lepigonum rupestre*, Lebel; *Hypericum Androsæmum*, Linn.; *Malva rotundifolia*, Linn.; *Erodium maritimum*, L'Hérit.; *Trifolium striatum*, Linn.; *Astragalus hypoglottis*, Linn.; *Astragalus glycyphyllos*, Linn.; *Oxytropis uralensis*, DC.; *Vicia lutea*, Linn.; *Vicia lathyroides*, Linn.; *Prunus Padus*, Linn.; *Rubus Sprengelii*, Weihe; *Sedum Rhodiola*, DC.; *Sium erectum*, Huds.; *Crithmum maritimum*, Linn.; *Galium Mollugo*, Linn., var. *Bakeri*, Syme; *Inula crithmoides*, Linn.; *Artemisia maritima*, Linn.; *Carduus tenuiflorus*, Curt.; *Statice auriculæfolia*, Vahl; *Mertensia maritima*, Don; *Convolvulus Soldanella*, Linn.; *Scrophularia aquatica*, Linn.; *Orobanche rubra*, Sm.; *Scutellaria minor* Huds.; *Euphorbia portlandica*, Linn.; *Orchis pyramidalis*, Linn.; *Allium vineale*, Linn.; *Scirpus Savii*, Sebast. and Mauri; *Cladium*

germanicum, Schrad. ; *Carex pendula*, Huds. ; *Carex punctata*, Gaud. ; *Carex filiformis*, Linn. ; *Calamagrostis epigeios*, Roth ; *Equisetum maximum*, Lam. ; and *Chara polyacantha*, Braun
 As to *Cladium germanicum*, Schrad., I may state that it was recorded about sixty years ago by Dr. Macnab for Ravenstone Loch, Wigtownshire, where it may still exist, but from the rank growth of reeds, &c., in this loch it would be very difficult to find the plant. However, in July last I was fortunate in finding this rush in another station, near New Luce, thus confirming it for Wigtownshire.

As to Kirkcudbrightshire, I may record that last summer I found a third station for *Juncus tenuis*, Willd., in that county, viz., at Creetown Railway Station. The two mosses, *Oncophorus crenulatus* (Mitt.), Braithw., and *Philonotis fontana* (Linn.), Brid., var. *capillaris*, Lindb., are this year added to the mosses of the Glenkens, Kirkcudbrightshire.

Notes on a "List of the Birds which have been observed in the district of Ardnamurchan, Argyllshire," with additions thereto.

By JOHN J. DALGLEISH, F.S.A.Scot., M.B.O.U.

[Read 25th February, 1896.]

IN 1877 I contributed to the *Proceedings* of the Society* a list of the birds which I had observed in Ardnamurchan during a period of twenty-one years preceding. Since that time I have continued to note, from time to time, such changes and additions as have occurred, and which I now offer as a supplement to the previous paper.

No change has taken place in the physical features of the district, with the exception of the growth of the fir woods on the shores of Loch Sunart. This has not, however, affected the local distribution to any appreciable extent. In the notes on the original list which follow, the numbers are the same as those therein—

1. *Haliaeetus albicilla* (Linn.), White-tailed Eagle. A pair which had bred for some years on the cliffs near the lighthouse, and was well known to passengers by the Skye steamers, has disappeared. One was supposed to have been trapped in Mull, and the other seems to have failed in finding another mate, and after a lapse of two years it also was missed.
2. *Buteo vulgaris*, Leach, Common Buzzard. Still a resident, breeding sparingly.
4. *Falco aesalon*, Tunstall, the Merlin, is now only a straggler.
8. *Strix stridula*, Linn., Tawny Owl.
9. *Aluco flammeus* (Linn.), Barn-owl. Several nests of both of these species have been observed since 1877, one of those of the former being placed under a large rock.

* *Proceedings*, Vol. III., p. 259.

35. *Anthus trivialis* (Linn.), Tree-pipit. Mr. J. Swinburne has found a nest at Blain, Moidart, which is just across the River Shiel from Ardnamurchan.
38. *Turdus musicus*, Linn., Thrush. A white specimen was shot near the lighthouse in 1882.
44. *Pica rustica* (Scop.), Magpie. This species has not reappeared.
47. *Corvus frugilegus*, Linn., Rook. A small colony of four or five pairs took up its residence at Camusna-gaul, Ardslnish, in 1887, and the rookery in 1895 contained about fifteen nests.
54. *Linota flavirostris* (Linn.), Twite. This species has proved, on further observation, not to be uncommon on the moors.
58. *Plectrophanes nivalis* (Linn.), Snow-bunting. I have obtained specimens of this bunting since 1877.
76. *Totanus glottis* (Pall.), Greenshank. One was shot at Loch Kentra by Mr. S. Swinburne, in November, 1880.
87. *Cygnus musicus*, Bechst., Hooper. The occurrences mentioned under this head in 1877 may have been of Bewick's Swan, as this latter species has certainly occurred, as noted in the supplementary list below.
95. *Colymbus arcticus*, Linn., Black-throated Diver. Mr. J. Swinburne informs me that he has frequently shot Black-throated Divers in Lochs Kentra and Moidart, but I have no further record of its appearance on the hill lochs.
103. *Puffinus anglorum* (Temm.), Manx Shearwater. Is found not to be uncommon in the channel between Eigg, Rum, and Ardnamurchan, and breeding in both of the islands mentioned.
104. *Stercorarius catarrhactes* (Linn.), Common or Great Skua. Two were seen off Fascaidale, on the north coast, by Mr. J. Swinburne, on 4th November, 1895.
105. *Larus canus*, Linn., Common Gull. A number now breed on rocks round the coast, and on some rocky points on the shores of the mainland, in addition to those on the Hill Loch noted in 1887.

107. *Larus fuscus*, Linn., Lesser Black-backed Gull. This species has also extended its breeding limits to other islands in Loch Sunart.

The following sixteen species, which have been observed since 1877, now fall to be added to the list, making the total number of birds of the peninsula one hundred and thirty-one. The numbers are consecutive:—

116. *Sylvia atricapilla* (Linn.), Blackcap. One was seen at Mingary by Mr. A. Burn Murdoch in 1881.
117. *Phylloscopus sibilatrix* (Bechst.), Wood-warbler. Not uncommon in the woods on Loch Sunart side.
118. *Passer montanus* (Linn.), Tree-sparrow. In August, 1880, I discovered a colony of about twenty pairs established at Kilchoan, some of which were breeding in the walls of the old church there, and others in the thatch of the crofters' houses. For a further account see Proceedings Royal Physical Soc., Edin. VII., p. 196.
119. *Garrulus glandarius* (Linn.), Jay. One appeared at Glenborrodale in November, 1883, and remained for about a week.
120. *Corvus monedula*, Linn., Jackdaw. A number haunt the ruins of Castle Tyrim, the ancient stronghold of the Clanranald, at the mouth of the River Shiel, from whence they cross to the Ardnamurchan shore. A pair frequented the old church at Kilchoan in 1883.
121. *Aquila chrysaetus* (Linn.), Golden Eagle. The Golden Eagle has nested on three occasions in Ardnamurchan since 1877, viz., on a rock named Craigbuy, on Gortencorn Farm, in 1889, and on the west shoulder of Ben Laga in 1893 and 1894, but has not taken up a permanent residence. This species is without doubt increasing in numbers in the Highlands, while its congener, the White-tailed Eagle, is decreasing.
122. *Cygnus bewicki*, Yarrell, Bewick's Swan. Appears frequently in winter. Mr. Ross, gamekeeper, shot two out of a flock on a loch at Glenmore, on 12th February, 1880, one of which is in my collection.

123. *Tadorna cornuta* (S. G. Gmel.), Common Sheldrake. Nests at Gorteneorn and Achateny, on the north coast, and a newly-hatched young brood was observed on Oronsay Island, in Loch Sunart, in 1895.
124. *Fuligula marila* (Linn.), Scaup-duck. Occurs in Lochs Moidart and Kentra. A young male was shot on the former in 1878 by Mr. John Swinburne.
125. *Somateria mollissima* (Linn.), Common Eider Duck. Occurs of late years in Loch Moidart. In 1883 I observed a pair, which probably was nesting there. Mr. C. Stewart, Kinlochmoidart, states that some have lately done so in the loch.
126. *Rallus aquaticus*, Linn., Water-Rail. Probably occurs regularly in winter. One was shot at Tarbert in 1879, and I saw another caught alive at Arevegaig the same season.
127. *Gallinula chloropus* (Linn.), Moor-hen. Occurs on the River Shiel, but is not plentiful.
128. *Fulica atra*, Linn., Coot. An immature bird was shot on Lochan-na-Crannaig, Kilchoan, on 18th September, 1883.
129. *Phalaropus fulicarius* (Linn.), Grey Phalarope. One observed by Mr. A. Burn Murdoch on 24th September, 1879, on the Sound of Mull, close to the Ardnamurchan shore, west of M'Lean's Nose.
130. *Helodromas ochropus* (Linn.), Green Sandpiper. One was shot many years ago by Mr. S. Swinburne at Ardtoe; one, a female, at Lochan-na-Crannaig, Kilchoan, by Mr. A. Burn Murdoch, 9th August, 1894; while on 8th August, 1895, a male was killed on the neighbouring estate of Sunart, at Strontian.
131. *Colymbus septentrionalis*, Linn., Red-throated Diver. Has been observed several seasons on a hill-loch at Tarbert, where it may breed, although its eggs have not yet been found.

Notes on Some Australian Mammals.

By R. BROOM, M.D., B.Sc., Taralga, New South Wales.

[Read 4th August, 1896.]

Echidna aculeata (Shaw).

In the warmer parts of Australia the breeding season of the Echidna seems to be June, July, or August. In the Taralga district, which may be taken as typical of the Blue Mountains, the period would appear to be later. In a specimen I had an opportunity of studying (the details of which I have elsewhere recorded*), copulation took place on 4th September, and two eggs were laid on 1st and 2nd October, gestation thus being about twenty-eight days. On 23rd March of this year, a young Echidna was brought to me, which, when rolled up, was about the size of the two fists closed together, and measured nine inches along the dorsal curve, over the spines, from snout to tail. It was almost certainly an animal of the previous season, and would probably be about six months old. In October, 1894, I got a specimen about two-thirds grown, measuring along the dorsal curve seventeen inches. Judging from the size of the six-months specimen and the rate of growth, this one had probably been born in the previous October, and would thus be a year old. If these assumptions be correct, it is probable that the Echidna takes two years to arrive at sexual maturity.

Phascolomys mitchelli, Owen.

This Wombat is very common in suitable situations in the wilder parts of the Blue Mountains, between the Wombeyan Caves and Mount Werong. On 13th October, 1895, a young one was brought to me from the latter place, measuring about fourteen

* "Note on the Period of Gestation in Echidna," Proc. Linn. Soc. N.S.W., 1895.

inches in length. It seemed a very affectionate little thing, and never liked to be left alone. It is probable that the young ones follow the mother about when out grazing, as this one would continually follow any one moving about. From room to room it would be at one's heels. When one stood, it would push in and stand apparently quite happy and contented between one's feet; while if an attempt were made to get away from it by running or dodging, it would patter after with incredible rapidity. This habit of following was apparently due to the instinct of keeping close to the mother for safety. When put in the yard, it would at times fancy a moving fowl was its lost mother, and off it would run after it, following it round and round, up and down, to the great astonishment of the fowl. Sometimes it would be after a dog or a pig in the same way. Like the specimen observed by Sir E. Home, it liked to be taken up to lie in the lap, where it would fastly fall asleep. It even seemed to be quite happy when carried about hanging over the arm. At night it was left wrapped up in furs in a corner of the room adjoining the bedroom; in the morning, whenever it heard any movement or voice, it would endeavour, by scraping at the door, to get into the bedroom, or, if the door were left open, it would try to climb up on to the bed.

It is probable that the young Wombats do not dig, as this little one never attempted it even when left in the garden, and, furthermore, its front claws were quite blunt and worn down, and very unlike the long digging claws of the adult.

My little one took milk or water, and was very fond of nibbling fresh grass. It seemed to feel the cold very much, and would often climb on to the open hearth and lie before the fire.

After having had the little Wombat for only about a week, it pined and died.

Pseudochirus peregrinus (Bodd.).

This species is decidedly rare in the Taralga district, though it is occasionally met with. In Lydekker's recent "Hand-book to the Marsupialia and Monotremata," he says of this form, that "although there is usually but a single offspring produced at a birth, it is stated that as many as three young may occasionally be found in the pouch of the female." My friend, Mr. Walter Scott, of Golspie, to whom I have been much indebted for his

kindness in procuring me specimens, recently brought me four small fœtuses which he had found in the pouch of a specimen he had shot. The fœtuses had evidently been just born, being each about two-thirds of an inch in length. Though this specimen was shot in the last week of June, the Ring-tailed Phalangers usually have their young about the same time as the Common Phalanger (*Trichosurus vulpecula* (Kerr)), in the end of April and the beginning of May.

Dromicia nana (Desm.).

This species is regarded as being confined to Tasmania. Two specimens, it is true, were captured at North Shore, Sydney, and described by Krefft in 1863 under the name *Dromicia unicolor*; but as no further specimens have ever been found, Thomas says with regard to the North Shore specimens, "I have no doubt both specimens were Tasmania specimens which had escaped from captivity."

In the fossil deposits in the neighbourhood of the Wombeyan Caves, which I have been studying for some time, I have found the remains of *Dromicia nana* in great abundance, so that it must have been one of the commonest of the small Marsupials of New South Wales in the later Tertiary period. Not only, however, is there conclusive evidence of its former existence, but, from a recent discovery, it must have survived into quite recent times, and may even be alive to-day in its old home.

In the Grand Arch of the Wombeyan Caves—which is a large natural bridge—there are on the numerous ledges near the base, which are frequented by Rock Wallabies, mingled with the dry and decomposing wallaby dung, a large number of small mammalian and other bones. These remains are chiefly those of *Petaurus breviceps*, Waterh., *Phascogale flavipes*, Waterh., and the Bush Rat, with a few bones of *Pseudochirus peregrinus* (Bodd.), *Perameles obesula* (Shaw), and some of small birds and snakes. Among these, however, I was fortunate in finding two jaws of *Dromicia nana* (Desm.). As the Wombeyan Caves are situated in one of the wildest parts of the colony, it is quite impossible that these remains could be those of Tasmanian specimens escaped from captivity. Nor is any such theory now required even for the North Shore specimens, in view of the fact that *Dromicia nana* (Desm.) was

abundant in New South Wales in later Tertiary times. Though I have sought living specimens in vain, there can be little doubt but that the species has been living in this district in very recent times, and there is every reason to believe that, though no doubt very rare, living specimens will yet be found.

I am indebted to Mr. J. J. Fletcher, Secretary, Linnæan Society, New South Wales, for calling my attention to Krefft's discovery of *Dromicia* at North Shore, and to Thomas's observations there-upon.

The more perfect of the jaws has been placed in the Australian Museum, Sydney.

Bolbitius bulbillosus, Fr., a Fungus New to Britain.

By WILLIAM STEWART.

[Read 4th August, 1896.]

IN the end of August, 1895, a *Bolbitius* larger and stouter than *B. tener*, and with a remarkable margined bulb, appeared in quantity on the green in front of the fountain on the Broomfields, Largs. Not being able to identify it with any of the species described in the "British Fungi" of the Rev. Dr. Stevenson, I sent specimens to him, and also to the Rev. Dr. Keith, of Forres. Both gentlemen were disposed to think it *B. bulbillosus*, Fr., but neither was quite decided, in consequence of the shrivelled condition of some, and the decayed state of others of the plants when examined. Dr. Stevenson wrote (24th August, 1895)—"If there had been no appearance of striæ on pileus, I could have no doubt about its being *B. bulbillosus*, Fr. What you send me is distinctly striate—approaching ribbed—but this may be from shrinking from age, as it reaches me." Dr. Keith wrote (4th September, 1895)—"The *Bolbitii* do not carry or keep well, and the specimens were a good deal shrivelled, and some of them quite spoiled. There was one with the bulb still attached and very perfect. But for the bulb, I would have been inclined to consider your fungus *B. tener*, but as Fries makes the bulb—"the somewhat margined bulb"—the most striking and characteristic mark of *B. bulbillosus*, and the bulb which I cut through was decidedly margined, I think the probability is that your fungus belongs to that species. There is certainly no other species in Fries's book which is represented as possessing such a bulb as yours showed." Other specimens sent to Dr. Stevenson did not keep any better, and matters remained undecided until the autumn of this year. In the last week of August I visited Largs, but, much to my disappointment, did not find a single plant. A brother, however, who had his summer quarters there, brought me specimens gathered in September, some of which were at once despatched to Dr. Stevenson

and Dr. Keith; while Professor King and I carefully compared others with Fries's description, and were entirely satisfied, as there was not the slightest trace of striæ on the fresh specimens. Drs. Stevenson and Keith also were convinced of the identity of the plant with *B. bulbillosus* of Fries. Dr. Stevenson wrote (28th September, 1896)—“I have your note, with plant. I think there can be no doubt about it, as far as I can see from the state of specimens. Bulb seems conclusive, whatever varieties may exist.” Dr. Keith also wrote (30th September, 1896)—“I have as little doubt, withered though it was, the *Bolbitius* was *B. bulbillosus*, Fr. The bulbous base was most marked.”

Many of the specimens gathered were upwards of six inches high, the pileus being an inch and a quarter high, and about three-quarters of an inch broad, quite smooth, and appeared nearly perfectly white whilst growing among the rank grass. Fries's description (translated) is as follows:—

“*Bolbitius bulbillosus*—Pileus fleshy-membranaceous, campanulate, then expanded—without striæ—becoming pale *fuscous-yellowish*: Stem fistulose, attenuated from the *somewhat marginate bulbous base*—becoming yellowish-white: Gills free, ventricose, and, as well as the spores, ferruginous.”

In Memoriam.—JOHN GRIEVE, M.A., M.D., F.R.S.E., F.L.S.

JOHN GRIEVE was born in Glasgow on 27th June, 1827, and was educated at the High School, Glasgow (where he distinguished himself), and at the Universities of Glasgow and Edinburgh, taking the degree of M.A. at the former, and that of M.D. at the latter. Love of natural history betrayed itself while he was still very young, and a present of Buffon's "Natural History," some kindly assistance from a minister in Dumfriesshire, opportunities of observation in the field, and several visits to Sir William Jardine's Museum, all enlarged his ideas and confirmed the natural bent of his mind. He joined this Society in 1856. In 1859 he was elected a Member of Council. Next year (1860) he contributed two papers, and at intervals during a period of twenty-six years thereafter, half-a-dozen papers were read by him, most of which relate to the invertebrate life in the waters of South-Western Scotland, and are published in the *Transactions* of the Society. He frequently exhibited objects at the meetings of the Society, the last of these being on 27th March, 1894. A short communication was made by him to the meeting on 28th January (see page 385), three months before his death, which took place on the 16th of April, 1896. He was never married. Although not very well known among the active members of the Society at the present time, they were made aware, by his occasional appearances and contributions, of the kindly interest which he took in his favourite pursuits, and in the Society.

In appearance, Dr. Grieve was tall and spare, with a bronzed countenance and ample brown beard. He was a very quiet and reticent, but kind and warm-hearted man, upright and amiable in all his ways, and he will be much missed by those who knew him well.

Reports on Excursions.

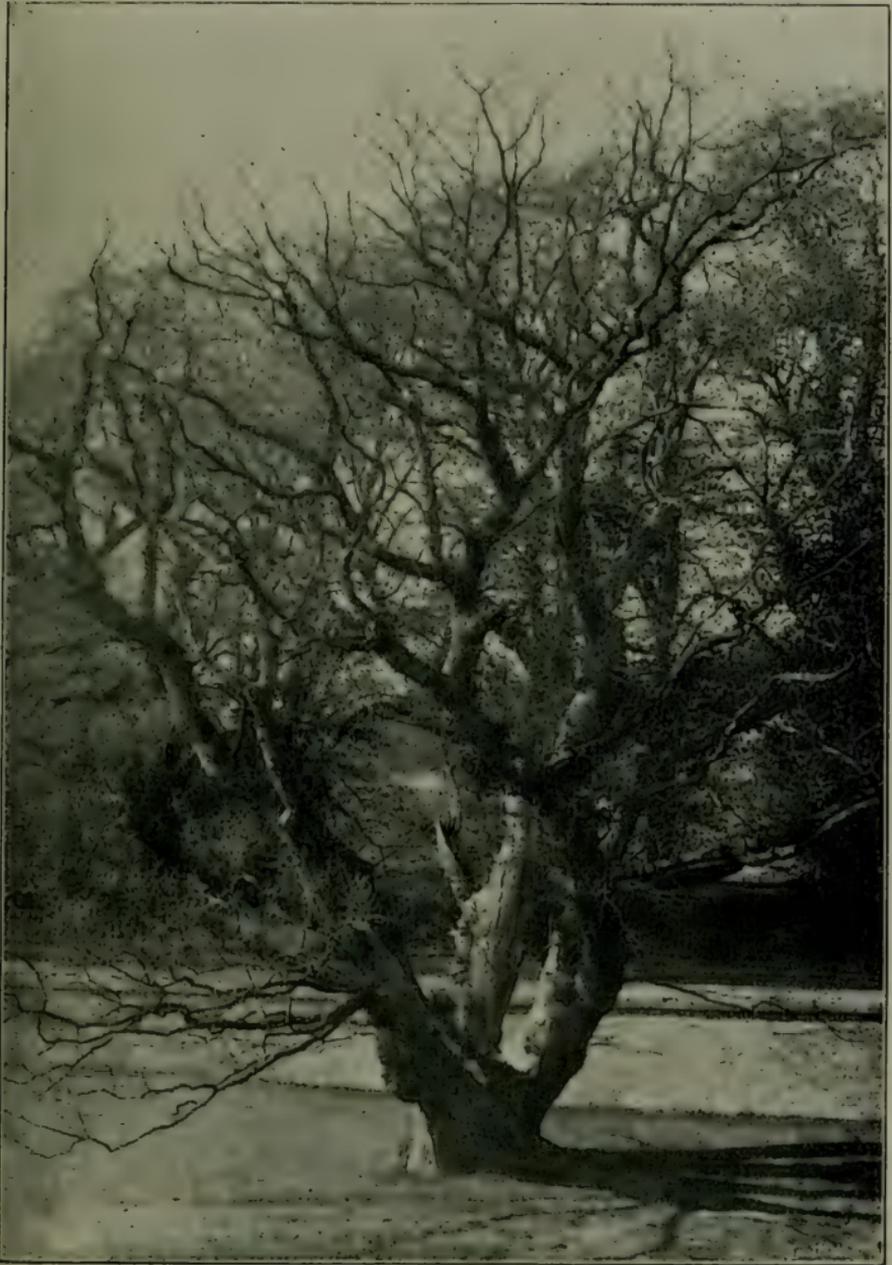
*Reports marked thus * relate to joint-excursions with the Andersonian Naturalists' Society, Glasgow.*

REDLANDS, KELVINSIDE, 2nd May, 1895.—This was an evening excursion. The car terminus, Kelvinside, was the rendezvous, and the party was met by Mr. George Russell, who conducted those present to the conservatories at Redlands, the residence of Mr. J. B. Mirrlees.

In the section first visited, *Dendrobium Brymerianum*, Reichb., from Burmah, was perhaps the most remarkable of the orchids on view, as, in addition to its fine yellow colour, the labellum is divided into long branching filaments which give it an extraordinary appearance. Another striking species was *D. densiflorum*, Wall., with a rare purple hue. In the main portion of the conservatory, a circular table in the centre covered with *Azalea mollis*, Blume, was a glowing mass of colour. In the large Tree-fern under the dome, a house-sparrow had built a nest among the fronds, about twenty feet from the floor. There were also on view a large specimen of *Rhododendron aureum*, Georgi, covered with large tresses of light-yellow flowers, and a comparatively new Genista or Broom with a red centre.

The pond outside contained a mass of Typha, obtained from Mr. P. Ewing, F.L.S., some years ago. The single crown then presented has now increased to over one hundred.

LEE CASTLE, 11th May, 1895.—At this excursion, attention was principally directed to trees. The sylvan pride of the estate is a venerable Oak, the celebrated "Pease Tree" [Plate IV.]. Mr. R. Hutchison in the "Transactions of the Highland and Agricultural Society of Scotland" for 1881 says:—"It stands in a hollow, originally the outlet of the burn or rivulet, which has formed in the soil or subsoil a deep ravine, or gill, as it is locally termed. The soil is a medium loam, with beds



From Photo. by

James Mitchell.

OAK (*Quercus Robur*, Linn.,) AT LEE CASTLE, LANARKSHIRE.



of sand and gravel, resting on the usual sandstone, shale, &c., of the coal formation. The trunk of this veteran is now quite hollow, and at the height of about 8 feet from the present surface of the ground forms itself into three branches." The girth at the narrowest part of the trunk within reach, which was at about 3 feet 4 inches from the ground, was 23 feet $9\frac{1}{4}$ inches, showing an increase of $1\frac{3}{4}$ inches since 14th June, 1890. The entrance to the hollow butt is smaller than it was in 1890, and would scarcely admit a person of ordinary size. The hollow itself is said to be frequented by a colony of weasels. At a height of $7\frac{1}{2}$ feet the trunk divides into four stems, the largest measuring 12 feet in girth at 1 foot from the fork.

An Oak, west of the castle, measured 12 feet 2 inches at 5 feet, an apparent increase of $3\frac{1}{2}$ inches in 5 years. A beautiful Beech, west of the castle, measured 15 feet 6 inches in girth at 4 feet 9 inches from the ground (the top of a mound), an apparent increase of $2\frac{1}{2}$ inches in five years. This is evidently the Beech noted by Mr. Hutchison in the "Transactions of the Highland and Agricultural Society of Scotland," as 14 feet 9 inches at 5 feet in 1879. A Beech, east of the castle, measured 15 feet $3\frac{1}{2}$ inches at 4 feet; and another, on the east side of the garden, with a short fluted bole of 8 feet, measured 15 feet 8 inches at 5 feet 1 inch, an apparent increase of 4 inches since 1890. A third Beech, near the last, was 13 feet $7\frac{1}{2}$ inches at 5 feet. A Larch, growing on a slope, measured 12 feet 1 inch on a line 5 feet up on the north side of the tree, and 4 feet 6 inches up on the south side, an apparent increase of 3 inches in five years.

BOTANIC GARDENS, 21st May, 1895.—This was an evening excursion, but no report appears in the Society's minutes.

KILMALCOLM, 25th May, 1895.—On this excursion the following Mosses were obtained, viz.:—*Mnium cinclidioides*, Biytt; *Ptychomitrium polyphyllum*, B. & S.; *Oligotrichum hercynicum*, Ehr.; *Hypnum aduncum*, Hedw.; *H. stramineum*, Dicks.; and *Sphagnum squarrosum*, Pers.

MAICH GLEN, 1st June, 1895.—AIKENHEAD, 11th June, 1895.—No reports of these excursions appear in the minutes of the Society.

TULLICH HILL AND BEN REOCH, 15th June, 1895.—This was a joint-excursion with the Geological Society of Glasgow. The party, numbering about fifty, proceeded by the West Highland Railway to the Glen Douglas "passing-place," where a special stop was made. After leaving the train, the party passed along the line to the point where the road down the glen crosses the railway. Here the company separated into three portions, one going down to the side of Loch Long and walking to Arrochar, a second taking to the moor and hills, while a third kept to the railway for the purpose of examining the cuttings on the line. A few of the second party reached the top of Tullich Hill, and from thence to the summit of Ben Reoch, whence a magnificent view was obtained. The geological portion of the company found the rocks exposed along the line to be mainly metamorphic, possibly of Silurian age, though this point is not as yet considered settled. At several places the schists have been cut through by intrusive rocks of various ages. In one of the cuttings the igneous rock has assumed a columnar form, and resembles the material of which Ailsa Craig is largely composed. In another there is a trap-dyke which is probably of Miocene age, and, if so, it would indicate that the deep valley of Loch Long has been hollowed out since that comparatively recent geological period. The depression between Tullich Hill and Ben Reoch forms a deep glen descending to Loch Long. Near the 16-mile post from Craigendoran, there was observed a remarkable fissure in the hill-side, at least 30 feet deep. It has been filled up by concrete, but above and to the north-east of it there is quite a network of cracks in the ground, evidently land-slips, and further on there are evidences of former slips in the "craggs, knolls, and mounds, confusedly hurl'd" on the face of the hill.

BALLAGAN, 29th June, 1895.—BOTANIC GARDENS, 30th July, 1895.—ROWARDENNAN, 10th August, 1895.—No reports of these excursions appear in the minutes of the Society.

MILLPORT, 24th August, 1895.—Landing at Keppel Pier, the party proceeded towards the Marine Station. The marshy ground lying at the base of the old sea-cliff was examined, and among the plants found there were, *Agrimonia odorata*, Mill., *Cotyledon Umbilicus*, Linn., *Sedum anglicum*, Huds., *Samolus Valerandi*, Linn., *Ænanthe Lachenalii*, Gmel., *Sagina nodosa*, Fenzl, *Lysimachia Nummularia*, Linn., *Verbascum Thapsus*, Linn., *Empetrum nigrum*, Linn., *Asplenium marinum*, Linn. On arrival at the "Ark" (as the temporary Marine Station is called), the party was met by Dr. David Robertson, F.L.S., who pointed out and described many interesting specimens in the collections. Thereafter, proceeding to Dr. Robertson's house, the party was entertained to tea, and privileged to see some of their host's extensive collection of algæ and marine invertebrates.

* ROWALLAN, &c., 7th September, 1895.—At this excursion, the remains of the lake-dwelling or crannog at Buston, also the Castle-hill or Moat-hill at Stewarton, were visited.

TORRANCE, EAST KILBRIDE, 21st September, 1895.—This excursion was largely attended. The company were courteously received by the proprietor, Col. R. E. S. Harington-Stuart, of Torrance, and by Mrs. Stuart, and were conducted by them over the extensive flower-gardens and through the wooded policies, rich in fungi, of which upwards of fifty species were found. Thereafter, those present were entertained to tea, when a hearty vote of thanks was moved by Professor King to the host and hostess for their kindness and hospitality. Among the fungi collected, the following deserve mention, *Agaricus cristatus*, A. & S., *Polyporus melanopus*, Fr., *Trametes mollis*, Fr., *Grandinia granulosa*, Fr., *Stemonitis fusca*, Roth.

‡ BLAIR, 5th October, 1895.—A "fungus foray" was carried out on this date, jointly with the Andersonian Naturalists' Society, Glasgow, and the Ayr Natural History Society. Over

sixty species of fungi were noted, among which the following deserve mention:—*Agaricus mitis*, Pers., *A. clypeatus*, Linn., *Polyporus giganteus*, Fr., *Helvella crispa*, Fr., *Leotia lubrica*, Pers.

* DUMBARTON, 28th March, 1896.—On the afternoon of this date, a large company took part in the opening excursion of the season. By kind permission of Lord Overtoun, a Life Member of the Society, the estate of Overtoun, near Dumbarton, was visited. The weather was delightful, and, from the commanding situation of the estate, many charmingly varied prospects were obtained. The date was rather an early one for field work, and nothing noteworthy regarding the natural history of the district falls to be recorded, but the excursion was memorable from the opportunity which presented itself of visiting, under the leadership of Mr. W. A. Donnelly, Bowling, the circular fort on Dunbuie Hill, and watching the operation of excavation which was going on. The actual recovery from the refuse mound, during the brief visit of the party, of a spear-head shaped implement, a part of a stone ornament, and a hammer-like object, excited considerable curiosity. The existence of a structure here had been suspected for a long time by Mr. Donnelly, owing to the lines of the summit, as seen on all sides, either from a distance or near at hand, indicating something other than a natural formation; and the attention of the Helensburgh Naturalist and Antiquarian Society being directed to it, that body, with the permission of the proprietors, carefully investigated the structure and the remains found therein. In an amply-illustrated article in the "Proceedings of the Society of Antiquaries of Scotland" (Vol. VI., 3rd Series, pp. 291-308), Mr. A. Miller, F.S.A.Scot., gives the results of the investigation. Neither in its form, dimensions, nor situation, does it differ from the forts or brochs in the north of Scotland. There does not appear to have been any secondary occupation of this fort. It is remarkable for the complete absence of metal implements, and the same has to be said of pottery—facts which may indicate great antiquity. The stone implements found were all of slate—none of flint. A large number of stones with markings of the cup-and-ring order was found, some of them showing unique features. The objects discovered differ widely from those recorded from similar structures

elsewhere, which makes it a difficult matter to determine the age of this fort. There is no appearance of the influence of Roman or Celtic civilisation. The animal remains, which have yet to be investigated, may help to fix the period of occupation of this remarkable antiquity, which those who engaged in this excursion were fortunate in seeing under most favourable circumstances.

* Howwood, 18th April, 1896.—The fine estate of Castle Semple, embracing Lochwinnoch, has been visited frequently by this and kindred societies, and reported upon in its botanical aspects. A large company turned out on the afternoon of this date, and under the leadership of the President, Professor King, an enjoyable and profitable afternoon was spent in fine weather; but the date was an early one for the botanists, and nothing falls to be recorded in their department. To the ornithologist the estate is very attractive, and many interesting records are connected with it. On the present occasion a large number of species of birds was noted, and among them the following deserve mention. The Chiff-chaff (*Phylloscopus rufus* (Bechst.)) was first heard and seen in the gardens; and subsequently, in the woods between the mansion house and the western boundary, some half-dozen males were heard calling. In Gray's classic work on the "Birds of the West of Scotland" extremely little information is given regarding the distribution of this species in the area drained by the Clyde. The Willow-wren (*Phylloscopus trochilus* (Linn.)) was industriously sought for, but without success. It was undoubtedly later than usual in arriving in the Clyde area this year. Of the Long-tailed Titmouse (*Acredula rosea* (Blyth)) a pair was seen. The Rhododendrons in the gardens form the roosting-place of vast numbers of Starlings (*Sturnus vulgaris*, Linn.), and the wood west of the gardens contains a very large rookery. Not many years ago Castle Semple boasted the possession of a heronry of fair size, but at present it is doubtful if more than one pair of Herons (*Ardea cinerea*, Linn.) nests within the demesne. Several Mallards (*Anas boscas*, Linn.), a pair of Teal (*Querquedula crecca* (Linn.)), and several flocks of Widgeon (*Mareca penelope* (Linn.)) of about a dozen birds each, were noted. It was interesting to find that, besides the Chiff-chaff, another of our summer visitors, the

Common Sandpiper (*Totanus hypoleucus* (Linn.)) had become well established for the season, about a dozen of them being seen on the north side of the Loch. The following large trees were measured:—A Beech (*Fagus sylvatica*, Linn.) west of garden, 11 feet 9 inches at 5 feet on the side next the walk; a Cedar of Lebanon (*Cedrus Libani*, Barrel.) 12 feet 9½ inches at 3 feet 8 inches on the west side of the trunk; a Spanish Chestnut (*Castanea sativa*, Mill.) west of garden, 15 feet 8½ inches at 4 feet 8 inches on the north-east side of the tree.

* BRAIDWOOD, 9th May, 1896.—On the afternoon of this date, a party, numbering about forty, visited the Fiddler Gill, at Braidwood, and proceeded subsequently *via* Crossford to Craignethan ("Tillietudlem") Castle. The botany of this district was already familiar to many of those present, and the report shows that nothing was added to our knowledge of its flora.

BOTANIC GARDENS, 12th May, 1896.—This, an evening excursion, took place in fine weather, and was largely attended. The new Lily-pond and Marsh-ground, although in a somewhat incomplete state, attracted considerable attention. In the former were observed quantities of *Nymphæa alba*, Linn., and *Nuphar luteum*, Sm., recently taken from St. Germain's Loch, Bearsden; also several hybrid *Nymphæa* obtained by purchase.

In the Kibble Conservatory were noted, among other plants, *Thuya orientalis*, Linn., a tiny spreading bush, fully fifty years old, and not more than ten inches high, which was densely clothed with numerous short, tufted, fan-shaped branchlets of a glossy light-green colour; *Cineraria cruenta*, l'Hérit., a native of Teneriffe, with heart-shaped leaves, toothed at the edge, tinged with red or purple (in the wild state the flowers have a deep-purple disk, with bright-purple rays, but since it has been taken up as a florist's flower a countless number of varieties have been raised from seed, with flowers in which white, purple, crimson, violet, &c., are combined in ever-varying proportions); a leafless leguminous plant, *Bossicea scolopendria*, Sm., with flat stems,

commonly called the "Plank Plant;" *Eucalyptus rostrata*, Schlecht., in flower, in which condition it is seldom seen in Britain; the "Bottle-brush" (*Melaleuca squarrosa*, Smith); and *Dolichos lignosus*, a curious twining leguminous shrub.

In the Greenhouses were noted a handsome twining shrub, *Bignonia capreolata*, Linn., belonging to the Trumpet-flower family; *Lonicera sempervirens*, Linn., a climbing honeysuckle, with evergreen foliage and scarlet flowers, a native of North America; several species of *Phyllocactus*; two large Palms, *Sabal flabelliformis*, and *Livistona chinensis*, R. Br., in fruit; a huge specimen of the Abyssinian Banana (*Musa Ensete*, Bruc.); several economic plants, including *Guaiacum officinale*, Linn., called by turners *lignum vite*; the Tamarind Tree (*Tamarindus indica*, Linn.), &c.

In the herbaceous ground plants were flowering earlier than last year, and the Hawthorn, Lilac, and Laburnum were declared never to have had such a profusion of blossom in the remembrance of those in charge of the Gardens.

* BRODICK, 21st May, 1896.—This excursion, which was well attended, took place in fine weather on the day appointed for the local celebration of the Queen's Birthday. On arrival at Brodick, the party proceeded at once to Goatfell, the ascent of which was made by most of those present. Just at the point where the hill-road leaves the shore, *Linaria Cymbalaria*, Mill., was growing in profusion. At an elevation of about 1,000 feet, the Chickweed Winter-green (*Trientalis europæa*, Linn.) was found. Till 1,500 or 1,800 feet elevation was reached, the flora was chiefly a heath one. The Dwarf Juniper (*Juniperus communis*, Linn., var. *nana*, Willd.) was abundant from 1,000 to 1,800 feet. Above the last-named elevation, the mountain consists of a bare granitic cone, soil being almost completely absent, and the sand derived from the denudation of the rocks is almost incapable of supporting vegetation. *Alchemilla alpina*, Linn., *Vaccinium Vitis-Idæa*, Linn., and several grasses and carices, the last two not in flower, were all the phænogamous plants noted at a high elevation. The cryptogamic flora was also very scanty. Here and there, upon the bleached rock-masses, might be seen a patch of *Andreæa*

Rothii, W.M., and one or two crustaceous lichens; and where there was a trickle of water, a tuft of *Andreæa alpina*, Sm., or *Nardia emarginata*, Ehr.; but nothing more to relieve the monotony of the surface. The ornithologists at this excursion had to confess to some disappointment with the results obtained. The Chiff-chaff (*Phylloscopus rufus* (Bechst.)), which was* first recorded for Arran in 1895, was heard on the Cnocan Burn, and the Wood-wren (*Phylloscopus sibilatrix* (Bechst.)) was common in the pines above the stables.

* MILLPORT, 13th June, 1896.—A dredging excursion to Millport was arranged for this date, and was well attended. *Lima hians*, Gmel., in its nest, some fine examples of the Nine- and Thirteen-rayed Starfishes (*Solaster endeca*, Linn., and *S. papposus*, Retz.), and a good haul of *Eupagurus prideauxii*, Leach (a hermit-crab which occupies a leathery house formed for it by the Sea Anemone *Adamsia palliata*, Forbes), were the principal objects of interest reported.

QUEEN'S PARK, 16th June, 1896.—About fifty members and friends attended this excursion. Assembling at the gates, Victoria Road, the party was met by Mr. Cruden, Curator of the Queen's Park, and Mr. M'Iver, Foreman of the Plant-houses, and conducted over the park by way of the shrubbery adjoining Queen's Drive, round by the west end of the terrace, and along the herbageous border. This stretch contains many interesting specimens of trees and shrubs, for the most part in vigorous health, notwithstanding the atmospheric conditions inseparable from a large industrial centre. The most noteworthy specimens here inspected were a cut-leaved variety of the common Hornbeam (*Carpinus Betulus*, Linn., var. *incisa*); the maples, *Acer campestre*, Linn.; *A. platanoides*, Linn.; *A. Pseudo-Platanus*, Linn.; *A. circinnatum*, Pursh; the Medlar (*Mespilus Smithii*, DC.); the Hickory (*Pterocarya stenoptera*, C.DC.); the Plane Tree (*Platanus occidentalis*, Linn.); a crested variety of the Common Beech (*Fagus sylvatica*, Linn., var. *tortuosa*); the Walnut Tree (*Juglans regia*, Linn.); the

* Annals of Scot. Nat. Hist., 1895, p. 195.

Siberian Pea Tree (*Caragana Altagana*, Poir.); the Maiden-hair Tree (*Ginkgo biloba*, Linn.); the Turkey Oak (*Quercus Cerris*, Linn.); the Buckeye (*Pavia flava*, DC.); the Locust Tree (*Robinia Pseud-acacia*, Linn.), in flower, a rare circumstance in the history of the Park; the Wild Pear (*Pyrus communis*, Linn.); the Service Tree (*Pyrus pinnatifida*, Ehrh.); the Willow-leaved Pear (*Pyrus salicifolia*, Lois.); the Tansy-leaved Thorn (*Crataegus tanacetifolia*, Pers.); the Cock's-spur Thorn (*C. Crus-galli*, Linn.); the Black-fruited Thorn (*C. nigra*, W. and K.); the Flowering Ash (*Ornus europaea*, Pers.); the Lentiscus-leaved Ash (*Fraxinus lentiscifolia*, Desf.); the Golden Ash (*F. aurea*, Pers.); the Walnut-leaved Ash (*F. juglandifolia*, Willd.); a variegated form of the American Ash (*Fraxinus americana*, Willd.); *Kalreuteria paniculata*, Laxm.; and the Mahaleb Cherry (*Cerasus Mahaleb*, Mill.). *Polygonum Sachalinense*, F. Schmidt, a tall herbaceous plant, somewhat resembling a dock, to which, indeed, it is nearly allied, was much admired for its ornamental appearance. Entering the range of plant-houses which was erected recently, much satisfaction was expressed at the fine general collection of exotics. In the cool green-house there was a gorgeous floral display. Among interesting plants were the Egg Plant (*Solanum Melongena*, Wall.), so called from its fruit, which in size, shape, and whiteness bears a strong resemblance to a hen's egg (although not often cultivated in this country for culinary purposes, it is much esteemed in France as an esculent); the Sensitive Plant (*Mimosa pudica*, Linn.), which was duly experimented upon; and the New Zealand Flax (*Phormium tenax*, Forst.), with flower-spike 8 feet to 10 feet in height. Leaving the plant-houses, the party then proceeded through that part of the Camphill Estate recently thrown open to the public which was formerly the garden and orchard. The parterres, the fastigate yews, the holly trees, and the old fruit trees lend a quaint old world flavour to the garden, which makes it a most charming retreat on a summer's eve. There are here two trees of the Fern-leaved Beech (*Fagus sylvatica*, Linn., var. *heterophylla*) about 30 feet in height; a graceful specimen of the Weeping Ash upwards of 20 feet in height; and a Cedar of Lebanon (*Cedrus Libani*, Barrel.), this last showing, it is to be regretted, signs of incipient decay. In the old greenhouse there is a very

large specimen of *Wistaria chinensis*, DC. The flowering was nearly over, but some weeks before, the plant was loaded with blossom, and presented a beautiful sight. The President, on behalf of the Society, moved a hearty vote of thanks to Mr. Cruden and Mr. M'Iver for their attention and courtesy.

* TOWARD, 20th June, 1896. — A party, about twenty in number, visited Castle Toward on the afternoon of this date, in favourable weather. The policies and gardens are of considerable extent, and occupy, in close proximity to the sea, a sheltered situation which is particularly well suited for the growth of many plants not considered hardy enough in some parts of Scotland to flourish in the open air. The great variety of form and colour in the leaves of the Japanese Maples (*Acer palmatum*, Thunb.), of which there were a number of handsome examples, arrested attention. A One-leaved Ash (*Fraxinus heterophylla*, Vahl.), in the avenue approaching the Castle by the lodge nearest Toward, and a Birch (*Betula alba*, Linn.), which was conspicuous on account of the great size of the clusters of adventitious buds among its branches, were examined with interest. The last-named tree measured 8 feet 1 inch at 2 feet 9 inches from the ground. However familiar the true plane trees may be to dwellers in the South of our island, it is unusual to see a well-grown example in the West of Scotland, hence a large Western Plane (*Platanus occidentalis*, Linn.) with a girth of trunk 9 feet 5 inches at 1 foot 11 inches from the ground on the west side, was regarded as a curiosity. On approaching the gardens fine clumps of bamboos growing most luxuriantly presented an unexpected contrast to the more familiar plants growing around. The Hoary Plantain (*Plantago media*, Linn.) was found on a grassy bank in this vicinity. Among the introduced species which attracted most attention may be mentioned one of the Japanese Yews (*Cephalotaxus drupacea*, Sieb. and Zucc.), *Azara microphylla*, Hook., *Magnolia Soulangeana*, Hort., *Ptelea trifoliata*, Linn., *Griselinia littoralis*, Raoul, a beautiful evergreen, and *Olearia Haastii*, Hook., one of the New Zealand Daisy Trees, which was just coming into bloom. A variety of well-grown Conifers and some Portugal Laurels of great size and covered profusely with

blossom excited admiration. A *Magnolia* in the Rock Garden measured 3 feet 2 inches at 3 feet 9 inches from the ground on the west side of the tree. In a stream near the gardens, *Minulus luteus*, Linn., was well established, and on the shore the following plants were noted, *Raphanus maritimus*, Sm., *Daucus Carota*, Linn., *Linaria vulgaris*, Moench, *Geranium sylvaticum*, Linn., *G. pratense*, Linn., *Anthyllis Vulneraria*, Linn., *Hebenaria bifolia*, Br., *H. chlorantha*, Bab. On a gravel walk *Agaricus fumosus*, Pers., was found. The most interesting incident to the ornithologists present was the occurrence of the Chiff-chaff (*Phylloscopus rufus* (Bechst.)).

* KILMUN, 27th June, 1896.—On the afternoon of this date a party, numbering about twenty, visited the Benmore Estate, at the head of the Holy Loch. Puck's Glen, which is a charming ravine, was first explored. The plants found there included *Saxifraga Geum*, Linn., *Listera cordata*, Br., *Carex pallescens*, Linn., *Hymenophyllum tunbridgense*, Sm., *Aspidium aculeatum*, Sw., the last two in abundance. A dead Roe-deer (*Capreolus caprea*, Gray) was seen in the bed of the stream. According to the forester who accompanied the party, Roe-deer abound on Benmore Estate. Near the mansion-house at Benmore some tall specimens of *Picea nobilis*, Doug., loaded with large cones, excited the admiration of the party. In the grass at the same place *Hieracium aurantiacum*, Linn., was plentiful. The Kestrel (*Falco tinnunculus*, Linn.) and the Chiff-chaff (*Phylloscopus rufus*, (Bechst.)) were the most interesting birds observed. At Kilmun, *Anchusa sempervirens*, Linn., and *Asplenium marinum*, Linn., were gathered.

* MANUEL, 11th July, 1896.—A small party visited Carribber Wood, near Manuel, on the afternoon of this date. The fine old Yews near the site of Manuel Priory were seen but not measured for lack of time. Nothing of special interest regarding the natural history of the district appears in the report of this excursion.

* ARROCHAR HILLS, 18th July, 1896.—The excursions at the Glasgow Fair Holidays to the Arrochar Hills were not attended by any members of this Society.

* ARDENTINNY, 1st August, 1896.—A small company visited Ardentenny on the afternoon of this date. *Hymenophyllum tunbridgense*, Sm., the rarer of the filmy ferns, was the most interesting plant met with.

* DALRY, 22nd August, 1896.—The excursion on the afternoon of this date was carried out conjointly with the Geological Society of Glasgow. A large blaes bing, near the station at Dalry, now covered with the Viper's Bugloss (*Echium vulgare*, Linn.), was first visited. Seed of this plant had been sown here some years before. Fish coprolites are got in this blaes bing, and a mass of calcite mixed with shale was found, in which there were cavities filled with ozokerite, or mineral grease, a natural distillation from the black blaes or shale. The Garnock Water was followed until the mouth of the Caaf Water was reached. At this point there is a famous pool, which in the memory of the conductor of the party (Mr. John Smith, Monkredding, Kilwinning) was celebrated as a salmon pool at a time when the Garnock was a famous salmon river. After passing the mouth of the Bombo, the boulder-covered part of the Garnock was reached. This is certainly the finest part of this stream, in its middle reaches at least. As if to heighten the effect at this point, the Kingfisher (*Alcedo ispida*, Linn.) was seen by a number of the party. On the Monkcastle Burn a little waterfall was visited, and in the shale at its base many fossils may be obtained in a fine state of preservation. The limestone on the top of this fossiliferous shale-bed is the same as that at the Linn Spout, in this district, and in the rotten cavities in the limestone at both localities many sponge spicules and conodonts are to be found. Part of this limestone is also rich in trilobites, and many genera of brachiopods are represented in it.

Above the limestone there is a sandstone which has been worked in the upper part of the glen. A trap-dyke there, partly amygdaloidal, crosses the glen obliquely, and the variety of jointing on its exposed weathered side was much admired.

At DALGARVAN, which was next visited, a Yew tree was measured, and found to be 5 feet 9½ inches in girth at 4 feet 8 inches from the ground. The ornamental garden gate beside it was much admired. Dalgarvan Mill was then passed, and, on reaching Smithstone, the boulder-clays, with the intervening sand and gravel beds, were examined. The exposures of these beds are rather limited, but there can be no doubt regarding the superposition of the beds, as sections of them are visible at the old limestone mine, and in two or three places in Bell's "Plantin'."

The limestone once worked here belongs to the lower series, and as the beds which were seen at Monkcastle are those of the upper series, between the two points there must be an extensive break in the strata, as those present were walking towards the dip, and but for this ought to have reached a higher geological horizon.

A drizzling rain setting in, an interesting excursion was perforce somewhat abruptly ended, the party returning from Kilwinning.

Proceedings of the Society.

SUMMER SESSION, 1895.

28TH MAY, 1895.

Professor Thomas King, President, in the chair.

Reports were read of excursions to Strathleven, Cochno, and Lee Castle, by Mr. John Renwick; to the Redlands Conservatories, Kelvinside, by Rev. G. A. Frank Knight, M.A.; and to Kilmalcolm, by Mr. Johnston Shearer. (See pp. 358, 359.)

It was resolved to send congratulations to Mr. George R. Milne Murray, F.L.S., a Corresponding Member of the Society, and Secretary of the Committee for the Exploration of the Marine Flora of the West of Scotland, on the occasion of his appointment as Keeper of the Botanical Department, British Museum, in succession to Mr. William Carruthers, F.R.S., retired.

The Society also agreed to take part in the movement to have the portrait of Mr. Carruthers (an Hon. Member) painted, to commemorate his recent successful presidency of the Linnean Society of London.

A copy of the newly-issued ninth edition of the "London Catalogue of British Plants," by Mr. F. J. Hanbury, F.L.S., presented to the Society by Mr. A. Somerville, B.Sc., F.L.S., was laid on the table. This edition, which follows its predecessor after nine years, embraces 1,958 species, with varieties in addition.

Mr. John Paterson exhibited *Fringilla montifringilla*, Linn., the Brambling, a finch whose breeding home is in the birch forests of Scandinavia. In Britain the Brambling is a winter visitant, and it appears sometimes in enormous flocks; but on the western watershed it is much rarer than on the eastern, and in the Clyde area it is far from common. During the recent severe weather it was observed in Renfrewshire.

Professor King submitted a coloured plate illustrating *Argyria canescens*, D. Don, a plant belonging to the natural order Bignoniaceæ, which flowered in a cool house at Kew in 1893-94.

from roots which he had obtained through a friend from the Desert of Atacama, North Chili. In the description of the plant accompanying the illustration it is stated that "the genus is here for the first time figured from a specimen cultivated in Europe." Professor King remarked that the plate conveyed a remarkably truthful representation of this beautiful plant, which attains to a height of three feet in its native habitat. The colours of the flowers range from bright-yellow to dark-brown.

Rev. G. A. Frank Knight, M.A., exhibited huge spines of *Acacia horrida*, Willd., obtained by him near the Koonap River, Cape Colony, where the tree covers great tracts.

Mr. Knight also exhibited and read a paper on *Ornithorhynchus anatinus* (Shaw), the Duck-billed Platypus of Australian rivers, that "living fossil" which reproduces to-day a type of existence elsewhere long extinct. Full of anomalies, a "complete anachronism," with a beaver-like tail, a duck-like beak, the heart of a bird, toes webbed for swimming, no adult teeth, the voice of a puppy, and believed at first to be a fraud of the stuffer. It, like a reptile or bird, lays eggs, incubates them, and completes its motherhood by suckling its young! This animal, a non-placental mammal, is especially interesting, as it helps to prove that Australia was cut off from Europe-Asia before the Tertiary period.

A note by Dr. R. Broom, B.Sc., New South Wales, Corresponding Member, was read on the supposed nasal valves of the *Ornithorhynchus*, which are the subject at present of further investigation. (See page 317.)

Professor King exhibited a series of fresh plants received from Buckinghamshire. These included the White and the Black Bryony, climbers which seem to imitate one another, though belonging to natural orders widely separated from each other.

Mr. William Stewart exhibited a large specimen of the fungus *Polyporus squamosus*, Fr., from Cumbernauld.

25TH JUNE, 1895.

Professor Thomas King, President, in the chair.

The report of a joint-excursion with the Geological Society of Glasgow to Arrochar, on 15th instant, was submitted. (See page 360.)

On behalf of Mr. A. Somerville, B.Sc., F.L.S., there were exhibited the inflorescence and leaves of *Crambe maritima*, Linn., the Sea-Kale, from Imacher Point, Arran, where the plant, in its wild state, has been long established. It is gratifying that a large and conspicuous species, like the Sea-Kale, should in these days have escaped the ravages of the thoughtless. Where it occurs among the shingle at Imacher, there can be counted at present not fewer than 250 plants. Two peculiarities within the flower of this plant call for notice—(1) the filaments of the four longer stamens are, on their outer sides, toothed near the tip; and (2) the indehiscent seed-vessel is an erect pod, consisting of an upper and a lower part or joint, the lower being slender and empty, and forming a pedicel for the upper, which contains but a single seed. *Crambe maritima* was formerly eaten wild; it was, according to Hooker, cultivated in England for 200 years, and was introduced into the Continent from this country. As a wild plant, it occurs from the coast of Finland to the Bay of Biscay, reappearing on the Black Sea. As a genus, *Crambe* is found in Europe and Western Asia, and there are 16 species known to science.

Mr. Alexander Sweet exhibited flowering specimens of various species of cultivated herbaceous plants, and in the course of his remarks alluded to the phenomenon known as the “doubling” of flowers. The introduction of this topic led to an interesting and animated discussion as to the causes which bring about the transformation of stamens and stigmas into petals.

Mr. Peter Ewing, F.L.S., exhibited a specimen of *Equisetum arvense*, Linn., var. *alpestre*, Wahlenb., from Killin, and in referring to a visit made to that district at the end of May he stated that, in consequence of the recent dry, hot weather, many hill plants, which in ordinary seasons do not ripen fruit until the latter end of July, had this year fruited and dispersed their seeds in May.

6TH AUGUST, 1895.

Mr. William Stewart, Vice-President, in the chair.

The Chairman referred to the loss the Society had sustained in the recent death of an active member, Mr. Thomas B. Wilkie, and sympathy was expressed with the bereaved family.

Letters were read from Dr. Robert Broom, B.Sc., New South Wales, thanking the Society for electing him a Corresponding Member; and from Mr. G. R. M. Murray, F.L.S., acknowledging the congratulations of the Society on his being appointed Keeper of the Botanical Department, British Museum.

Reports on the excursions to Ballagan on June 29th, and to the Botanic Gardens on July 30th, were handed in. The excursion to Toward and Loch Striven, intimated on the syllabus card, had been abandoned, owing to unfavourable weather.

Mr. Robert Dunlop exhibited, among others, the following Lepidoptera:—*Smerinthus ocellatus*, Linn., from Girvan; *S. populi*, Linn., and *S. tilie*, Linn., from near Kilmarnock; *Acherontia atropos*, Linn., from Anstruther, Fifeshire; *Sphinx convolvuli*, from Girvan; *S. ligustri*, Linn., from near Kilmarnock; *Deilephila euphorbiae*, Linn., and *D. galii*, W.E., from Monkton, Ayrshire; *Chærocampa elpenor*, Linn., and *C. porcellus*, Linn., from Lendalfoot, Ayrshire; *Macroglossa stellatarum*, Linn., from Kirkcudbright; and *Sesia bembeciformis*, Hub., from Airdrie.

The Chairman, Mr. Stewart, brought forward a number of plants from Hawkhill Gardens, Largs.

Mr. Stewart also exhibited a large number of fungi from Cadder Wilderness, the most notable one being *Agaricus (Flammula) carbonarius*, Fr.; and, on behalf of Professor King, he showed a series from Dunlop, including *Crepidotus calolepis*, Fr., a fungus only once before found in the west country, viz., by Mr. D. A. Boyd at West Kilbride.

Mr. C. Sherry exhibited a specimen of the Killarney Fern, *Trichomanes radicans*, Sw., and made some remarks on its distribution.

Mr. R. D. Wilkie brought forward a large, strong form of *Ag. (Psalliota) campestris*, L., the common field Mushroom, raised by cultivation, also a number of mosses, including *Trichostomum crispulum*, Bruch., from Keppel; *Pterogonium gracile*, Sw., *Encalypta ciliata*, Hoffm., and *Zygodon Stirtoni*, Schp., from Millport.

Mr. James Steel exhibited the head and bill of *Ornithorhynchus anatinus* (Shaw), the Australian Duck-mole; the skull of a female Kangaroo (*Macropus giganteus* (Zimm.)); and the tibia of the gigantic, now extinct, New Zealand bird, the Moa, *Dinornis*

elephantopus. This led to a discussion on the question of how far the theory of the use and disuse of parts will account, on the one hand, for the great development of the leg bones, and, on the other, for the dwarfed or rudimentary state of the wings of the moas.

Rev. G. A. Frank Knight, M.A., exhibited the jaws of a Skate caught off Aberdeen by trawlers; and a young Globe-fish, *Tetrodon oblongus*, from the Red Sea. The special peculiarities of the latter fish are its highly-distensible stomach and its parrot-like beak, formed of bones which have become ankylosed.

27TH AUGUST, 1895.

Professor Thomas King, President, in the chair.

Reports on the excursions to Rowardennan on 10th inst., and to Millport on 24th idem, were submitted. (See page 361.)

The President read some notes descriptive of a short holiday spent in Morecambe and its vicinity, and stated, as the result of his observations on the flora of that district, that he had been more struck with its resemblance to than with its difference from the flora of the south-west of Scotland. He also exhibited *Ascophyllum Mackaii* (Turn.), var. *Robertsoni*, Batt.,* a rare seaweed, from Lochranza; and a fruiting branch of *Rosa spinosissima*, Linn., and pointed out that in the latter plant the peduncle became fleshy and formed part of the fruit, a feature not normal in other roses.

Mr. William Stewart and the President jointly exhibited numerous specimens of fungi from Tullichewan, permission to visit which estate had been kindly granted by the proprietor, Mr. James Campbell. Amongst those worthy of note as being rather uncommon in Clydesdale were—*Lactarius glyciosmus*, Fr.; *L. deliciosus*, Fr.; *L. camphoratus*, Fr.; *Entoloma rhodopolius*, Fr.; *Tricholoma saponaceus*, Fr.; *T. virgatus*, Scop.; *Marasmius porreus*, Fr.; *Leotia lubrica*, P.; *Nyctalis parasitica*, Fr.; *Boletus olivaceus*, Schæff.

Mr. A. Sweet exhibited *Frunella vulgaris*, Linn., var. *Webbiana*; and *Rubus nutkanus*, an ornamental raspberry with large flowers.

* *Trans.*, Vol. III., N.S., pp. 270, 271.

SESSION—1895-96.

24TH SEPTEMBER, 1895.

Professor Thomas King, President, in the chair.

Mr. W. Macadam Smith, Newhall, Dowanhill Gardens, was elected a Life Member, and the following gentlemen were elected Ordinary Members of the Society, viz. :—Mr. Stephen Hindle, 105 Blythswood Drive; Mr. Alfred M'Dowall, National Bank of Scotland; Mr. Norman D. Napier, 104 West George Street; Mr. J. Parker Smith, M.P., of Jordanhill. Mrs. Agnes H. Hindle, 105 Blythswood Drive, and Mr. Frank M'Culloch, 166 Sauchiehall Street, were admitted as Associates.

It was agreed to accord the thanks of the Society to Sir W. Renny and Lady Watson, and to Mr. Edward P. Tennant, Yr., of The Glen, for gifts to the Library and donations to the Illustration Fund. Thanks were also accorded to Professor Herdman, F.R.S., for a copy of his opening address to the Zoological Section of the British Association at Ipswich.

Intimation was made that an exchange of publications had been arranged with the Royal Society (London).

Reports on the excursions to Rowallan Castle and Torrance (East Kilbride) were given. (See page 361.)

On behalf of Mr. A. Bennett, F.L.S., Corresponding Member, Mr. A. Somerville, B.Sc., F.L.S., exhibited *Carex fusca*, Allioni (*C. Buxbaumii*, Wahl.), from Loch Shiel, near Arisaig, where it had been discovered by Mr. W. F. Miller. This is an addition to the flora of Great Britain, as it has previously been recorded only from the shores of Lough Neagh, Ireland. There was also shown, on behalf of Mr. Bennett, the rare sedge *Rhynchospora fusca*, R. & S., found by Mr. S. M. MacVicar in the same locality, an interesting addition to the flora of the Highlands.

Mr. R. S. Wishart, M.A., exhibited a second series of flowering plants from Berwick-on-Tweed, including *Lathyrus Aphaca*, Linn., *Silybum Marianum*, Gaertn., *Carduus pycnocephalus*, Jacq., *Asperula arvensis*, Linn., *Hyoscyamus niger*, Linn., *Allium vineale*, Linn., *Phalaris paradoxa*, Linn., and *Hordeum maritimum*, With.

Mr. Wishart also showed from Stepps the annual form of *Carduus pycnocephalus*, Jacq., grown from seed this year, and a first year's shoot of raspberry bearing fruit.

Mr. R. M. Morton exhibited *Orobanche speciosa*, parasitic on the bean, and *O. ramosa* on hemp, both showing the effects of the parasites on their respective host-plants.

Professor King exhibited a large series of fresh fungi gathered at the recent excursions of the Cryptogamic Society of Scotland in Glen Urquhart, Inverness-shire, and read some notes thereon. (See pp. 319, 320.)

THE FORTY-FOURTH ANNUAL GENERAL MEETING

29TH OCTOBER, 1895.

Professor Thomas King, President, in the chair.

REPORT OF THE COUNCIL.

Membership.—During the past year the Society lost 7 Members through death. The Membership is now as follows:—

Honorary, - - - - -	14
Corresponding, - - - - -	35
Ordinary Members (including 29 Life Members),	224
	273
Total Membership, - - - - -	273

Admissions.—The admissions during the year included 1 Honorary, 2 Corresponding, and 30 Ordinary Members (including 1 Life Member).

Associates.—The number of Associates on the roll is 20. The number admitted during the year was 12.

Obituary.—The obituary record of the year includes the names of John Stewart, Donald Farquhar, and Thomas B. Wilkie, all well-known local botanists.

Winter Session, 1895-96.—Eight Monthly Meetings were held during this Session, and the interest of these and the attendance of the members were well maintained throughout.

Summer Session, 1895.—Four Meetings and sixteen Excursions took place during this Session, all receiving satisfactory support.

Publication.—Vol. IV. (New Series), Part I., of the *Transactions* was issued during the past year.

Finance.—The Hon. Treasurer (Mr. John Renwick) submitted his Annual Statement of Accounts, duly audited. This Statement showed a balance in the Society's Ordinary Fund of £91 3s. 9d., and in the Life Members' Fund of £136 10s. Out of the balance, £91 3s. 9d., there will fall to be paid the cost of *Transactions* for the past year, the new Library Catalogue, and a book (still unpublished) for which the Society has received a donation. (See page 396.)

Library.—The Hon. Librarian (Mr. James Mitchell) gave a favourable report on the position of the Library. The number of readers had increased, while a large number of books, many of them gifts, had been added during the year. A matter of great importance and interest to the members of the Society was the preparation of a new Catalogue of the Library, of which a proof-copy was laid on the table. The compilation of the Catalogue was undertaken by the Rev. G. A. Frank Knight, M.A., who had received important assistance from Mr. Richard M'Kay, while the cost had been defrayed by Mr. Duncan Mackinnon, a Life Member of the Society.

The reports were all unanimously approved of and adopted.

The Society then proceeded to fill up the vacant offices in the Council—Mr. P. Ewing, F.L.S., being elected a Vice-President for a period of three years, and Mr. William Stewart a Vice-President for one year; Messrs. John Paterson, James Whitton, R. Dunlop, and R. M. Morton were elected Members of Council for three years, and Mr. John Fleming for one year.

Messrs. George Burnett, 276 Dumbarton Road; Matthew Gemmell, 5 Lindsay Terrace; Andrew Jamieson, Hopetoun, Bearsden; Thomas Kirkpatrick, Jun., 6 Montgomerie Crescent, Kelvinside; James Lyle, The Academy, Lenzie; and W. S. Workman, 5 Hanover Terrace, were elected as Ordinary Members.

Intimation was made that the Botanical Exchange Club of the British Isles had agreed to add the Society's name to the list of those receiving its report. The thanks of the Society for additions to the Library were accorded to Mr. David Mackinlay, Great Western Terrace, Kelvinside, for the gift of Gütke's "Heligoland," and to the Rev. R. Lawson, Maybole, for his book on Ailsa Craig.

Professor G. Bell Todd, M.B., C.M., exhibited and described a large collection of dried plants, made in Australia, by Baron Fred. von Mueller, K.C.M.G., M.D., Ph.D., F.R.S., Government Botanist, Victoria. These consisted chiefly of ferns and their allies, but embraced also many flowering plants and shrubs, almost all of them belonging to orders represented in this country.

Mr. D. M'Lellan, late Superintendent of Parks, Glasgow, exhibited two cones of *Pinus ponderosa*, Dougl., which had been obtained at Hamburg House, Droitwich, Worcestershire, the seat of Sir Harry Vernon. This noble species of pine was first found by Mr. Harting on the mountains of Santa Cruz, and named by him in compliment to George Bentham, late Secretary of the London Horticultural Society. It is said to attain a height of 220 feet, with girth of 28 feet. The cones are borne in clusters of from three to four together, each mature cone measuring 6 inches in length by $2\frac{1}{2}$ inches in breadth. The tree is quite hardy, and very valuable for its timber.

Mr. John Paterson, owing to the kindness of Mr. Allan Gilmour, Yr., of Eaglesham, exhibited a Great Snipe (*Gallinago major*, Gmel.), which that gentleman had shot on his property on 27th September last. The fact was recalled that it was thirty-one years since this species was last exhibited to the Society, although in 1885 a pair was shot at Clydebank in May, an unusual season for the Great Snipe to occur in this country, as its appearances are almost confined to the period of the autumn migration. It has occurred, though but sparingly, in nearly all the Scottish faunal areas.

Mr. A. Somerville, B.Sc., F.L.S., on behalf of Mr. F. Lockhart Robertson, showed a young Oak tree (*Quercus Robur*, Linn.), 11 inches in height, and having a root 41 inches long. This seedling had grown to the extent mentioned in twenty months, from an acorn suspended over water.

Professor King exhibited a number of plants, in fruit, from Buckinghamshire, including *Datura Stramonium*, Linn.

26TH NOVEMBER, 1895.

Professor Thomas King, President, in the chair.

Mr. F. J. Hanbury, F.L.S., F.E.S., and Mr. Edward E. Prince,

B.A., F.L.S., Director of Fisheries, Dominion of Canada, were elected as Corresponding Members.

Mr. Symers M. MacVicar, Invermoidart, Salen, Sunart, was elected as an Ordinary Member. Miss Mary Brown, 105 Buccleuch Street, and Miss Annie Henderson, 38 Berkeley Street, were admitted as Associates.

Professor G. Bell Todd, M.B., C.M., exhibited a second series of Australian Plants collected by Baron Fred. von Mueller. (See page 380.)

Mr. A. Somerville, B.Sc., F.L.S., exhibited, on behalf of Miss M. Henderson, photographs of the Scaly Spleenwort, *Ceterach officinarum*, Willd., growing spontaneously in the "Isle" of Rosneath. Mr. Somerville claimed this as a new record. Living plants from Hyères, and dried specimens from County Mayo, increased the interest of the exhibit.

Mr. George Russell exhibited *Anthurium cristallinum*, Linden & André, showing fasciation in the spadices and leaves.

Mr. R. Broom, M.B., C.M., B.Sc., Taralga, N.S.W., Corresponding Member, sent a communication entitled "Observations on the Habits of Echidna." (See page 321.)

Mr. P. Ewing, F.L.S., read a paper entitled "Remarks on 'The London Catalogue of British Plants,' Ninth Edition, 1895." (See page 324.)

On behalf of the Council, notice of motion was given regarding the appointment of an Editor of *Transactions* and the appointment of a committee to improve the constitution.

The following donations to the Library were intimated:—"A Guide to the Natural History of Loch Lomond and Neighbourhood," from Mr. Frank Coulson, and a "Biographical Notice of the Rev. David Ure," from Mr. Thomas Boyle.

23RD DECEMBER, 1895.

Professor Thomas King, President, in the chair.

Miss E. Raymond Burden, 153 Greendyke Street; Mr. Walter Dixon, 164 St. Vincent Street; Professor Malcolm Laurie, D.Sc., B.A., F.R.S.E., F.L.S., St. Mungo's College; Mr. Johnstone Macfie, M.D., 45 Ashton Terrace, Hillhead; Mr. W. J. Marlow, Botanic

Gardens; and Mr. George Paxton, Richardland House, Kiimarnock, were elected as Ordinary Members. Miss Margaret Glass, 18 Walmer Crescent, was admitted as an Associate.

It was agreed to appoint an Editor of *Transactions*, and Mr. A. Somerville, B.Sc., F.L.S., was elected to the office. A Committee, consisting of the Council, with the addition of Messrs. Joseph Somerville, D. A. Boyd, R. Grierson, and D. M'Laren, was appointed to examine the Constitution and report.

Owing to the creation of the office of Editor of *Transactions*, certain alterations in the Constitution were rendered necessary. (See page 383.)

Mr. John Paterson exhibited a Spotted Crake (*Porzana maruetta*, Leach), which had been shot on the River Add, Argyllshire, in August, 1893. In 1889 this species was not known to have occurred north-west of the Clyde (Saunders's "Manual of British Birds"), but since that date Mr. J. A. Harvie-Brown had been able to include it in his Vertebrate Fauna of Argyll on the strength of one authentic occurrence.

On behalf of Mr. H. M'Culloch, taxidermist, Mr. Paterson also exhibited a number of interesting birds which had reached him recently for preservation. These were—a Great Grey Shrike (*Lanius excubitor*, Linn.), from Blantyre; an Iceland Gull (*Larus leucopterus*, Faber), from Stornoway; and a Slavonian Grebe (*Podiceps auritus* (Linn.)), from West Loch Tarbert. The first-named is a scarce winter visitor, but it has occurred at one time or another all round the Glasgow district. The Iceland Gull is somewhat erroneously so called, as it is only a winter visitor to that island, and breeds in Greenland and Arctic America. An interesting account of the occurrence of large numbers of this species in the Firth of Forth in 1873 appears in the *Proceedings* of this Society for that year, page 210. The Slavonian Grebe is, like the others sent by Mr. M'Culloch, a winter visitor only, although it has been erroneously declared to breed in Scotland, and the statement has been widely circulated. (See the "Annals of Scottish Natural History," 1892, page 171.)

Mr. P. Ewing, F.L.S., exhibited a collection of plants from Cornwall and the Scilly Isles. Amongst them were—*Tamarix gallica*, Linn.; *Ulex nanus*, Forst.; *Carlina vulgaris*, Linn.; *Cuscuta Epilinum*, Weihe; *Erica ciliaris*, Linn.; *Euphorbia Paralias*, Linn.

On behalf of Mr. J. B. Mirrlees, Mr. George Russell exhibited *Nepenthes ampullaria*, Jack, a native of Borneo, which was introduced to this country about 1789. Mr. Russell also exhibited a variegated sport of this season from a chrysanthemum, var. "Achievement." In connection with this, Mr. Russell read some notes on the origin of sports, in which he stated as his opinion, based on the observations of thirty years, that hybridism was the principal cause of all sports.

Mr. David Robertson, LL.D., F.L.S., F.G.S., communicated a paper dealing with the nest-building habits of *Lima hians*, Gmel. (See page 331.)

The Rev. David Landsborough, Corresponding Member, read a paper entitled "An Introduction to the Botany of Ayrshire." In this paper the physical features of the county were described, and details given of the range of temperature, annual rainfall, &c. The success which had attended the attempts at the cultivation of exotic ornamental trees was enlarged upon. A long list of such plants, which had been reared under Mr. Landsborough's observation, and particulars of their behaviour under the influence of our climate, were given.

The following gifts to the Library were laid on the table:—(1) Muirhead's "Birds of Berwickshire" (2 vols.), from Mr. H. J. Tennant, M.P.; and (2) Mrs. Blackburn's "Birds from Moidart and Elsewhere," from Mr. Alexander A. Ferguson, F.S.A.Scot.

28TH JANUARY, 1896.

Professor Thomas King, President, in the chair.

Mr. Robert H. Read, M.B.O.U., was elected as a Corresponding Member.

Mr. William Leighton, 91 Union Street, and Mr. R. Taylor, 50 Lime Street, Oatlands, were elected as Ordinary Members.

On behalf of the Council, Mr. R. D. Wilkie moved the following alterations in the Constitution:—Chapter VIII., Section 1, to read—"The business of the Society shall be managed by a Council of twenty-one, consisting of a President, three Vice-Presidents, twelve Councillors, two Secretaries, a Treasurer, a Librarian, and an Editor of *Transactions*, who shall take office for

three years. One of the Vice-Presidents and four Councillors shall retire annually by rotation." Section 2—after "Treasurer" read "Librarian nor Editor of *Transactions*." Chapter X.—delete words "and in the *Proceedings* of the Society." After Chapter XII., interpolate, as a new chapter, headed "Editor of *Transactions*," "The Editor shall attend to the preparation of the material for the Society's *Proceedings* and *Transactions*." Chapter XX., Section 2, to read—"A Publishing Committee, of which the Editor shall be Convener, shall be elected annually by the Council, and shall decide," &c.

Mr. A. Somerville, B.Sc., F.L.S., exhibited the Narrow-bordered Bee Hawk-moth (*Macroglossa bombylifomis*, Ach.), from Glen Lonan, near Oban, and communicated some notes regarding its habits and distribution.

Mr. Daniel Dewar exhibited, from the Botanic Gardens, *Vitis pterophora*, Baker, an extremely handsome Brazilian vine, which is chiefly remarkable for its great size and the peculiar mode by which its vegetative propagation is effected. Towards the close of the season of active growth the subterminal internodes of the long, dependent branches swell up, forming large tubers 8 or 9 inches long, which in the course of time are constricted at the nodes and fall to the ground, where under suitable conditions they give rise to new plants; *Bœhmeria nivea*, Gaudich., an urticaceous plant from China and Japan, the strong bast-fibres of which are used for weaving the material known in England as grass-cloth; *Faydenia prolifera*, Hook., a West Indian fern; *Lycopodium phlegmaria*, Linn., a large New Zealand club-moss; and *Pilocereus senilis*, Lem., the Old Man Cactus, from Mexico. All the above plants were suitably described by Mr. Dewar.

Mr. P. Ewing, F.L.S., exhibited *Aquilegia alpina*, Linn., from Canlochan, Forfarshire, where he had gathered it in July, 1895. Although without doubt an introduction, it was difficult, Mr. Ewing stated, to understand by what agency this rare species, a native of the Swiss and Italian Alps, could have been introduced into the almost inaccessible spot where several plants were found growing vigorously. Mr. Ewing also exhibited a complete series of mounted specimens of the British Sphagnaceæ, as described by Dr. Braithwaite in his work on "The Sphagnaceæ or Peat-Mosses of Europe and North America."

Mr. R. D. Wilkie exhibited a number of mosses from Calder Glen, Lochwinnoch, including *Gymnostomum curvirostrum*, Hedw. ; *Anæctangium compactum*, Schleich., fertile ; *Dicranum Bonjeanii*, De Not. ; *Zieria julacea*, Sch., fertile ; *Bryum roseum*, Schreb. ; *Diphyscium foliosum*, W. & M.

On behalf of Mr. James Murray, there was exhibited *Hedwigidium imberbe*, Smith, a rare British moss, which he had gathered near Loch Trool, Kirkcudbrightshire. This appears to be the first record of this species for Scotland.

Mr. James M'Andrew, of New Galloway, Corresponding Member, contributed a paper entitled "Botanical Notes for 1895—Wigtownshire." (See page 344.)

In a brief communication, Dr. John Grieve drew attention to an old record of the occurrence of the Sturgeon (*Acipenser sturio*, Linn.) in the Clyde, which he had come across in the *Scots Magazine*, 1754. The reference to the occurrence is as follows:—"On the 10th of July [1754], a large Sturgeon, a fish not common in our seas or rivers, was taken in the Clyde by the Renfrew salmon-fishers, and carried alive to Glasgow. It measured about 8 feet 4 inches in length, and was proportionately thick."

25TH FEBRUARY, 1896.

Professor Thomas King, President, in the chair.

Intimation was made of the gift to the Library of MacGillivray's "British Birds," from Sir Charles Tennant, Bart., of The Glen, to whom a hearty vote of thanks was accorded. To Mr. W. A. Dobie thanks were also accorded for enabling the Society to add the *Zoologist* to the list of scientific journals which it receives.

Mr. P. Ewing, F.L.S., exhibited a complete series of the British *Andreaeaceæ* enumerated in Braithwaite's "British Moss Flora," all from Scottish localities.

Mr. R. D. Wilkie exhibited living specimens of the so-called "Japanese Blue Moss" (*Climacium* sp. ?), which had recently been the subject of a controversy in the Glasgow newspapers. The examples exhibited showed green shoots developed on the blue ones. These had been reared, from dyed imported plants,

by Mr. D. Scott, nurseryman. Mr. Wilkie also exhibited *Hypnum cordifolium*, Hedw., from Giffnock, Renfrewshire.

On behalf of Mr. J. J. Dalgleish, F.S.A.Scot., M.B.O.U., a paper was read by Mr. A. Somerville, B.Sc., F.L.S., entitled "Notes on a 'List of the Birds which have been observed in the District of Ardnamurchan, Argyllshire,' with additions thereto," in which the author brought his observations on the avi-fauna of Ardnamurchan up to the date of writing. (See page 347; also the *Proceedings* of the Society, Vol. III., p. 259, for the original list.)

Professor F. O. Bower, D.Sc., F.R.S., gave a statement of results of recent work on Sporangia, which had been communicated by him previously to the Royal Society, London. Having traced the progress of the sterilisation of spore-producing tissues, as it may be seen in the Bryophytes, he emphasised the fact that in them the spores all originate from a connected non-septate tissue. In all the higher vascular plants there are distinct sporangia. The question is how the last-named class may have originated from the Bryophytes. By comparison of the anthers of certain flowering plants, it was shown that subdivision by septa has been a frequent feature in producing many pollen-sacs from a single one. On grounds of observation of various ferns, it was shown that a similar process has probably occurred there also. It was concluded, therefore, as probable that septation has been a factor in the progression from simple forms. While not wishing to take a dogmatic attitude, nor to define the importance of this feature, Professor Bower expressed the opinion that septation of sporangia has played an important part in the origin of vascular plants as they appear at the present day.

31ST MARCH, 1896.

Professor Thomas King, President, in the chair.

Mr. William Bennett, Airdrie, was elected as an Ordinary Member.

Mr. Richard M'Kay reported on the excursion made by the Society to Overtoun. (See page 362.)

Thanks were accorded to two gentlemen who had enabled the Society to add the *Ornithologist* to the list of periodicals it

receives. The following valuable gifts were announced :—(1) “A Fauna of the Moray Basin,” from Mr. P. Mackinnon, Campbelltown; (2) “Index Kewensis,” from Mr. G. H. Darwin, F.R.S., Professor of Astronomy in the University of Cambridge; (3) “Popular Lectures and Addresses,” by the Right Hon. Lord Kelvin, F.R.S., from the author; and (4) a cheque for £5 towards the fund for illustrating the *Transactions* of the Society, from Mr. John Mackinnon, of Balinakill, Argyllshire. On the motion of the President, the thanks of the Society were heartily accorded to Lord Kelvin and the gentlemen above-named for their generosity.

Professor King moved, and Mr. A. Somerville, B.Sc., F.L.S., seconded a proposal to grant £5 5s. to the Millport Marine Scientific Station. This was agreed to.

The part of the *Transactions* of the Society forming Part II., Vol. IV., New Series, for the period which ended on 1st May, 1895, was laid on the table.

Mr. John Paterson exhibited a Bittern (*Botaurus stellaris*, Linn.), which had been brought to him in the flesh, and had met its death by coming in contact with the telegraph wires at Banton, Stirlingshire, at dusk on the afternoon of the 17th of February this year. Mr. Paterson also exhibited an example of Buffon's Skua (*Stercorarius parasiticus*, Linn.), which he had seen in the collection of Mr. Drummond Pringle, Chapel, Braidwood, in whose possession it had remained unidentified for about thirty-five years. This rare straggler to Lanarkshire had been shot in Dalsersf Parish, opposite Mauldslic Castle, and given by the gamekeeper who had shot it to Mr. Pringle, who preserved it.

On behalf of Mr. H. M'Culloch, taxidermist, a Common Scoter (*Edemia nigra* (Linn.)) was exhibited. It had been secured by a fisherman at the Dorling, a sandbank near Campbelltown.

Dr. Robert Brown exhibited a collection of plants from the Swiss Alps.

Mr. G. Russell, on behalf of Mr. J. B. Mirrlees, showed examples of the Sugar-cane from Trinidad, and gave a full description of the various methods of cultivation and figures dealing with the sugar production in Demerara, Barbados, Java, Queensland, Louisiana, and Natal.

Mr. Symers M. MacVicar sent for exhibition, from Moidart,

Inverness-shire, the mosses *Amblystegium radicale*, P. Beauv. (a new record for the West Highlands), and *Hypnum micans*, Wils., a species stated in Wallace's "Island Life" to be found in Europe in Britain alone.

Mr. R. D. Wilkie exhibited some mosses from Simla, which had been collected by Surgeon-Major Shearer, Officiating Secretary to the P.M.O., H.M. Forces in India. Among them were *Thuidium recognitum*, Hedw., and *Pleurochaete squarrosa*, Lindb., both of which occur in Britain.

Mr. David Robertson, LL.D., F.L.S., F.G.S., communicated a paper entitled "Jottings from my Note-Book—on *Cancer pagurus*, Linn.," being notes on a young specimen of the crab named, which was exhibited. (See page 332.)

Mr. W. Anderson Smith, Ledaig, contributed a paper entitled "The Coloration of Fishes." (See page 335.)

28TH APRIL, 1896.

Mr. Robert Kidston, F.R.S.E., F.G.S., Vice-President, in the chair.

Mr. William Gemmill, Jun., 62 Bath Street, was admitted as an Associate.

Mr. R. D. Wilkie moved the adoption of the amended reading of Chap. XIII. of the Constitution as follows:—

Section I. to read—"The Session of the Society shall extend from September of each year to the following August inclusive, and Ordinary Meetings, of which," &c., &c.

Section II. to read—"Excursions shall be made at such times as may be arranged by the Council, but of these due notice shall be given to the Ordinary Members and Associates by circular."

Section III. to read—"Alteration of the date of any meeting and arrangements for special meetings and excursions may be made by the Council, but of these due notice shall be given to the Ordinary Members and Associates by circular."

The alterations proposed were unanimously adopted.

Professor King referred to the loss the Society has sustained by the death of Dr. John Grieve, F.R.S.E., F.L.S., who became a member in 1858. (See page 357.)

Professor King reported on the excursion to Castle Semple. (See page 363.)

Mr. James Mitchell, Hon. Librarian, intimated that he had received from Mr. J. G. A. Baird, M.P., the gift of a complete set of the annual Parliamentary Blue Book Reports of the Fishery Board of Scotland. Mr. Mitchell also intimated that he had received from Mr. George Horn, Braithwaite's "British Moss Flora" (2 vols.), Stevenson's "Mycologia Scotica," and Cooke's "British Fungi." Hearty votes of thanks were accorded to the donors.

Mr. R. D. Wilkie exhibited *Tortula princeps*, De Not., and *Ditrichum flexicaule*, Schleich., from Falls of Clyde; *Antitrichia curtispindula*, Linn., and *Hypnum Crista-castrensis*, Linn., from Callander; *Grimmia funalis*, Schimp., *Oncophorus virens*, Brid., and *Neckera crispa*, Linn., fertile, from Killin.

Mr. John Paterson read a paper entitled "Ornithological Notes, Clyde Faunal Area, 1895," in which he made reference to the following points:—the irruption of the Little Auk (*Mergulus alle* (Linn.)) early in the year; the duck-life of our estuarine waters, with statistics; the movements of the Gulls in Glasgow Harbour; the arrival of our summer visitors; the status of the Common Sheld-Duck (*Tadorna cornuta* (S. G. Gmel.)) as a Clyde species; the occurrence in summer of the Tufted Duck (*Fuligula cristata* (Leach)) and Shoveler (*Spatula clypeata* (Linn.)) at Possil Marsh, and the Cormorant (*Phalacrocorax carbo* (Linn.)) there, in winter. A list of the birds of Douglasdale and some notes on waders in the Clyde estuary concluded the paper.

Mr. A. Somerville, B.Sc., F.L.S., contributed a list of fifty-eight wild plants which he had found in flower in Arran, in the first week of April of the present year. Among the plants forming the list the following deserve mention:—*Barbarea vulgaris*, R. Br.; *Stellaria uliginosa*, Murr.; *Montia fontana*, Linn.; *Myrrhis odorata*, Scop.; *Crepis virens*, Linn.; *Veronica serpyllifolia*, Linn.; *Euphorbia Peplus*, Linn.

On the recommendation of the Council, it was agreed to hand over to Mr. A. Somerville, B.Sc., F.L.S., the sum of £30, on the

same terms as those upon which the sum of £51 10s. had already been granted. (See pages 299, 300.)

26TH MAY, 1896.

Professor Thomas King, President, in the chair.

Mr. R. M. Morton reported on an excursion to Fiddler Gill (see page 364). Mr. R. D. Wilkie reported on an excursion to Brodick (see page 365). Mr. J. Cairns, Jun., on behalf of Mr. C. Sherry, reported on a visit to the Botanic Gardens (see page 364).

Professor King intimated that the Council were now in a position to relieve Mr. R. D. Wilkie, the Acting Secretary, as Mr. S. M. Wellwood had agreed to become one of the Honorary Secretaries. Mr. Wilkie was heartily thanked for the very efficient manner in which he had discharged the duties of Secretary, which he had undertaken at an awkward emergency.

Dr. David Robertson, F.L.S., F.G.S., sent for exhibition *Porcellio pictus*, Brandt & Ratz, an Isopod Crustacean, from Great Cumbrae. This species is very characteristic, and easily distinguished from all others. The head is black and three-lobed in front, strongly granulated. The median dorsal line is dark coloured, with a yellow irregular patch on each side down to the eighth and slightly to the ninth and tenth segments; the telson is triangular, short, and acute. It is about three times as long as broad. It has been recorded from England and Ireland, and is said to inhabit dry situations, such as the rubbish of old ruins and under dry leaves. The example exhibited was captured on a dry papered wall in a dwelling-house at Millport. Regarding the distribution of this Isopod Crustacean in Scotland, see the Society's *Proceedings*, Vol. III. (N. S.), p. xvi.

Mr. Symers M. MacVicar sent for exhibition, from Moidart, *Ranunculus petiolaris*, Marshall, and *Ajuga pyramidalis*, Linn. The first-named was described from specimens obtained near Kingshouse, Argyllshire, in 1892. It occurs also in Skye and in Sutherlandshire. The original root-leaves are reduced to subulate petioles (hence the specific name given to the plant); the outer ones are recurved, and most of them disappear before the

flowers open. *Ajuga pyramidalis* is a rare species. It occurs in Westmoreland, and from Argyllshire northwards to the Outer Hebrides and the Orkney Islands. In Ireland it is only known as occurring in the Aran Isles. Though in Britain it seems to have a preference for maritime localities, in the Swiss Alps it grows in pastures at a mean elevation of 4,500 feet.

Mr. F. L. Grant, M.A., exhibited a living specimen of *Cteniza cæmentaria*, Latr., the Trap-door Spider, found among logwood in a ship from Hayti.

Mr. John Renwick showed some native plants from North Queensferry.

Mr. R. Dunlop gave a lime-light exhibition of views of places near Glasgow which are interesting to the naturalist, the antiquarian, and the geologist.

30TH JUNE, 1896.

Professor Thos. King, President, in the chair.

Professor King read a memorial notice of the late John Grieve, M.A., M.D., F.R.S.E., F.L.S. (See page 357.)

Professor Malcolm Laurie, D.Sc., B.A., F.R.S.E., F.L.S., reported on a dredging excursion to Millport (see page 366); Mr. John Cairns, Jun., on an excursion to Castle Toward (see page 368), and Mr. R. D. Wilkie on one to Benmore, Kilmun. (See page 369.)

Mr. Wilkie's report on the evening excursion to Queen's Park was held as read. (See page 366.)

Mr. George Horn exhibited under the microscope *Volvox minor*, Stein., from Hogganfield Loch. This was believed to be a new record for the district.

Mr. Richard M'Kay exhibited a moss, *Breutelia arcuata*, Schimper, fertile, from Fiddler Gill, Braidwood; also *Potentilla norvegica*, Linn., and *Ceratophyllum demersum*, Linn., from Grangemouth.

Mr. John Renwick exhibited some plants from the last-named locality.

A number of photographs of the bark, leaves, and fruits of forest trees, presented to the Society by Mr. George Paxton, was on exhibition. The series was much admired. [Pl. v. and vi.]

Mr. S. M. Wellwood exhibited an extensive collection of fresh herbaceous plants from an Ayrshire garden.

Mr. Henry Grieve sent for exhibition *Dabeocia polifolia*, Don, and *Eriocaulon septangulare*, With., from Connemara.

Mr. D. B. Duncanson exhibited under the microscope sections of the ovule of the Scotch Fir (*Pinus sylvestris*, Linn.). The process of fertilisation in the Coniferae, although familiar to students, diagrammatically, is but seldom seen owing to the delicate manipulation essential in preparing sections.

Mr. Johnston Shearer exhibited some plants from waste ground at Hangingshaw, Glasgow, including *Erysimum orientale*, Mill., *Anagallis arvensis*, Linn., var. *cærulea*, Lam., *Saponaria Vaccaria*, Linn., *Silene Cucubalus*, Wibel., *S. conica*, Linn., *Scandix Pecten-Veneris*, Linn., *Asperula arvensis*, Linn., *Asperugo procumbens*, Linn., *Lithospermum officinale*, Linn., *L. arvense*, Linn.

A paper, communicated by Dr. D. Robertson, F.L.S., F.G.S. entitled "Jottings from my Note-Book—on *Amphidotus cordatus*, Penn.," was read. (See page 333.)

4TH AUGUST, 1896.

Professor Thomas King, President, in the chair.

Mr. David B. Duncanson, 149 North Street, was elected as an Ordinary Member.

Mr. John Fleming reported on an excursion to Carribber (see page 369), and Mr. A. Sweet on one to Ardentinny (see page 370).

Mr. R. D. Wilkie, on behalf of the Council, moved the adoption of the amended Constitution of the Society, of which a proof had been sent to all Ordinary Members. The motion was seconded by Mr. William Stewart, and carried unanimously. Among the changes thus brought about, the abolition of entry-money, and the increase in the subscription payable by Associates to 5s., were the most important. The increased subscription in the case of Associates is accompanied with an extension of their privileges, including access to the valuable Library of the Society. The alterations involved were in the following chapters, sections, and sub-sections of the Constitution—

Chap. V., Sections 2 and 3.

VI., Section 2.



From Photographs by
BARK OF BEECH (*Fagus*).

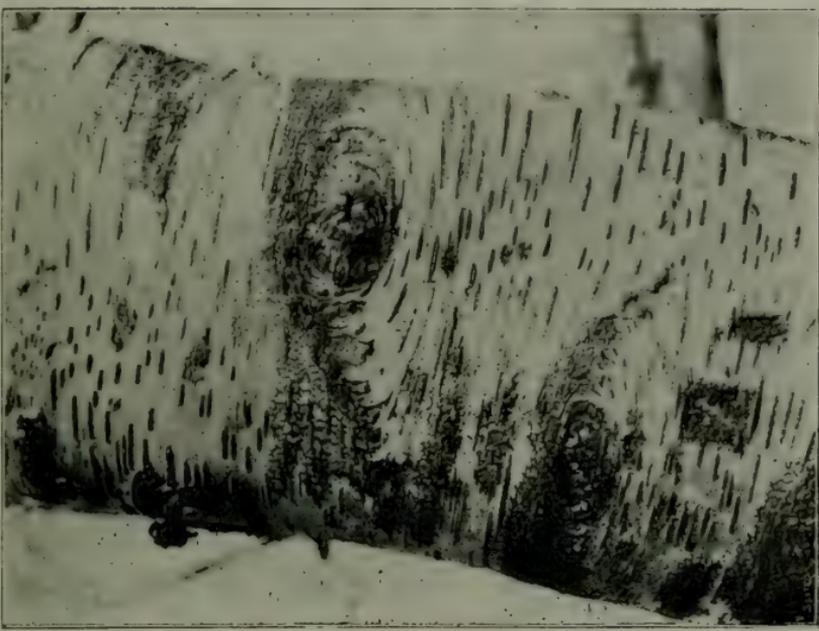


George Paxton.
BARK OF LIME (*Tilia*).





From Photographs by
BARK OF OAK (*Quercus*).



George Paxton.
BARK OF BIRCH (*Betula*).



Chap. VII.,	Sections 1 and 2.
VIII.,	„ 5 and 6.
XI.,	„ 2 and 3.
XIV.,	„ 4 and 5.
XV.,	Section 2, Sub-sections 4, 8, and 9.
XVI.,	Sections 1 and 4.
XIX.,	„ 1, 2, 6, and 7.
XX.,	„ 4 and 5.
XXII.,	„ 3, 4, and 5.

A number of fungi was exhibited by Professor King and Mr. William Stewart, including *Bolbitius bulbillosus*, Fries, from Largs, a species new to Britain. (See page 355.)

Professor King exhibited *Ptilota asplenioides*, *P. filicina*, and other species of Algæ from California.

Mr. A. Sweet exhibited a number of herbaceous plants in flower, which led to a discussion on the effects of cultivation and on the species from which some of our garden flowers have originated.

Dr. R. Broom, B.Sc., Taralga, N.S.W., Corresponding Member, exhibited a collection of South Sea Island fishing-hooks, showing ingenious combinations of mother-of-pearl and tortoise-shell, which served both as hook and bait.

Dr. Broom also exhibited a series of fossils from the bone-breccia deposit which he had discovered recently in the neighbourhood of the Wombeyan Caves, N.S.W.

The specimens shown were:—

1. Two almost perfect jaws of *Burramys parvus*, Broom. This is the interesting little Diprotodont marsupial recently described by Dr. Broom, which is chiefly characterised by its large grooved premolars. It is regarded as being intermediate between the Phalangers and the Macropodids—differing from *Hypsiprymnodon* in having three small functionless teeth between the large p^4 and i^1 . There is also reason to believe that in *Burramys* we have the nearest known relative of the extinct pouched-lion *Thylacoleo carnifex*, Owen.

2. Two lower jaws and a specimen exhibiting the almost complete maxillary teeth of *Palœopetaurus elegans*, Broom. This small Diprotodont is believed to be intermediate between *Petaurus*

and *Gymnobelideus*, and to be in all probability the ancestor of both.

3. Premolars and molars of *Pseudochirus antiquus*, Broom, an extinct Ring-tailed Phalanger.

4. Lower jaw of *Dromicia nana* (Desm.), the small Tasmanian Dormouse-Phalanger.

5. Lower and two upper jaws of *Phascologale flavipes*, Waterh. the existing Yellow-footed Pouched-mouse.

6. Lower jaw of *Phascologale penicillata* (Shaw), the existing Brush-tailed Pouched-mouse.

Dr. Broom also read a paper entitled "Notes on Some Australian Mammals." (See page 351.)

Mr. J. Bruce Hunter exhibited some flowering plants from Ben Lawers.

Mr. A. Somerville, B.Sc., F.L.S., sent some plants from Clova for exhibition, including the moss *Tetraplodon bryoides*, Linn.

31st AUGUST, 1896.

Professor Thomas King, President, in the chair.

Professor T. Kennedy Dalziel, M.B., C.M., Dean of Anderson's College Medical School, and Mr. Thomas S. Campbell, 85 Gibson Street, Hillhead, were elected as Ordinary Members.

Mr. George M'Crie sent for exhibition a number of flowering plants collected in Norway.

Mr. William Stewart exhibited *Lentinus lepideus*, Fr., a rare fungus, which had been sent to him by Mr. J. R. Macgregor, Paisley, who found it growing on a wall-plate in his dye work. This species had only been recorded previously for two Scottish districts, viz., Tay and Tweed. The plant exhibited was a remarkably fine specimen, one-half larger than the dimensions given for the species, as it measured upwards of six inches across the pileus, with broad, thin, decurrent, roughly-toothed, and sinuate gills, transversely striate. When it reached Mr. Stewart it was wholly white, with the exception of a portion of the cap which had pressed against some obstruction while growing, and at the point of contact it showed a reddish-brown dint, but the plant at last turned entirely of a russet colour. The smell was

somewhat like that of port wine. Dr. Plowright, to whom it had been submitted, writes that it has become very common on railway sleepers at King's Lynn.

Professor King and Mr. Stewart exhibited a collection of fungi from Cadder Wilderness, freshly gathered, and the latter gentleman referred to the characteristics of the less common species, including *Agaricus capnoides*, Fr., *A. flavidus*, Schæff., *Russula sardonica*, Fr., *Lactarius glyciosmus*, Fr.

Mr. P. Ewing, F.L.S., exhibited and described some rare Alpine flowering plants from Perthshire, also a number of species characteristic of the flora of Cornwall.

Mr. A. Somerville, B.Sc., F.L.S., exhibited *Sium erectum*, Huds., from West Kilbride, and stated that there is no satisfactory evidence to justify the inclusion of *S. latifolium*, Linn., as an Ayrshire species.

Mr. R. M. Morton exhibited *Scandix Pecten-Veneris*, Linn., from Braidwood.

Mr. James Whitton sent for exhibition leaves and fruits of forest trees.

Mr. Johnston Shearer exhibited some tree fruits from Queen's Park.

Professor King read a paper entitled "Botanical Notes on a Visit to the North of Ireland," in which he drew attention to the similarity of the flora of Clyde to that of the district which he described in his paper.

ABSTRACT STATEMENT OF ACCOUNTS—SESSION 1894-95.

<p>1891, Sept. 1. To Balance in National Security Savings Bank (£100), say— Life Members' Fund, - £26 0 0 Ordinary Fund, - 74 0 0 <hr/>£100 0 0 Less due to Treasurer, - 5 0 7½ <hr/>1895—Aug. 31. To 2 Life Members' Subscriptions @ £5 5s., - £94 19 4½ (1 for Session 1894-95, 1 for 1895-96.) " 182 Members Annual Subscriptions @ 7s. 6d., - 10 10 0 " 9 " Entry-mones @ 7s. 6d., - 68 5 0 " 9 " Arrears, - 11 12 6 " 16 Associates' Subscriptions and 1 Arrears, @ 2/6, - 4 5 0 " Interest, - 2 2 6 " Proceedings sold, - 6 1 5 " Received from Mitchell Library for Proceedings, - 6 7 11 " Postages, &c., - 6 7 3 <hr/>One-eighth of Legacy by Sir Michael Connal, £1 5s.; less Duty, 2s. 6d., - 1 2 6 " Donations for Illustration Fund, - 4 6 0 " Donations for Library Catalogue, - 7 0 0 " Book, £2 2s.; Carruthers' Portrait Fund, 5s., - 2 7 0 <hr/>£225 6 5½</p>	<p>1896, Aug. 31. By Rent and Attendance, - £8 19 6 " Postage, Stationery, &c., - 10 19 2 " Printing Circulars, - 10 18 7 " Proceedings, - 41 16 0 " Carriage on Proceedings, - 1 10 3 " Postages, &c., on Foreign Proceedings, - 3 6 5 " Donation to Carruthers' Portrait Fund, - 0 15 6 " Library—New Books, - 9 3 8 " Insurance, - 0 6 0 " Postages, - 0 7 9½ " Bindings, 1893-94, £6 7s. 10d.; 1894-95, £3 2s., - 9 9 10 " Balance Life Members' Fund on loan @ 4 1/10, - *£36 10 0 " Balance Ordinary Fund on loan @ 4 1/10, *£15 0 0 " Balance Ordinary Fund in National Security Savings Bank, - 85 0 0 <hr/>Less due to Treasurer, 8 16 3 <hr/>91 3 9 <hr/>£225 6 5½</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

* On Security of Guaranteed Railway Stock.
Life Members' Fund—
Invested in 2½ per cent. Debentures of The Modern Permanent Building and Investment Society, Melbourne, £100 0 0
On loan at 4 per cent., - 36 10 0

£136 10 0

GLASGOW, 23rd October, 1895.—We have audited the above Accounts, compared same with the relative Vouchers and Securities, and find them correct.
(Signed) F. N. SLOANE, C.A., {
THOS. G. BISHOP, { Auditors.

October, 1895.

Natural History Society of Glasgow.

SESSION XLV., 1895-96.

Office-Bearers.

President.

Professor THOMAS KING, Anderson's College Medical School.

Vice-Presidents.

ROBERT KIDSTON, F.R.S.E., F.G.S., 24 Victoria Place,
Stirling.

PETER EWING, F.L.S., The Frond, Uddingston.

WILLIAM STEWART, Violetgrove House, St. George's Road.

Acting Secretary.

R. D. WILKIE, 302 Langside Road.

Honorary Treasurer.

JOHN RENWICK, 49 Jamaica Street.

Honorary Librarian.

JAMES MITCHELL, 240 Darnley Street, Pollokshields.

Honorary Editor of Transactions.

A. SOMERVILLE, B.Sc., F.L.S., 4 Bute Mansions, Hillhead.

Members of Council.

W. A. DOBIE.

JOHN CAIRNS, JUNR.

JOHN PATERSON.

JOHN FLEMING.

J. BRUCE HUNTER.

JAMES WHITTON.

DAVID PEARSON.

RICHARD M'KAY.

ROBERT M. MORTON.

R. D. WILKIE.

JOHNSTON SHEARER.

ROBERT DUNLOP.

Auditors.

JOSEPH SOMMERVILLE and GEORGE RUSSELL.

LIST OF BRITISH AND IRISH SOCIETIES, &c., WITH
WHICH PUBLICATIONS ARE EXCHANGED.

- Alnwick.—Berwickshire Naturalists' Field Club.
Barrow.—Naturalists' Field Club.
Bath.—Natural History and Antiquarian Field Club.
Belfast.—Naturalists' Field Club.
 Natural History and Philosophic Society.
Birmingham.—Philosophical Society.
Brighton.—Brighton and Sussex Natural History Society.
Bristol.—Naturalists' Society.
Cambridge.—The University Library.
Cardiff.—Naturalists' Society.
Chester.—Society of Natural Science.
Chelmsford.—The Essex Naturalist.
Dublin.—Royal Dublin Society.
 Trinity College Library.
Dumfries.—Dumfriesshire and Galloway Natural History and
 Antiquarian Society.
Dundee.—East of Scotland Union of Naturalists' Societies.
Eastbourne.—Naturalists' History Society.
Edinburgh.—The Royal Society.
 Advocates' Library.
 Botanical Society.
 Field Naturalists' and Microscopical Society.
 Geological Society.
 Royal Physical Society.
 Scottish Geographical Society.
 Scottish Microscopical Society.
Glasgow.—Andersonian Naturalists' Society.
 Baillie's Institution Free Library.
 Faculty of Physicians and Surgeons.
 Geological Society.
 Industrial Museum.
 Mitchell Library.
 Philosophical Society.
 Stirling's Library.
 University Library.

- Leeds.—Naturalists' Club and Scientific Association.
 Yorkshire Naturalists' Union.
- Leicester.—Literary and Philosophical Society.
- Liverpool.—Naturalists' Field Club.
 Biological Society.
- London.—British Museum Library.
 British Museum (Natural History Department).
 British Association.
 Entomological Society.
 Geologists' Association.
 Hampstead Naturalists' Club.
 Linnean Society.
 Quekett Microscopical Club.
 Royal Geographical Society.
 Royal Microscopical Society.
 Royal Society.
- Manchester.—The Botanical Exchange Club of the British Isles.
 Field Naturalists' and Archæologists' Society.
 Geological Society.
 Literary and Philosophical Society.
 Microscopical Society.
- Marlborough.—The College Natural History Society.
- Newcastle-on-Tyne.—Tyneside Naturalists' Field Club.
- Northampton.—Natural History Society.
- Norwich.—Norfolk and Norwich Naturalists' Society.
- Oxford.—Bodleian Library.
- Paisley.—Free Library.
- Penzance.—Natural History and Antiquarian Society.
- Perth.—Perthshire Society of Natural Science.
- Plymouth.—Plymouth Institution, and Devon and Cornwall
 Natural History Society.
- Stoke-upon-Trent.—North Staffordshire Naturalists' Field Club.
- Truro.—Royal Institution of Cornwall.
- Warwick.—Naturalists' and Archæologists' Field Club.
- Watford.—Hertfordshire Natural History Society and Field Club.

LIST OF COLONIAL AND FOREIGN SOCIETIES, &c.,
WITH WHICH PUBLICATIONS ARE EXCHANGED.

- Albany, N.Y.—New York State Museum.
 Alberta, Macleod, N.W.T.—Macleod Historical Society.
 Amsterdam.—Koninklijke Akademie van Wetenschappen.
 Basle.—Naturforschende Gesellschaft.
 Bergen.—Museum.
 Berne.—Schweizerische Entomologische Gesellschaft.
 Bonn.—Naturhistorischer Verein der Preussischen Rheinlande
 und Westfalens.
 Niederrheinische Gesellschaft für Natur und Heilkunde.
 Bordeaux —Société Linnéenne.
 Boston, Mass.—Society of Natural History.
 Bremen.—Naturwissenschaftlicher Verein.
 Brisbane.—Queensland Branch of Royal Geographical Society of
 Australasia.
 Brünn.—Naturforschender Verein.
 Brunswick.—Verein für Naturwissenschaft.
 Brussels.—Société Entomologique de Belgique.
 Société Malacologique de Belgique.
 Société Royale de Botanique de Belgique.
 Buda-Pesth.—Királyi Magyar Természettudományi Társulat.
 Mathematische und Naturwissenschaftliche Be-
 richte aus Ungarn.
 Buenos Ayres.—Museo de La Plata.
 Cambridge, Mass.—Museum of Comparative Zoölogy of Harvard
 College.
 Cassel.—Verein für Naturkunde.
 Cherbourg.—Société Nationale des Sciences Naturelles et Mathé-
 matiques.
 Chicago.—Field Columbian Museum.
 Cincinnati.—Society of Natural History.
 Cordova.—Academia Nacional de Ciencias.
 Dantzig.—Naturforschende Gesellschaft.
 Davenport, Iowa.—Academy of Natural Sciences.
 Dresden.—Naturwissenschaftliche Gesellschaft.
 Elberfeld.—Naturwissenschaftlicher Verein.
 Florence.—Società Entomologica Italiana.

- Frankfort.—Senckenbergische Naturforschende Gesellschaft.
- Ghent.—Natuurwetenschappelijk Genootschap.
- Giessen.—Oberhessische Gesellschaft für Natur und Heilkunde.
- Gorlitz.—Naturforschende Gesellschaft.
- Granville, Ohio.—Denison University Scientific Laboratories.
- Gratz.—Naturwissenschaftlicher Verein für Steiermark.
- Greifswald.—Naturwissenschaftlicher Verein von Neu-Vorpommern und Rügen.
- Hague, The.—Nederlandsche Entomologische Vereeniging.
- Halifax.—Nova Scotian Institute of Natural Science.
- Halle.—Naturforschende Gesellschaft.
Kaiserliche Leopold-Carolinische Deutsche Akademie
der Naturforscher.
- Hamburg.—Naturwissenschaftlicher Verein für Hamburg-Altona,
Hamburgischer Wissenschaftlicher Anstalt.
- Heidelberg.—Naturhistorisch-medicinischer Verein.
- Helsingfors.—Societas pro Fauna et Flora Fennica.
- Kiel.—Naturwissenschaftlicher Verein für Schleswig-Holstein.
- Kiev.—Société des Naturalistes.
- Königsberg.—Physikalisch-ökonomische Gesellschaft.
- Landshut.—Botanischer Verein.
- Lawrence.—University of Kansas.
- Liege.—Société Royale des Sciences.
- London, Ontario.—Entomological Society of Ontario.
- Luxemburg.—Verein Luxemburger Naturfreunde.
- Lyons.—Société Linnéenne.
- Madison.—Wisconsin Academy of Sciences, Arts, and Letters.
- Madrid.—Sociedad Española de Historia Natural.
- Meriden, Conn.—Scientific Association.
- Metz.—Société d'Histoire Naturelle.
- Mexico.—Sociedad Científica "Antonio Alzate."
- Milwaukee.—Public Museum.
Natural History Society of Wisconsin.
- Minneapolis.—Minnesota Academy of Natural Sciences.
- Montevideo.—Museo Nacional.
- Moscow.—Société Impériale des Naturalistes.
- Munich.—Bayerische Botanische Gesellschaft.
- Münster.—Westfälischer Provinzial-Verein für Wissenschaft und
Kunst.

Neuchâtel.—Société des Sciences Naturelles.

New Brighton.—Natural Science Association of Staten Island.

New Haven, Conn.—Connecticut Academy of Arts and Sciences.

New York.—Academy of Sciences.

Linnaean Society.

Microscopical Society.

Scientific Alliance.

Nuremberg.—Naturhistorische Gesellschaft.

Odessa.—Société des Naturalistes de la Nouvelle-Russie.

Osnaburg.—Naturwissenschaftlicher Verein.

Ottawa.—Geological and Natural History Survey of Canada.

Department of Agriculture.

Padua.—La Nuova Notarisia.

Società Veneto-Trentina di Scienze Naturali.

Paris.—Société Entomologique de France.

Société Zoologique de France.

Passau.—Naturhistorischer Verein.

Philadelphia.—Academy of Natural Sciences.

Wagner Free Institute of Science.

Poughkeepsie.—Vassar Brothers Institute.

Prague.—Königl.-Böhm. Gesellschaft der Wissenschaften.

Puebla.—Sociedad Central de Profesores.

Raleigh, N.C.—Elisha Mitchell Scientific Society.

Rio de Janeiro.—Museo Nacional.

Rochester, N.Y.—Academy of Science.

Rome.—Rassegna delle Scienze Geologiche in Italia.

Società Romana per gli Studi Zoologici.

San Francisco.—California Academy of Sciences.

St. John.—Natural History Society of New Brunswick.

St. Louis, Missouri.—Academy of Science.

St. Petersburg.—Comité Géologique.

Societas Entomologica Rossica.

Russisch - Kaiserliche Mineralogische Gesellschaft.

Salem, Mass.—Essex Institute.

Santiago.—Deutscher Wissenschaftlicher Verein.

Société Scientifique du Chili.

Somerville, Mass.—Tufts College.

Stockholm.—Société Entomologique.

- Stuttgart.—Verein für Vaterländische Naturkunde in Württemberg.
- Sydney.—Australian Museum.
- Tokio.—Imperial University of Japan.
- Toronto.—Canadian Institute.
Entomological Society of Ontario.
University of Toronto.
- Trentschin.—Naturwissenschaftlicher Verein.
- Trieste.—Società Adriatica di Scienze Naturali.
Museo Civico di Storia Naturale.
- Upsala.—Geological Institution of the University.
- Venice.—La Notarisia.
- Vienna.—Kaiserlich-Königliche Zoologisch-botanische Gesellschaft.
Ornithologischer Verein.
K. K. Naturhistorisches Hofmuseum.
- Washington, D.C.—Smithsonian Institution.
United States Department of Agriculture.
United States Geological and Geographical Survey.
- Wellington, N.Z.—New Zealand Institute.
- Winnipeg.—Historical and Scientific Society of Manitoba.
- Zurich.—Naturforschende Gesellschaft.

GENERAL INDEX.

- Alchemilla vulgaris*, and allied Forms, 40
 Annual Report, 1891-92, 126
 1892-93, 156
 1893-94, 288
 1894-95, 378
 Ardnamurchan, List of Birds of, 347
 Arran, A Day with the Dredge at Machrie Bay, 169
 Auk, The Little, 241
 Auk, Little, Notes on the Irruption of, in the Winter of 1894-95, 195
 •Auld Wives' Lifts, Measurements of, 98
 Australian Mammals, Notes on some, 351
 Bargaran, Witchcraft at, 91
 Birds, List of Ardnamurchan, 374
 Notes on the Habits of some Common, 50
 Blackbird, Habits of, 53
 Blairquhosh, Meikle Tree of, 122
Bolbitius bulbillosus, a Fungus new to Britain, 355
Bonnemaisonia asparagoides, that gave a Blue Stain to Paper, 172
 Boomerangs, Exhibit of, 140
 Botanical Notes from Wigtonshire for 1895, 344
 Botany of the West of Scotland, Contributions to the, 199
 Bute, Occurrence of *Cladium germanicum* in, 167
 Capon Tree, 152
 Castlemilk, Entomostraca from, 69
Cladium germanicum, Occurrence of, in Bute, 167
 Clouded-yellow Butterfly, Occurrence of, in Ayrshire, 35
 Coloration of Fishes, 335
 Constitution of the Society, Changes in, 382, 383, 388, 392
 Copper Mine at Caerwinning Hill, 115
 Crannog at Buston, 361
 Crookston Dollar, Notes on, 103, 294
 Cryptogamic Society (Scottish), Meeting of, in 1895, 319
 Cyclopeans, Notes on the Anatomy and Significance of, 31
Cystopteris montana in Stirlingshire, 215
 Disappearance of Native Plants, Notes on, 44, 141
 Dougalston, Historical Notice of, 95
 Swans at, 97
 Dredge, Day with, at Machrie Bay, Arran, 169
 Dungoyach, Standing-stones at, 121
 Echidna, Observations on the Habits of, 321
 Entomostraca from Castlemilk, 69
 Excursions—
 Aikenhead, 360
 Ardeer Sandhills, 274
 Ardentinny, 370
 Ardgowan, 123, 164
 Arrochar, 373
 Ashgrove, 88, 125
 Auchenharvie, 274, 285
 Baldernock, 95, 141
 Balfron, 274, 284
 Ballagan, 360, 375
 Balmaha, 116, 124
 Benmore, 369
 Blair, 361
 Blairquhosh, 121, 159
 Blythswood, 122, 164
 Bonnybridge, 124
 Botanic Gardens, 103, 145, 274, 283, 359, 360, 364
 Braidwood, 364
 Brisbane, 88, 125
 Brodieck, 365
 Broomley, 273
 Castlemilk, 147
 Cochno, 277
 Craignethan, 87, 124
 Crookston, 268
 •Cumbrae, Little, 111, 147
 Dalgarvan, 371
 Dalry, 370
 Dalziel, 101, 145
 Darnley, 124
 Dougalston, 95, 141, 272
 Dumbarton, 362
 Dungoyne, 154
 Edinbarnet, 106, 145
 Eglington, 85, 124
 Erskine, 89, 140
 Finlaystone, 122, 159, 160
 Garelochhead, 107, 147
 Garnkirk, 86, 124, 274, 282.
 Garscube, 110, 147.
 Gartcosh, 124.
 Hawkhill, 86
 Howwood, 363
 Johnstone Castle, 131
 Kerelaw, 88, 125
 Kilbride, West, 269
 Kilmahew, 121, 159, 160
 Kilmalcolm, 359, 372

Excursions—

- Kilmun, 369
- Lee, 358, 372
- Maich Glen, 360
- Mains, 100
- Manuel, 369
- Mauldslic, 92
- Millport, 361, 366
- Milton-Lockhart, 118, 153
- Monkton, 274, 283
- Montgreenan, 274, 285
- Mugdock, 131
- Murdostoun, 120, 153
- Pitcon Glen, 113, 151
- Pollok, 115, 151
- Prestwick, 283
- Puck's Glen, 369
- Queen's Park, 366
- Redlands, 99, 358, 372
- Rosneath, 271
- Ross Hall, 268
- Rowallan, 361, 377
- Rowardennan, 360
- Strathleven, 275
- Torrance, 361, 377
- Toward, 368
- Troon, 116, 151
- Tullichewan, 272
- Tullich Hill and Ben Reoch, 360
- Wemyss Castle, 268
- West Kilbride, 269
- Westmount, 99
- Woodbank, 272
- Woodside, 112, 151

- Finlaystone, Fungi of, 61
- Four-winged Chick, On the Anatomy of a, 315
- Fungi of Kilmahew, Finlaystone, and West Kilbride, 61

Gulls and their Neighbours, 244

- Habits of some Common Birds, 50
- Ha'-hill at Maulside, connection with Sir William Wallace, 95
- Hawthorn at Redlands, 99
- Hearing, Comparative Anatomy of the Organs of, 137
- Herring, Giant, Notes on, 139

India, Vine Culture in, 49

In Memoriam—

- Robert Bullen, 127
- Sir Michael Connal, 148
- David Corse Glen, 132
- Dr. John Grieve, 357
- John Stewart, 392
- Robert Turner, 73

Jordan Valley, Climate of, 176

Formation of, 13

Jottings from my Note-book—

- Aglaioptenia myriophyllum, 83
- Amphidotus cordatus, 333
- Amphithoe podoceroidea, 80
- Anceus maxillaris, 82
- Buccinum undatum, 81
- Cancer pagurus, 332
- Gulls and their Neighbours, 244
- Halicystis ovalis, 174
- Lima hians, 331
- Podocerus pulchellus, 80
- Sacculina carcini, 79

Kilbirnie, Castle of, 113

Church of, 113

Kilbride, West, Fungi of, 61

Kilmahew, Fungi of, 61

Lake-dwelling at Buston, 361

Lima hians and its Mode of Life, 218

London Catalogue of British Plants (Ninth Edition), Notes on, 324

Machrie Bay, Arran, Day with the Dredge at, 169

Meikle Tree of Blairquhosh, 122

Meteorological Notes for 1893, 16 ; for 1894, 229

Millport, Marine Scientific Station, Gift to, 387

Moat-hill at Stewarton, 361

Mugdock, Battle of, 121

Native Plants, Disappearance of, 44

Obituary—

- Aitken, J. H., 156
- Bullen, Robert, 127
- Connal, Sir Michael, 148, 156
- Crosby, John, 127
- Crosskey, Rev. H. W., LL.D., F.G.S., 156
- Cruickshank, G. M., 288
- Dairon, James, F.G.S., 127
- Dennistoun, Alexander, F.Z.S., 156
- Douglas, Robert, 127
- Farquhar, Donald, 292, 378
- Fordyce, Rev. James, 127
- Glen, David Corse, C.E., F.G.S., 131, 156
- Grieve, John, M. A., M. D., F.R.S.E., F.L.S., 357, 389
- Hadaway, Thomas Spark, 127
- Horne, R. R., 156
- Lang, John, 127
- Leslie, Dr. George, 288

Obituary—

- Mackinnon, Sir William, Bart.,
C.I.E., F.R.G.S., F.Z.S.,
156
- McLellan, Robert, 288
- Macneill, Duncan, 156
- McOnie, Sir William, 288
- Owen, Sir Richard, K.C.B.,
D.C.L., LL.D., F.R.S., &c.,
138, 156
- Rae, John, 156
- Stewart, Alexander, 288
- Stewart, John, 292-293, 378.
- Turner, Robert, 73, 163, 164, 288
- Walls, William, 156
- Westwood, Professor J. O., M.A.,
F.L.S., F.E.S., 156
- Wilkie, Thomas B., 274, 378
- Ornithorhynchus, On the Supposed
Nasal Valves of, 317
- Palestine, A Passing Glance at the
Flora of, 175, 296
- Land and Fresh-water Mollusca
of, 9
- Abundance of Land Shells in, 10
- Pease Tree of Lee, 250, 276, 358
- Peronosporæ of North Ayrshire, 28
- Pholas crispata as a Borer, 37
- Plantago maritima: Its Distribution
in Ayrshire, 226
- Porbeagle Shark, Habits and Ana-
tomical Structure of, 134
- Rats, Some Facts concerning, 138
- Robin, Habits of, 52
- Rook, Habits of, 56
- Row, meaning of Place-name, 108
- Sparrow, House, Habits of, 57, 140
- Spermogonia of Puccinia suaveolens,
Notes on, 145-146
- Sporangia, Notes on, 386
- Standing-stones of Dungoyach, 121
- Swallow, Habits of, 51
- Swans at Dougalston, 97
- Tarpon, Notes on, 139
- Titmouse, Blue, Habits of, 54
- Treasurer's Statement—1891-92,
144; 1892-93, 166; 1893-94,
302; 1894-95, 396.
- Trees, Records of Measurements of,
246
- Trepang, Notes on, 163
- Ustilagineæ of North Ayrshire, 24,
138
- Vine-Culture in India, 49
- Wasps, A Word about, 265
- Whale, Remains of, at Irvine, 116
- Wigtownshire—Botanical Notes for
1895, 344
- Witchcraft at Bargaran, 91
- Yew, Queen Mary's, Cutting from,
103

TOPOGRAPHICAL.

- Abel-Shittim, 189
- ABERDEENSHIRE—
- Bennachie, 143
- Bullers of Buchan, 242
- Callater, Glen, 216
- Dee, 241
- Ythan, 241
- Aberfoyle, 125
- Achacha, 48
- Achateny, 350
- Adamhill, 227
- Add, River, 382
- Africa, British Central, 290
- Aikenhead, 286, 360
- Ailsa Craig, 153
- Airdrie, 162, 375
- Akabah, Gulf of, 13, 14, 15, 177
- Alexandra Park, 237
- Ancrum, 153, 248, 249, 254, 255,
256, 258, 259, 260, 263
- Anstruther, 375
- Ard, Loch, 126
- Ardeer, 274, 283, 287
- Ardentiny, 134, 370, 392
- Ardgowan, 123, 164, 253, 255, 260,
262
- Ardmillan Hill, 227
- Ardnamurchan, 347, 386
- Ardneil Bank, 25, 26, 29, 47
- Ardrossan, 25, 27, 28, 29, 228
- Ardslignish, 348
- Ardtoe, 350
- Arevegaig, 350
- ARGYLLSHIRE, 198, 199, 200-207,
209-214
- Achacha, 48
- Achateny, 350
- Add, River, 382
- Ardentiny, 134, 370, 392
- Ardnamurchan, 347, 386

ARGYLLSHIRE—

Ardslnignish, 348
 Ardtoe, 350
 Arevegaig, 350
 Awe, Loch, 284
 Benderloch, 48
 Benmore, 369, 391
 Blain, 348
 Campbeltown, 198, 296
 Camus-na-gaul, 348
 Cantyre, 199, 201, 204, 210
 Carradale, 283
 Craighbuy, 349
 Dorling, 387
 Dunoon, 44, 45
 Easdale, 198
 Fascadale, 348
 Fyne, Loch, 48, 281
 Glenborrodale, 349
 Gorteneorn, 349, 350
 Hebrides, Outer, 195, 198
 Hill Loch, 348
 Innellan, 45
 Islay, 198, 298
 Kentra, Loch, 348, 350
 Kilchoan, 349, 350
 Kilmun, 369, 391
 Kingshouse, 390
 Laga, Ben, 349
 Laoigh, Ben, 152, 216
 Lochan-na-Crunnaig, 350
 Lochgoilhead, 143
 Lonan, Glen, 384
 MacLean's Nose, 350
 Mingary, 349
 Moidart, 348, 350, 387-388, 390
 North Shore, 353
 Oban, 197, 281, 298, 384
 Oronsay, 350
 Port Ellen, 198
 Puck's Glen, 369
 Shiel, Loch, 377
 Shiel, River, 350
 Strontian, 350
 Sunart, Loch, 347, 349, 350
 Tarbert, 350
 Tarbert, West Loch, 382
 Tarbet, 30
 Toward, 44, 45, 368, 391
 Tyrin, Castle, 349
 Arisaig, 377
 ARRAN, 46, 48, 84, 159, 162, 287,
 291, 300, 374, 389
 Brodick, 365
 Corrie, 153, 282
 Goatfell, 365
 Imacher, 374
 Iorsa, 287

ARRAN—

Kildonan, 153
 Lag, 300
 Lamdash, 84, 174, 295
 Lochranza, 276
 Machrie Bay, 169
 Struey Rocks, 153
 Arrochar, 373
 Ashgrove, 88, 125
 Assam, 292
 Atlantic, North, 300
 Auchendennan, 196
 Auchenhavrie, 274, 285
 Auchentiber, 226
 Auchinduich, 147
 Auchinleck, 227
 Auld Wives' Lifts, 98
 Australia, 351
 Awe, Loch, 284
 Ayr, 197, 265, 266, 298
 AYRSHIRE, 24, 37, 199, 201-208, 210,
 212-214, 298
 Adamhill, 227
 Ailsa Craig, 153
 Ardeer, 274, 283, 287
 Ardmillan Hill, 227
 Ardneil Bank, 25, 26, 29, 47
 Ardrossan, 25, 27, 28, 29, 228
 Ashgrove, 88, 125
 Auchenhavrie, 274, 285
 Auchentiber, 226
 Auchinleck, 227
 Ayr, 197, 265, 266, 298
 Ballantrae, 227
 Barr, 227
 Barrassie, 25, 117, 118
 Barrhill, 227
 Bell's Plantin, 371
 Biggles Moor, 46
 Black Craig Hill, 227
 Blair, 361
 Bombo, 370
 Boydston, 30
 Brisbane, 88, 128
 Broomfields, 355
 Bullerholes, 226
 Buston, 361
 Caaf, 370
 Caerwinning Hill, 115
 Carlung, 29
 Castle Hill, Stewarton, 361
 Chapelton, 28, 29, 47, 154, 270, 271
 Colmonell, 227
 Coylton, 227
 Craighead, 227
 Craigie, 227
 Crosbie, 61, 63-68
 Culzean Castle, 145

AYRSHIRE—

Cumnock, New, 227
 Cumnock, Old, 227
 Cunninghamhead, 46
 Dailly, 227
 Dalgarnvan, 371
 Dalry, 35, 47, 115, 153, 227, 282, 370
 Dalrymple, 227
 Darmalloch, 227
 Dundonald, 48
 Eglinton, 85, 124, 248
 Gailles, 25, 117, 118
 Garnock, 370
 Girvan, 227, 375
 Glenhead Braes, 26, 270
 Glenmore, 227, 349
 Gourock Burn, 44, 46
 Greenan, 138
 Hawkhill, 86
 Hindog Glen, 47
 Horse Isle, 228
 Hunterston, 48
 Irvine, 116, 118, 283
 Kerelaw, 88, 125
 Kilbirnie, 113, 151
 Kilbride, West, 25, 26, 27, 28,
 29, 30, 44, 45, 46, 47, 48, 61-
 68, 126, 134, 140, 142, 148,
 154, 159, 161, 163, 164, 269,
 280, 281, 291
 Kilbride Glen, 26, 28, 29, 30, 62-68
 Kilmarnock, 375
 Kilmaurs, 35
 Kilrusken, 29
 Kilwinning, 46, 131, 226, 283
 Kirkland Glen, 28
 Kirktonhall, 269
 Largs, 25, 27, 28, 29, 35, 125, 165,
 355, 393
 Lendalfoot, 375
 Maich Glen, 360
 Meadowfoot, 64, 68
 Merrick Mountain, 228
 Monkcastle Burn, 370, 371
 Monkton, 274, 283, 375
 Montgreenan, 274, 285
 Noddsdale, 26, 28, 29, 30
 Ochiltree, 227
 Patna, 227
 Pinwherry, 227
 Pitcon Glen, 113, 151
 Portincross, 47, 48
 Prestwick, 138, 283
 Rowallan, 361, 377
 Rowantree Inn, 227
 Seamill, 25, 26, 27, 28, 29, 30, 45,
 47, 165, 269, 283
 Shewalton, 48

AYRSHIRE—

Stair, 227, 248, 254
 Stevenston, 25, 27, 35, 46, 88
 Stewarton, 45, 227, 361
 Straiton, 227
 Swinlees Quarry, 114
 Symington, 227
 Tarbert Hill, 26, 63-68
 Troon, 30, 35, 116, 118, 151, 152
 Yonderfield, 28, 29

Baalbec, 177

Bab-el-Wady, 11, 184

Baldernock, 95, 141, 256

Balfron, 274, 284

Balgray Dam, 197

Ballagan, 360, 375

Ballantrae, 227

Balmaha, 116, 124

Banff, 241

BANFFSHIRE—

Banff, 241

Koch Hill, 292

Troup Head, 242

Banias, 179

Barfod, 283

Bargaran, 90, 250, 259

Barr (Ayrshire), 227

Barr (Renfrewshire), 283

Barr, North, 92

Barrassie, 25, 117, 118

Barrhead, 252

Barrhill, 227

Bashan, 13

Bass Rock, 242

Bell's Plantin, 371

Belton, 248

Benderloch, 48

Benmore, 369, 391

Bennachie, 143

Berwick-on-Tweed, 293, 377

BERWICKSHIRE, 285

Dryburgh, 254, 256, 264

Merton, 255

Newton Don, 153, 255

Bethel, 179, 193

Bethlehem, 187, 193

Beyrout, 12

Biglees Moor, 46

Bishopton, 252

Blackburn, 263

Black Craig Hill, 227

Blain, 348

Blair, 361

Blairquhosh, 121, 159, 250, 251, 259

Blantyre, 382

Blue Mountains, 351

Blythswood, 122, 164, 262

- Bombo, 370
 Bonhill, 275
 Bonjedward, 261
 Bonnybridge, 124
 Botanic Gardens, 27, 103, 145, 274,
 282, 283, 359, 360, 364, 375
 Boulogne, 160, 165
 Bowling, 47
 Boydston, 30
 Braidwood, 282, 364
 Breadalbanes, 216, 298
 Brent, 280
 Bridge of Earn, 125
 Brisbane, 88, 128
 Brodick, 365
 Broomfields, 355
 Broomley, 273
 Buckinghamshire, 146, 373, 380
 Bullerholes, 226
 Bullers of Buchan, 242
 Bull Loch, 167
 Buston, 361
 BUTE, 159, 283, 291
 Bull Loch, 167
 BUTESHIRE, 199-214
 Arran, 46, 48, 84, 159, 162, 287,
 291, 300, 374, 389
 Brodick, 265
 Bull Loch, 167
 Corrie, 153, 282
 Cumbrae, 45, 46, 48, 70, 80, 81,
 83, 142, 291; 301, 390
 Fintry Bay, 46
 Keppel, 375
 Millport, 147, 220, 291
 Tan Buoy, 220
 Cumbrae, Little, 111, 147
 Gull Point, 111
 Shauniwilly Point, 112
 Fintry Bay, 46
 Goatfell, 365
 Gull Point, 111
 Imacher, 374
 Iorsa, 287
 Kildonan, 153
 Lag, 300
 Lamlash, 84, 174, 295
 Lochranza, 276
 Machrie Bay, 169
 Millport, 147, 220, 291, 361, 366,
 375, 376, 390, 391
 Shauniwilly Point, 112
 Struey Rocks, 153
 Tan Buoy, 220

 Caaf, 370
 Cadder Wilderness, 138, 140, 159,
 216, 375, 395
 Caenlochan, 216, 384
 Caerwinning Hill, 115
 CAITHNESS-SHIRE—
 Thurso, 282
 Calais, 160
 Calder Glen, 385
 California, 287
 Callander, 389
 Callater, Glen, 216
 Calvary, 11
 Cambuslang, 46
 Cam Creag, 283
 Campbeltown, 198, 296
 Camsail, 248
 Camus-na-gaul, 348
 Cana, 11
 Canaries, 11
 Cantyre, 199, 201, 204, 210
 Cape Colony, 373
 Cardowan, 110
 Cardross, 145
 Carluke, 92, 95
 Carlung, 29
 Carmel, 177
 Carradale, 283
 Carribber, 369, 392
 Castle Hill, 361
 Castle-Kennedy, 260
 Castlemilk, 69, 147, 161, 255, 257,
 262
 Castle Semple, 283, 363
 Cauldshiels Loch, 75
 Channel Islands, 286
 Chapelton, 28, 29, 47, 154, 270, 271
 Chili, 373
 Chryston, 86, 124
 Clyde, 284, 296, 385
 Clyde, Falls of, 389
 Clyde, Firth of, 83, 84, 162, 281
 Clydebank, 44, 45, 46, 47, 380
 Clyde Ironworks, 44
 Clyde Isles, 199-214
 Cochno, 277, 278
 Cock-my-lane, 283
 Coele-Syria, 177
 Colmonell, 227
 Connemara, 392
 Cornwall, 382, 395
 Corrie, 153, 282
 Coylton, 227
 Craigbuy, 349
 Craigendoran, 145
 Craighead, 227
 Craigie, 227
 Craig Madaidh, 152
 Craigmaddie, 98, 99
 Craignethan, 87, 120, 124, 364
 Craigton, 140

- Crocodile River, 177
 Crookston, 268, 294
 Crosbie, 61, 63, 68
 Crossford, 120, 259, 267
 Crossmyloof, 284, 286
 Croydon, 154
 Culzean Castle, 145
 Cumbernauld, 373
 CUMBRAE, 45, 46, 48, 70, 80, 81, 83,
 142, 291, 301, 390
 Fintry Bay, 46
 Millport, 147, 220, 291, 361, 366,
 375, 376, 390, 391
 Tan Buoy, 220
 CUMBRAE, LITTLE, 111, 147
 Gull Point, 111
 Shauniwilly Point, 112
 Cumnock, New, 227
 Cumnock, Old, 227
 Cunninghamhead, 46

 Dailly, 227
 Dalgarnan, 371
 Dalmuir, 44, 45, 46, 47, 145
 Dalry, 35, 47, 115, 153, 197, 227,
 282, 370
 Dalrymple, 227
 Dalsersf, 259, 387
 Dalziel, 101, 145, 250, 251, 254, 259,
 261, 264
 Damascus, 177, 181, 186
 Darmalloch, 227
 Darnley, 124, 262
 Dead Sea, 10, 11, 13, 14, 15, 176,
 177, 178, 181, 186, 189, 190,
 192, 296
 Dee, 241
 Dennistoun, 196, 198
 Dog River, 12
 Dorling, 387
 Dorset, 284
 Dothan, 11
 Dougalston, 95, 141, 247, 254, 255,
 264, 272, 281
 Douglasdale, 389
 Drummond Hill, 260
 Dryburgh, 254, 256, 264
 Drymen, 247, 253
 Dull, 256
 Dumbarton, 162, 275, 362
 DUMBARTONSHIRE, 199, 201-206, 208-
 214
 Arrochar, 373
 Auchendennan, 196
 Bonhill, 275
 Bowling, 47
 Broomley, 273
 Camsail, 248

 DUMBARTONSHIRE—
 Cardross, 145
 Clydebank, 44, 45, 46, 47, 380
 Cochno, 277, 278
 Craigendoran, 145
 Craigton, 140
 Cumbernauld, 373
 Dalmuir, 44, 45, 46, 47, 145
 Dumbarton, 162, 275, 362
 Dunbuie Hill, 362
 Duntocher, 155, 277
 Edinbarnet, 106, 145, 252, 253,
 254, 256, 257, 261
 Faifley, 277
 Gareloch, 246
 Garelochhead, 107, 147
 Garscube, 110, 198, 256, 261
 Glenfruin, 198
 Inveruglas, 143
 Kilbowie, 277
 Kilmahew, 61-68, 121, 159, 160, 254
 Kilpatrick, Old, 47, 277
 Kilpatrick Hills, 143, 145, 162,
 292
 Lenzie, 86, 124
 Leven, 274, 281
 Leven, Vale of, 248, 275
 Lomond, Loch, 196, 198
 Mains, 100, 254, 258, 260, 262, 287,
 292
 Mambeg, 109, 246, 253
 Overtoun, 362, 386
 Renton, 259
 Reoch, Ben, 360
 Rosneath, 248, 254, 257, 262, 271,
 281, 381
 Rossdhu, 198, 255, 264
 Row, 79
 Saint Germain's Loch, 364
 Sloy, Loch, 292
 Strathleven, 250, 263, 275
 Tullichewan, 196, 248, 253, 254,
 255, 256, 258, 261, 272, 281,
 282
 Tullich Hill, 360
 Vairlich, Ben, 143
 Woodbank, 248, 256, 259, 272
 DUMFRIESSHIRE—
 Eccles, 248
 Grey Mare's Tail, 143
 Moffat, 131, 134, 155
 Dunbuie Hill, 362
 Dundonald, 48
 Dungoyach, 121
 Dungoyne, 143, 154
 Dunoon, 44, 45
 Duntocher, 155, 277
 Duntreath, 122, 254

- Eaglesham, 380
 Earn, Bridge of, 125
 Easdale, 198
 Eastwood, 263
 Ebal, Mount, 11, 12
 EBUDS, MID, 200, 202, 204, 207, 209,
 210, 212
 EBUDS, NORTH, 200-206, 208-213
 EBUDS, SOUTH, 199, 201-205, 207,
 209-212
 Eccles, 248
 Edinbarnet, 106, 145, 252, 253, 254,
 256, 257, 261
 Eglinton, 85, 124, 248
 Egypt, 292
 Eigg, 348
 ELGINSHIRE—
 Forres, 287
 Elisha, Fountain of, 12, 186
 Engedi, 190, 191
 Ephesus, 193
 Ephraim, 12
 Er-Riha, 188
 Erskine, 89, 140, 252, 253, 254, 255,
 260, 262, 263

 Faifley, 277
 Fascadale, 348
 Fiddler Gill, 364
 FIFESHIRE—
 Anstruther, 375
 Queensferry, North, 391
 Saint Andrew's, 133
 Finlaystone, 61-68, 122, 159, 160,
 260, 262, 264
 Fintry Bay, 46
 Floors Castle, 255
 FORFARSHIRE, 134
 Caenlochan, 216, 384
 Montrose, 241
 Forres, 287
 Fyne, Loch, 48, 281

 Gales, 25, 117, 118
 Galilee, 192
 Galilee, Sea of, 12, 13, 14, 15, 176,
 177, 178
 Gareloch, 246
 Garelochhead, 107, 147
 Garnkirk, 86, 124, 262, 274, 282
 Garnock, 370
 Garscube, 110, 198, 256, 261
 Gartcosh, 124
 Gartmore, 126
 Gerizim, 193
 Ghor, 13
 Giffnock, 125, 385
 Gilgal, 188, 189

 Girvan, 227, 375
 Glasgow Green, 237
 Glenborrodale, 349
 Glenfruin, 198
 Glenhead Braes, 26, 270
 Glenmore, 227, 349
 Goatfell, 365
 Gondokoro, 177
 Gorteneorn, 349, 350
 Gourrock, 123, 196, 197
 Gourrock Burn, 44, 46
 Grasse, 186
 Great Glen, 298
 Greenan, 138
 Grey Mare's Tail, 143
 Grindelwald, 297
 Guernsey, 291
 Gullane, 286
 Gull Point, 111

 HADDINGTONSHIRE—
 Bass Rock, 242
 Belton, 248
 Gullane, 286
 Haram, 180
 Hattin, Horns of, 183
 Hawkhill, 86
 Hayti, 391
 Hebrides, 200-214
 Hebrides, Outer, 195, 298
 Hebron, 11, 181, 193
 Helvellyn, 216
 Herefordshire, 297
 Hermon, 14, 178, 179, 184, 185, 186, 193
 Hexham, 159
 Hill Loch, 348
 Hindog Glen, 47
 Hogganfield Loch, 391
 Holy Island, 285
 Horeb, 190
 Horse Isle, 228
 Howwood, 124, 363
 Huleh, 177, 178, 180
 Hunterston, 48

 Imacher, 374
 India, 49
 Innellan, 45
 Inveraray, 30
 Inverness, 298
 INVERNESS-SHIRE—
 Arisaig, 377
 Eigg, 348
 Great Glen, 298
 Inverness, 298
 Rum, 348
 Shiel, Loch, 377
 Skye, 390

- Inveruglas, 143
 Iorsa, 287
 Irvine, 116, 118, 283
 Islay, 198, 298
- Jaffa, 11, 181, 182, 184
 Jedburgh, 152, 249, 250, 263
 Jehoshaphat, Valley of, 187
 Jericho, 10, 12, 176, 181, 185, 186,
 188, 191
 Jersey, 292
 Jerusalem, 11, 180, 181, 182, 184,
 187, 188
 Jordan, 12, 13, 14, 15
 Jordan Valley, 176, 177, 178, 184,
 185, 186, 188, 189, 191, 296
 Judea, 11, 177, 179, 184, 185, 190
- Kelso, 153, 251, 261
 Kelvingrove, 237
 Kent, 287
 Kentra, Loch, 348, 350
 Keppel, 375
 Kerelaw, 88, 125
 Kilbirnie, 113, 151
 Kilbowie, 277
 Kilbrannan Sound, 174
 Kilbride, East, 361
 Kilbride, West, 25, 26, 27, 28, 29,
 30, 44, 45, 46, 47, 48, 61-68, 126,
 134, 140, 142, 148, 154, 159, 161,
 163, 164, 269, 280, 281, 291
 Kilbride Glen, 26, 28, 29, 30, 62-68
 Kilchoan, 349, 350
 Kildonan, 153
 Killearn, 196, 198
 Killin, 131, 134, 143, 152, 283, 284,
 374, 389
 Kilmahew, 61-68, 121, 159, 160, 254
 Kilmalcolm, 146, 359
 Kilmarnock, 375
 Kilmaurs, 35
 Kilmun, 369, 391
 Kilpatrick, Old, 47, 277
 Kilpatrick Hills, 143, 145, 162, 292
 Kilrusken, 29
 Kilsyth, 143
 Kilwinning, 46, 131, 226, 283
- KINCARDINESHIRE—
 Stonehaven, 242
 Kingshouse, 390
- KINROSSSHIRE—
 Leven, Loch, 281
 Kirjath-jearim, 184
 Kirkcudbright, 375
- KIRKCUDBRIGHTSHIRE—
 Kirkcudbright, 375
 Orchardtown Tower, 131
- KIRKCUDBRIGHTSHIRE—
 Saint Mary's Isle, 262
 Trool, Loch, 385
 Kirkland Glen, 28
 Kirktonhall, 269
 Kishon, 177
 Koch Hill, 292
- Lag, 300
 Laga, Ben, 349
 Lamlash, 84, 174, 295
- LANARKSHIRE, 199-214
 Aikenhead, 286, 360
 Airdrie, 162, 375
 Blantyre, 382
 Braidwood, 282, 364
 Cadder Wilderness, 138, 140, 159,
 216, 375, 395
 Cambuslang, 46
 Cardowan, 110
 Carluke, 92, 95
 Castlemilk, 69, 147, 161, 255, 257,
 262
 Chryston, 86, 124
 Clyde Ironworks, 44
 Craignethan, 87, 120, 124, 364
 Crossford, 120, 259, 267
 Dalserf, 259, 387
 Dalziel, 101, 145, 250, 251, 254,
 259, 261, 264
 Dennistoun, 196, 198
 Douglasdale, 389
 Fiddler Gill, 364
 Garnkirk, 86, 124, 262, 274, 282
 Gartcosh, 124
 Kilbride, East, 361
 Lee, 250, 358
 Lenzie, 86, 124
 Mauldslie, 92, 249, 251, 253, 254,
 255, 256, 257, 261, 263
 Milton-Lockhart, 118, 153, 248,
 249, 253, 254, 255, 256, 258,
 259, 260, 263
 Murdostoun, 120, 153, 254, 262
 Newmains, 121
 Partick, 44
 Possil Marsh, 216, 389
 Rutherglen, 69, 145
 Stepps, 110, 147, 153, 161, 291, 378
 Tillietudlem, 87, 120, 364
 Torrance, 361, 377
- Langbank, 61
 Laoigh, Ben, 152, 216
 Largs, 25, 27, 28, 29, 35, 125, 165,
 355, 393
 Latroun, 181
 Lawers, Ben, 40, 152, 216, 394
 Lebanon, 14, 162, 176, 178, 179

- Lecropt Moss, 45, 286
 Lee, 250, 358
 Lendalfoot, 375
 Lenzie, 86, 124
 Leven, 274, 281
 Leven, Loch, 231
 Leven, Vale of, 248, 275
 LINLITHGOWSHIRE—
 Carribber, 369, 392
 Lochan-na-Crannaig, 350
 Lochay, Glen, 215, 283
 Lochgoilhead, 143
 Lochranza, 276
 Lochwinnoch, 124, 283, 385
 Loganswraes, 252, 262
 Logierait, 247, 253
 Lomond, Ben, 215, 287
 Lomond, Loch, 196, 198
 Lonan, Glen, 384
 Lyon, Glen, 152

 Maarath, 11
 Machrie Bay, 169
 MacLean's Nose, 350
 Madaidh, Craig, 152
 Maich Glen, 360
 Mains, 100, 254, 258, 260, 262, 287,
 292
 Mambeg, 109, 246, 253
 Mamre, 187
 Manuel, 369
 Mar-Saba, 188
 Mauldslie, 92, 249, 251, 253, 254,
 255, 256, 257, 261, 263
 Maxwell Park, 237
 Meadowfoot, 64, 68
 Meall Ghaordie, 152
 Melrose, 75, 253
 Merom, Lake of, 12, 14, 177
 Merrick Mountain, 228
 Merton, 255
 Midian, 191, 192
 MIDLOTHIAN—
 Newbattle, 248
 Millport, 147, 220, 291, 361, 366,
 375, 376, 390, 391
 Milton-Lockhart, 118, 153, 248, 249,
 253, 254, 255, 256, 258, 259, 260,
 263
 Mingary, 349
 Moab, 13, 190
 Moffat, 131, 134, 155
 Moidart, 348, 350, 387-388, 390
 Monkcastle Burn, 370, 371
 Monkton, 274, 283, 375
 Montgreenan, 274, 285
 Montrose, 241
 Morecambe, 376

 Mounteviot, 254
 Mull, Sound of, 350
 Murdostoun, 120, 153, 254, 262

 Nablous, 187
 Nazareth, 11, 180
 Newbattle, 248
 Newmains, 121
 Newton Don, 153, 255
 New Zealand, 287
 Nice, 193
 Noddsdale, 26, 28, 29, 30
 North Shore, 353
 Northumberland, 285
 Norway, 296
 Nubia, 191, 192

 Oban, 197, 281, 298, 384
 Ochiltree, 227
 Old Calabar, 141
 Olives, Mount of, 184
 Orchardtown Tower, 131
 Oronsay, 350
 Overtoun, 362, 386

 Paisley, 47, 112, 151
 Paisley Canal, 46
 Palestine, 9, 175, 295
 Partick, 44
 Patna, 227
 Perth, 291
 PERTSHIRE—
 Breadalbanes, 216, 298
 Callander, 389
 Cam Creag, 283
 Craig Madaidh, 152
 Drummond Hill, 260
 Dull, 256
 Earn, Bridge of, 125
 Killin, 131, 134, 143, 152, 283,
 284, 374, 389
 Laoigh, Ben, 152, 216
 Lawers, 40, 152, 216, 394
 Lochay, Glen, 215, 283
 Logierait, 247, 253
 Lyon, Glen, 152
 Madaidh, Craig, 152
 Meall Ghaordie, 152
 Perth, 291
 Weem, 263
 Pharpar, 179
 Phœnicia, 12
 Pilatus, Mount, 297
 Pinwherry, 227
 Pitcon Glen, 113, 151
 Pollok, 115, 151, 253
 Polmadie, 280
 Pools of Solomon, 193

- Port Ellen, 198
 Portincross, 47, 48
 Possil Marsh, 216, 389
 Prestwick, 138, 283
 Puck's Glen, 369
 Punjaub, 49

 Queensferry, North, 391
 Queen's Park, 16, 18, 22, 23, 229,
 230, 235, 237, 239, 240, 366,
 391, 395

 Ramleh, 184
 Redlands, 99, 142, 292, 358
 Red Sea, 177
 RENFREWSHIRE, 199-214
 Ardgowan, 123, 164, 253, 255,
 260, 262
 Balgray Dam, 197
 Bariod, 283
 Bargaran, 90, 250, 259
 Barr, 283
 Barr, North, 92
 Barrhead, 252
 Bishopton, 252
 Blythswood, 122, 164, 262
 Calder Glen, 385
 Castle Semple, 283, 363
 Cock-my-lane, 283
 Crookston, 268, 294
 Darnley, 124, 262
 Eaglesham, 380
 Eastwood, 263
 Erskine, 89, 140, 252, 253, 254,
 255, 260, 262, 263
 Finlaystone, 61-68, 122, 159, 160,
 260, 262, 264
 Giffnock, 125, 385
 Gourock, 123, 196, 197
 Howwood, 124, 363
 Kilmalcolm, 146, 359
 Langbank, 61
 Lochwinnoch, 124, 283, 385
 Loganswraes, 252, 262
 Paisley, 47, 112, 151
 Paisley Canal, 46
 Pollok, 115, 151, 253
 Polmadie, 280
 Ross Hall, 268, 280
 Wemyss Castle, 268, 280
 Woodside, 112, 151
 Renton, 259
 Reoch, Ben, 360
 Riviera, 186, 193
 Robber's Fountain, 12
 Robber's Valley, 193
 Rosneath, 248, 254, 257, 262, 271,
 281, 381

 Ross, WEST, 200-207, 209-211, 213,
 214
 Rossdhu, 198, 255, 264
 Ross Hall, 268, 280
 ROSS-SHIRE—
 Stornoway, 382
 Row, 79
 Rowallan, 361, 377
 Rowantree Inn, 227
 Rowardennan, 198, 360, 376
 Roxburgh Castle, 256
 ROXBURGHSHIRE—
 Anerum, 153, 248, 249, 253, 254,
 255, 256, 258, 259, 260, 263
 Blackburn, 263
 Bonjedward, 261
 Cauldshiels Loch, 75
 Floors Castle, 255
 Jedburgh, 152, 249, 259, 263
 Kelso, 153, 251, 261
 Melrose, 75, 253
 Mounteviot, 254
 Newton Don, 153, 255
 Roxburgh Castle, 256
 Rum, 348
 Rutherglen, 69, 145

 Saint Andrew's, 133
 Saint Germain's Loch, 364
 Saint John's Wood, 154
 Saint Mary's Isle, 262
 Salt Sea, 10
 Samaria, 11, 180
 Scilly Isles, 382
 Seamill, 25, 26, 27, 28, 29, 30, 45, 47,
 165, 269, 283
 Sharon, 177, 182, 183, 296
 Shauniwilly Point, 112
 Shewalton, 48
 Shiel, Loch, 377
 Shiel, River, 350
 Shiloh, 11, 12
 Simla, 388
 Sinai, 191
 Singil, 193
 Skye, 390
 Sloy, Loch, 292
 Solomon's Pools, 11
 South Sea Islands, 290
 Springburn, 237
 Stair, 227, 248, 254
 Stepps, 110, 147, 153, 161, 291, 378
 Stevenston, 25, 27, 35, 46, 88
 Stewarton, 45, 227, 361
 Stirling, 141
 STIRLINGSHIRE, 199, 200-213, 300
 Aberfoyle, 125
 Ard, Loch, 126

STIRLINGSHIRE—

- Auld Wives' Lifts, 98
 Baldernock, 95, 141, 256
 Balfron, 274, 284
 Ballagan, 360, 375
 Balmaha, 116, 124
 Blairquhosh, 121, 159, 250, 251, 259
 Bonnybridge, 124
 Craigmaddie, 98, 99
 Dougalston, 95, 141, 247, 254,
 255, 264, 272, 281
 Drymen, 247, 253
 Dungoyach, 121
 Dungoyne, 143, 154
 Duntreath, 122, 254
 Gartmore, 126
 Killearn, 196, 198
 Kilsyth, 143
 Lecropt Moss, 45, 286
 Lomond, Ben, 215, 287
 Manuel, 369
 Rowardennan, 198, 360, 376
 Stirling, 141
 Stonehaven, 242
 Stornoway, 382
 Straiton, 227
 Straits Settlements, 298
 Stranraer, 287, 288
 Strathleven, 250, 363, 275
 Strontian, 350
 Struey Rocks, 153
 Sunart, Loch, 347, 349, 350
 SUTHERLANDSHIRE, 390
 Auchinduich, 147
 Swanage, 284
 Swinlees Quarry, 114
 Switzerland, 280, 295, 297
 Sydney, 353
 Symington, 227
 Tabor, Mount, 11

- Tan Buoy, 220
 Taralga, 351
 Tarbert, 350
 Tarbert, West Loch, 382
 Tarbert Hill, 26, 63-68
 Tarbet, 30
 Thurso, 282
 Tiberias, 12
 Tillietudlem, 87, 120, 364
 Torrance, 361, 377
 Toward, 44, 45, 368, 391
 Trool, Loch, 385
 Troon, 30, 35, 116, 118, 151, 152
 Troup Head, 242
 Tullichewan, 196, 248, 253, 254, 255,
 256, 258, 261, 272, 281, 282
 Tullich Hill, 360
 Tyrim, Castle, 349

Voirlich, Ben, 143

- Wady Kelt, 188
 Wady Rimthi, 191
 Wady Zerka, 177
 Weem, 263
 Wemyss, Castle, 268, 280
 Werong, Mount, 351
 WESTERNNESS, 199, 201-206, 208-213
 West Indies, 292
 Westmoreland, 216
 Westmount, 99, 100, 142
 WIGTOWNSHIRE, 295
 Castle-Kennedy, 260
 Stranraer, 287, 288
 Wombeyan Caves, 351, 353
 Woodbank, 248, 256, 259, 272
 Woodside, 112, 151
 Yonderfield, 28, 29
 Yorkshire, 154
 Ythan, 241

NAMES OF CONTRIBUTORS.

- Anderson, David, 295
 Angus, W. Craibe, 147, 241, 283, 301
 Baird, J. G. A., M.P., 389
 Ballantine, Matthew, 162
 Ballantyne, J., 167, 291
 Bennett, Arthur, F.L.S., 297, 377
 Bower, Professor F. O., M.A., D.Sc.,
 F.R.S., F.R.S.E., F.L.S., 139,
 141, 164, 386
 Boyd, D. A., 24, 28, 44, 50, 61, 117,
 118, 126, 131, 134, 138, 140, 142,
 143, 145, 147, 152, 154, 155, 156,
 159, 160, 161, 163, 164, 165, 280,
 281, 284, 286, 291, 292, 375
 Boyle, Thomas, 381
 Broom, R., M.D., B.Sc., 31, 165,
 297, 301, 315, 317, 321, 351, 373,
 381, 393.
 Brown, Robert, M.D., 297, 387
 Cairns, John, Jun., 126, 130, 133, 141,
 142, 145, 153, 154, 164, 280, 281
 Campbell, James, C.M., 265, 290,
 298, 300
 Coulson, Frank, 381
 Crichton, Mrs. George, 299
 Dalgleish, John J., F.S.A.Scot.,
 M.B.O.U., 347, 386

- Darwin, G. H., F.R.S., 387
 Dewar, Daniel, 384
 Dobie, W. A., 133, 162, 385
 Donnelly, W. A., 362
 Duncanson, David B., 392
 Dunlop, Professor James, M.D.,
 134, 139, 151, 162, 164
 Dunlop, Robert, 375, 391

 Ewing, Peter, F.L.S., 40, 103, 124,
 131, 134, 145, 152, 162, 283, 287,
 293, 294, 298, 324, 358, 374, 381,
 382, 384, 385, 395

 Ferguson, Oswald, L.D.S., 290
 Ferguson, Alex. A., F.S.A.Scot.,
 383
 Fleming, John, 110, 392

 Gilchrist, J. D. F., M.A., B.Sc.,
 Ph.D., 218, 295
 Grant, Frank L., M.A., 153, 159,
 282, 391
 Grierson, Robert, 138, 143, 292
 Grieve, John, M. A., M. D.,
 F.R.S.E., F.L.S., 163, 385, 392

 Harington-Stuart, Col. R.E.S., 361
 Harvie, Misses, 299
 Henderson, Miss M., 381
 Herdman, Professor Wm. A., D.Sc.,
 F.R.S., F.R.S.E., F.L.S., 377
 Holmes, Edward M., F.L.S., 284
 Horn, George, 389, 391
 Hunter, J. Bruce, 147, 394

 Keith, Rev. James, LL.D., 287
 Kelvin, The Right Hon. Lord,
 LL.D., D.C.L., D.Sc., F.R.S.,
 P.R.S.E., 387
 Kidston, Robert, F.R.S.E., F.G.S.,
 298, 386
 King, Professor Thomas, 44, 61,
 117, 124, 125, 126, 131, 138, 140,
 141, 146, 151, 154, 155, 159, 160,
 161, 162, 163, 164, 165, 280, 282,
 283, 284, 286, 287, 288, 291, 292,
 294, 295, 300, 319, 363, 372, 373,
 375, 376, 378, 380, 386, 389, 390,
 391, 392, 393, 394, 395
 Kirsop, John, F.G.S., 141
 Knight, Rev. G. A. Frank, M.A.,
 9, 161, 169, 280, 291, 372, 373,
 376, 379

 Landsborough, Rev. David, 162, 383
 Laurie, Professor Malcolm, D.Sc.,
 B.A., F.R.S.E., F.L.S., 391
 Lawson, Rev. R., 379

 M'Andrew, James, 295, 344, 385
 M'Crie, George, 161, 295, 394
 M'Culloch, Henry, 131, 141, 296,
 382, 387
 Macfie, Mr., 299
 M'Intosh, Professor Wm. C., M.D.,
 LL.D., F.R.S., F.R.S.E., F.L.S.,
 C.M.Z.S., 134
 M'Kay, Richard, 117, 124, 125, 126,
 140, 160, 246, 283, 286, 379, 386,
 391
 Mackenzie, Duncan, 139
 Mackinlay, David, 379
 Mackinnon, Duncan, 299
 Mackinnon, John, 387
 Mackinnon, P., 387
 M'Lellan, D., 380
 Macmillan, Rev. Hugh, D. D.,
 LL.D., F.R.S.E., F.S.A.Scot.,
 175, 295
 MacVicar, Symers M., 377, 387, 390
 Marjoribanks, Right Hon. Edward,
 M.P., 139
 Marshall, John T., M.C.S., 296
 Martin, Henry, 147
 Mathews, Henry R., Jun., 138
 Miller, W. F., 377
 Mirrlees, J. B., 358, 383, 387
 Mitchell, James, 130, 141, 142, 143,
 146, 158
 Morton, Robert M., 378, 390, 395
 Motherwell, A. B., 153
 Murdoch, A. Burn, 349, 350

 Norman, Rev. Canon A. M., M.A.,
 D.C.L., F.R.S., F.L.S., 296

 Overtoun, The Right Hon. Lord,
 M.A., F.R.G.S., 362

 Paterson, John, 195, 298, 372, 380,
 382, 387, 389
 Paxton, George, 391
 Pearson, David, 280
 Prince, Professor Edward E., B.A.,
 F.L.S., 133, 140, 141
 Pringle, Drummond, 387

 Renwick, John, 124, 130, 140, 141,
 148, 152, 154, 158, 246, 284, 286,
 372, 391
 Ritchie, C. P. R., 280
 Robertson, David, LL.D., F.L.S.,
 F.G.S., 79, 138, 142, 147, 156,
 162, 172, 244, 293, 295, 300, 331,
 361, 383, 388, 390, 392
 Ross, Mr., 349

- Russell, George, 99, 131, 139, 155,
292, 358, 381, 383, 387
- Scott, Thomas, F.L.S., F.R.Ph.S.E.,
69, 143, 161
- Shearer, Johnston, 49, 124, 125, 143,
283, 286, 372, 392, 395
- Shearer, Surgeon-Major, 388
- Sherry, Christopher, 143, 282, 283,
285, 291, 294, 375
- Smith, John, 35, 37, 116, 131, 138,
142, 226, 283, 284, 298
- Smith, W. Anderson, 388
- Somerville, Alex., B.Sc., F.L.S.,
215, 287, 291, 292, 293, 296, 297,
300, 372, 374, 377, 380, 384, 386,
389, 394, 395
- Sommerville, Joseph, 287
- Steel, James, 69, 111, 112, 140, 160,
284, 375
- Steel, Thomas, 125, 154
- Stewart, C., 350
- Stewart, William, 124, 125, 148,
153, 154, 155, 280, 355, 373, 374,
375, 376, 393, 394, 395
- Stirling, Col. J. S., 300
- Sweet, Alexander, 282, 374, 376,
392, 393
- Swinburne, John, 348, 350
- Swinburne, S., 348, 350
- Tennant, Sir Charles, Bart.,
F.S.A.Scot., 385
- Tennant, Edward P., Yr., M.A.,
377
- Tennant, H. J., M.P., 383
- Thomson, James N., 292
- Todd, Professor G. Bell, M.B., C.M.,
380, 381
- Watson, J., 147
- Watson, Lady, 377
- Watson, Sir W. Renny, 377
- Watt, L., 107, 143, 145, 148, 162,
292, 293
- Wellwood, S. M., 392
- Whitton, James, 16, 165, 229, 287,
298, 395
- Whyte, Rev. Alex., M.A., B.D.,
B.Sc., F.L.S., 140
- Wilkie, Robert D., 146, 154, 160,
164, 280, 282, 287, 385, 388, 389,
391, 392
- Wilkie, Thomas B., 159, 282, 286
- Wilson, Rev. Alex. S., M.A., B.Sc.,
146, 165
- Wishart, R. S., M.A., 125, 126, 131,
142, 145, 146, 147, 154, 156, 160,
161, 164, 165, 282, 284, 285, 293,
377, 378

POPULAR NAMES.

- Acacia, 253
- Adder, 159
- Adder's-tongue, 103
- Alder, 152
- Alligator Pear, 285
- Anabasis, 191
- Anemone, 183, 184
- Ant-eater, Porcupine, 133
- Apple of Sodom, 191
- Araucaria, 90, 253
- Argus Butterfly, Scotch, 287
- Ash, 17, 94, 107, 109, 116, 122, 123,
233, 246, 247, 253, 273, 277, 279
- American, 367
- Flowering, 367
- Golden, 367
- Lentiscus-leaved, 367
- One-leaved, 368
- Walnut-leaved, 367
- Weeping, 367
- Asphodel, 192
- Auk, Little, 195, 241, 296, 298, 301,
389
- Avocado Pear, 285
- Balm of Gilead, 186
- Balsam, False, 185
- Balsam Poplar, 17, 231
- Bamboo, 368
- Banana, 182
- Abyssinian, 365
- Barn-owl, 347
- Beech, 85, 89, 90, 94, 96, 102, 107,
115, 121, 122, 247, 248, 254,
272, 273, 277, 278, 359, 364
- Crested var., 366
- Fern-leaved, 367
- Bee Hawk-moth, Narrow-bordered,
384
- Bell Tree, 247, 253
- Birch, 90, 97, 153, 255, 368
- Bittern, 387
- American, 131
- Blackbird, 50, 55, 56, 59, 245
- Orange-winged, 177
- Blackcap, 349
- Black Currant, 281
- Bladder Fern, Mountain, 215, 287
- Blenny, 329

- Blue-moss, Japanese, 385
 Boomerang, 140
 Bottle-brush, 365
 Bramble, 179
 Brambling, 372
 Bryony, Black, 373
 White, 373
 Buckeye, 367
 Bush-rat, 353
 Butterfly, Clouded-yellow, 35, 131
 Scotch Argus, 287
 Small Copper, 35
 Buzzard, Common, 283, 347

 Cactus, Old Man, 384
 Calabar Bean, 143
 Camphire, 190
 Champion, Red, 270
 Capon Tree, 249, 259, 276
 Castor-oil Tree, 182
 Cat, 52
 Cedar, 86
 Cedar of Lebanon, 90, 153, 178,
 255, 364, 367
 Chaffinch, 50, 59, 60, 245
 Cherry, 233
 Mahaleb, 367
 Chestnut, 232
 Sweet, 90, 97, 123, 255, 273, 364
 Chickweed Winter-green, 365
 Chiff-chaff, 363, 366, 369
 Christmas Rose, 16
 Chrysanthemum, 383
 Clouded-yellow Butterfly, 131
 Coal-fish, 338
 Cocoa, 290
 Coney, 177
 Coot, 350
 Cormorant, 389
 Covenanters' Oak, 250, 259
 Crab, 79, 85
 Crane, Spotted, 382
 Crane's-bill, 179
 Crocodile, 177
 Indian, 298
 Crocus, 17, 230, 231
 Cromwell's Tree, 262
 Crow, 245, 276
 Cruickston Dollar, 294
 Cuckoo, 18
 Cudweed, 292
 Cyclopean, 31

 Daffodil, 233
 Daisy Tree, New Zealand, 368
 Date-palm, 184, 188
 Diver, Black-throated, 348
 Red-throated, 350

 Dock, 270
 Dog Mercury, 180
 Dog's-tooth Violet, 17
 Dormouse Phalanger, 394
 Duck, Tufted, 389
 Duck-billed Platypus, 373
 Duck-mole, 375

 Eagle, Golden, 147, 349
 White-tailed, 347
 Ear Moth, 35
 Earthworm, 33
 Echidna, 351
 Egg-plant, 367
 Eider Duck, Common, 350
 Elm, 19, 248, 272, 273
 English, 119, 248, 256
 Wych, 94, 97, 107, 110, 153, 248,
 256
 Evergreen Oak, 123, 260

 Fan-palm, 182
 Fig Tree, 188
 Fir, 86, 90, 101, 119, 260, 272, 279,
 392
 Silver, 85, 90, 248, 257, 273
 Four-winged Chick, 315

 Gall, Silk-button, 155
 Gall-mite, 281
 Gannet, 153
 Gean, 85, 249, 257, 277, 279
 Globe-fish, 376
 Goat's-beard, 285
 Golden Eagle, 147, 349
 Gourd, 188
 Grape Hyacinth, 231
 Grayling, 284
 Grebe, Slavonian, 386
 Greenfinch, 50
 Greenshank, 348
 Guelder-rose, 272
 Gull, Common, 348
 Iceland, 382
 Lesser Black-backed, 349
 Gulls, 244
 Gum Tree, 162
 Gunnel Fish, 339

 Hawk, 57
 Hawthorn, 99
 Hedge-sparrow, 50, 52
 Hemlock Spruce, 272
 Herb-paris, 269
 Herb-robert, 270
 Hermit-crab, 366
 Heron, 90, 123, 272, 363
 Herring, 338, 342
 Giant, 139

- Hickory, 366
 Holly, 107, 257
 Holy-grass, 282
 Honesty, 145
 Honey-berry, 104
 Hooper, 348
 Hornbeam, 85, 101, 258, 273, 366
 Horse-chestnut, 94, 119, 255, 279
 Hyacinth, Grape, 231
 Hyrax, 177

 India-rubber Tree, 182
 Ivy, 277

 Jackdaw, 349
 Jay, 186, 349
 Jujube Tree, 186
 Juniper, 190
 Dwarf, 365

 Kangaroo, 375
 Kava-bowl, 140
 Kestrel, 369
 Kingfisher, 97, 370
 King of the Woods, 259

 Laburnum, 233
 Larch, 85, 359
 Laurel, Portugal, 368
 Lignum Vitæ, 365
 Lilac, 233
 Lily, 183
 Lime, 19, 249, 277
 Common, 119, 153, 249, 258
 Large-leaved, 119, 153, 249, 258
 Lizard, Two-streaked Lace, 298
 Lobster, Thorny, 298
 Locust Tree, 184, 367
 Lump Sucker, 341
 Lythe, 338

 Mackerel, 338
 Magnolia, 369
 Magpie, 348
 Mahaleb Cherry, 367
 Maiden-hair Tree, 104, 367
 Mallard, 363
 Mango, 104, 285
 Manx Shearwater, 348
 Maple, Great, 85, 90, 101, 121, 123,
 252, 262
 Japanese, 368
 Maté, 105
 Mat-grass, 271
 Medlar, 366
 Meikle Tree, 250, 259
 Melancholy Thistle, 120, 283
 Melon, 189

 Merlin, 347
 Minnow, 337
 Missel Thrush, 55, 56
 Mistletoe, 186
 Oriental, 186
 Moa, 375
 Moor-hen, 350
 Moschatel, 270
 Moth, Ear, 35
 Silver-Y, 35

 Narcissus, 233
 Nettle, 185
 New Zealand Flax, 105, 367
 Night-jar, Tristram's, 177
 Nutmeg, 290

 Oak, 17, 90, 102, 122, 152, 233, 249,
 250, 259, 270, 273, 276, 277, 278,
 358, 359, 380
 Evergreen, 123, 260
 Turkey, 260
 Oak-spangles, 159
 Olive Tree, 187
 Orange Tree, 182
 Osher, 191
 Owl, Barn, 347
 Tawny, 347
 Oyster, 218

 Pear, Wild, 367
 Willow-leaved, 367
 Peregrine Falcon, 111
 Phalanger, Common, 353
 Dormouse, 394
 Ring-tailed, 353, 394
 Phalarope, Grey, 350
 Pine, Scotch, 86, 90, 101, 119, 260, 320
 Plane, 252, 262, 366
 Western, 368
 Plank Plant, 365
 Plantain, Hoary, 368
 Platypus, 317
 Pollock, 338
 Poplar, 230, 273
 Balsam, 17, 231
 Black, 110, 153, 251, 261
 White, 93, 251, 261
 Porbeagle Shark, 134
 Potato Disease, 28
 Pouched-mouse, Yellow-footed, 394
 Powan, 342
 Prickly Pear, 182
 Primrose, 17, 270

 Ragwort, 270, 293
 Rat, 138
 Bush, 353

- Rhea Fibre, 105
 Rhododendron, 231, 232, 233, 272, 363
 Robin, 50, 52, 245
 Rock-cod, 337
 Rockling, Five-bearded, 338
 Roe-deer, 369
 Rook, 56, 276, 348
 Rowan, 106, 252, 261

 Saithe, 338
 Salmon, 342
 Sandpiper, Common, 364
 Green, 350
 Scallop, 219
 Scaup-duck, 350
 Scorpion, 162
 Scotch Fir, 86, 90, 101, 119, 260, 272, 279
 Scoter, Common, 387
 Sea Anemone, 366
 Sea-doo, 241
 Sea-kale, 374
 Sea-spider, 162
 Sensitive Plant, 367
 Service Tree, 367
 Shark, Porbeagle, 134
 Shearwater, Manx, 348
 Shelldrake, Common, 350
 Sheld-duck, Common, 389
 Shepherd's Purse, 179
 Shittim Tree, 189
 Shoemaker, 342
 Shoveler, 389
 Shrike, Great Grey, 140, 382
 Siberian Pea Tree, 367
 Silk-button Gall, 155
 Silver Fir, 85, 90, 248, 257, 273
 Silver-Y Moth, 35
 Skate, 376
 Skua, Common or Great, 348
 Buffon's, 387
 Skulpin, 341
 Smiddy Oak, 251, 259
 Snake, Carpet, 139
 Ringed, 159
 Snipe, Great, 380
 Snow-bunting, 348
 Snowdrop, 17, 229, 231
 Soap Plant, 191
 Song Thrush, 85
 Sparrow, 50, 56, 139, 140, 245
 Spider, 153
 Trap-door, 391
 Spina Christi, 186
 Spleenwort, Scaly, 381
 Spruce, Hemlock, 272
 Squill, 17, 183

 Starfish, Nine-rayed, 366
 Thirteen-rayed, 366
 Star-flower, 269
 Starling, 50, 141, 245, 363
 Stickleback, 339
 Sturgeon, 385
 Sucker, Cornish, 340
 Lump, 341
 Montagu's, 341
 Two-spot, 340
 Sucker-fish, 340
 Sugar-cane, 188, 387
 Sun-bird, 177, 186
 Swallow, 51
 Swan, 97
 Bewick's, 349
 Sycamore, 188, 232, 252, 262, 277, 279

 Tamarind Tree, 365
 Tamarisk, 185
 Tarnoa, 140
 Tarpon, 139
 Teal, 363
 Thorn, 85, 233
 Black-fruited, 367
 Cock's-spur, 367
 Scarlet, 272
 Tansy-leaved, 367
 Thrush, 50, 55, 56, 245, 348
 Titmouse, Blue, 50, 54
 Great, 50
 Long-tailed, 363
 Tree-pipit, 348
 Tree-sparrow, 349
 Trepang, 163
 Trout, 337
 Alpine, 167
 Bull, 167
 Burn, 343
 Trumpet-flower, 365
 Trysting Tree, 259
 Tulip, 282
 Tulip Tree, 262, 269, 272, 367
 Turkey Oak, 260
 Twite, 348

 Vine Culture, 49
 Viper's Bugloss, 370
 Virginian Creeper, 119

 Wallaby, Rock, 353
 Walnut, 90, 263, 277, 366
 Wasp, 265, 300
 Water-lily, White, 180
 Yellow, 180
 Water-rail, 350
 Weasel, 57

Weaver-bird, 141
 Weevil, Black, 271
 Wellingtonia, 263
 Whin, 270
 Widgeon, 363
 Willow, 185, 230, 231, 263
 Fossil, 162
 Grey, 153
 Willow-hybrids, 298
 Willow-wren, 363
 Winter Aconite, 17

Witches' Oak, 90, 250, 259
 Wombat, 351
 Wood-lily, 269
 Wood-warbler, 349
 Wood-wren, 366
 Yam, 285
 Yew, 96, 103, 115, 123, 264, 272,
 278, 369, 371
 Japanese, 368

ZOOLOGY.

MAMMALIA.

Burramys parvus, 393
 Capreolus caprea, 369
 Dromicia nana, 353, 394
 unicolor, 353
 Echidna aculeata, 321, 351
 hystrix, 133
 Macropus giganteus, 375
 Ornithorhynchus, 317
 anatinus, 373, 375

Palæopetaurus elegans, 393
 Pameles obesula, 353
 Petaurus breviceps, 353
 Phascologale flavipes, 353, 394
 penicillata, 394
 Phascolomys mitchelli, 351
 Pseudochirus antiquus, 394
 peregrinus, 352, 353

Thylacoleo carnifex, 393
 Trichosurus vulpecula, 353

AVES.

Acredula rosea, 363
 Alcedo ispida, 370
 Aluco flammeus, 347
 Anas boschas, 363
 Anthus trivialis, 347
 Aquila chrysaëtus, 147, 349
 Ardea cinerea, 363

Botaurus lentiginosus, 131
 stellaris, 387
 Buteo vulgaris, 283, 347

Colymbus arcticus, 348
 septentrionalis, 350
 Corvus frugilegus, 56, 348
 monedula, 649

AVES.

Cygnus bewicki, 349
 musicus, 348
 Dinornis elephantopus, 375-376
 Erythacus rubecula, 52
 Falco æsalon, 347
 tinnunculus, 369
 Fringilla montifringilla, 372
 Fulica atra, 350
 Fuligula cristata, 389
 marila, 350

Gallinago major, 380
 Gallinula chloropus, 350
 Garrulus glandarius, 349

Haliaëtus albicilla, 347
 Helodromas ochropus, 350
 Hirundo rustica, 51

Lanius excubitor, 140, 382
 Larus canus, 348
 fuscus, 349
 leucopterus, 382
 Linota flavirostris, 348

Mareca penelope, 363
 Mergulus alle, 195, 241, 296, 298,
 301, 389

Edemia nigra, 387

Parus cæruleus, 54
 Passer domesticus, 57, 139
 montanus, 349
 Phalacrocorax carbo, 389
 Phalaropus fulicarius, 350
 Phylloscopus rufus, 363, 366, 369
 sibilatix, 349, 366
 trochilus, 363
 Pica rustica, 348
 Plectrophanes nivalis, 348

AVES.

- Podiceps auritus, 382
 Porzana maruetta, 382
 Puffinus anglorum, 348
 Querquedula crecca, 363
 Rallus aquaticus, 350
 Somateria mollissima, 350
 Spatula clypeata, 389
 Stercorarius catarrhactes, 348
 parasitica, 387
 Strix stridula, 347
 Sturnus vulgaris, 141, 363
 Suia bassana, 153
 Sylvia atricapilla, 349
 Tadorna cornuta, 350, 389
 Totanus glottis, 348
 hypoleucus, 364
 Turdus merula, 55
 musicus, 348

REPTILIA.

- Crocodylus porosus, 298
 Hydrosaurus salvator, 298
 Morelia variegata, 139
 Pelias Berus, 159
 Tropidonotus Natrix, 159

PISCES.

- Acipenser sturio, 385
 Callionymus lyra, 341
 Centronotus gunnellus, 339
 Clupea harengus, 338
 Coregonus clupeoides, 342
 Cottus scorpius, 342
 var. groenlandicus, 342
 Cyclopterus lumpus, 341
 Gadus morhua, 337
 pollachius, 338
 virens, 338
 Gasterosteus, 339
 Lamna cornubica, 134
 Lepidogaster bimaculatus, 340
 Decandolii, 340
 Leuciscus phoxinus, 337
 Liparis Montagui, 341
 Megalops thrissoides, 139
 Motella mustela, 338

PISCES.

- Salmo fario, 337, 343
 salar, 342
 salvelinus, 167
 trutta, 167
 Scomber scomber, 338
 Tetradon oblongus, 376

HYMENOPTERA.

- Bombus muscorum, 81
 Neuroterus lenticularis, 159
 numismatis, 155

LEPIDOPTERA.

- Acherontia atropos, 375
 Cheroecampa elpenor, 375
 porcellus, 375
 Colias edusa, 35, 36, 131
 Deilephila ephorbica, 375
 galii, 375
 Erebia blandina, 287
 Hydroecia nictitans, 35
 Macroglossa bombylififormis, 384
 stellatarum, 375
 Plusia gamma, 35
 Polyommatus phleas, 35
 Sesia bembeciformis, 375
 Smerinthus ocellatus, 375
 populi, 375
 tiliæ, 375
 Sphinx convolvuli, 375
 ligustri, 375

COLEOPTERA.

- Brosicus cephalotes, 271
 Dytiscus marginalis, 147
 Otiorhynchus atro-apterus, 271

ARACHNIDA.

- Amaurobius fenestralis, 153
 Bathyphantes concolor, 282
 Clubiona holosericea, 153
 Cteniza cœmentaria, 391
 Epeira diademata, 153
 quadrata, 153

ARACHNIDA.

Erigone atra, 153
dentipalpes, 153

Linyphia thoracica, 153

Lycosa amentata, 282
annulata, 153, 282
monticola, 153, 282
pullata, 282
riparia, 153, 282

Meta merianæ, 153
segmentata, 282

Phyllonethis lineata, 153
Phytoptus ribis, 281
Pyncogonum littorale

Tarentula pulverulenta, 153
Tegenaria derhamii, 282
Textrix lycosina, 153

Xysticus pini, 153

Zilla atrica, 153
x-notata, 153

GIGANTOSTRACA.

Cancer pagurus, 332
Carcinus mænas, 79

Eupagurus prideauxii, 366

Palinurus quadricornis, 298

CRUSTACEA.

Acroperus harpæ, 72
Alona quadrangularis, 72
Amphithoe podoceroïdes, 80, 142
Anceus maxillaris, 156
Apus glacialis, 162
Argulus foliaceus, 284

Bosmina longirostris, 72

Candona acuminata, 70
Canthocamptus minutus, 70, 71
Chydorus sphaericus, 72
Coronula diadema, 292
Corophium longicorne, 271
Cyclops fimbriatus, 70, 71
serrulatus, 70, 71
signatus, 70, 71
tenuicornis, 71.
thomasi, 70, 71
Cypria lævis, 70
ophthalmica, 70

CRUSTACEA.

Erpetocypris reptans, 70
Eurytemora clausii, 70, 71
Evadne nordmanni, 71

Iliocryptus sordidus, 72

Leydigia quadrangularis, 72
Limnocythere inopinata, 70

Pleuroxus uncinatus, 72
Podocerus pulchellus, 80, 142
Podon intermedius, 72
polyphemoides, 72
Porcellio pictus, 390

Sacculina carcini, 79, 138
Scalpellum vulgare, 84
Sida crystallina, 72

MYRIAPODA.

Peripatus Leuckarti, 140, 141

ECHINODERMATA.

Actinopyga mauritiana, 164
obesa, 164
polymorpha, 164
Amphidotus cordatus, 333, 392

Balanoglossus, 133, 134

Holothuria edulis, 163
mammifera, 164
vagabunda, 164

Solaster endeca, 366
papposus, 366
Stichopus variegatus, 164

Tornaria, 133

POLYZOA.

Alcyonella fungosa, 280

GASTROPODA.

Actæon tornatilis, 171
Aporrhais pes-pelecani, 171

Buccinum undatum, 81, 147, 171
Bulimus attenuatus, 12, Pl. I.
jordani, 12
labrosus, 12, Pl. I.
sidonensis, 12

Bulla, 10
utriculus, 171

Capulus hungaricus, 171
Cerithium, 10

GASTROPODA.

- Clausilia boissieri*, 12, Pl. I.
Cylichna cylindracea, 171
 umbilicata, 171
Cypræa, 10
 europæa, 171

Doris inconspicua, 142
 pusilla, 142
 sparsa, 142

Fusus antiquus, 171
 gracilis, 171

Helcion pellucidum, 81, 171
 var. *lævis*, 171
Helix, 222
 berytensis, 11, Pl. I.
 cæsareana, 11, Pl. I.
 cæspitum, 11, Pl. I.
 candidissima, var. *hierochun-*
 tica, 10
 caperata, 10
 cariosa, 11, Pl. I.
 cavata, 11, Pl. I.
 despreauxii, 11.
 hedenbergi, 12, Pl. I.
 hierochuntica, 10
 pisana, 11
 prasinata, 11
 Seetzeni, 10, 191
 spiriplana, 11, Pl. I.
 syriaca, 11, Pl. I.
 tuberculosa, 10, Pl. I.
 variabilis, 10

Littorina littorea, 171
 obtusata, 171
 rudis, 171

Marginella, 10
Melania tuberculata, 12, Pl. I.
Melanopsis jordanica, 12
 prærosa, 12, Pl. I.
 sauleyi, 12, Pl. I.
Murex, 10

Nassa, 10
 reticulata, 171
Natica Alderi, 171
 Montacuti, 171
Neretina jordani, 12
 michonii, 12

Odostomia pallida, 171
 rufa, var. *fulvocincta*, 171
 Scillæ, 171

GASTROPODA.

- Patella vulgata*, 171
 var. *depressa*, 171
Philine scabra, 171
Pleurotoma brachystoma, 171
 costata, 171
 turricula, 171
Purpura lapillus, 171

Rissoa abyssicola, 171
 inconspicua, 171
 proxima, 171, 291
 vitrea, 171

Trochus cinerarius, 171
 magus, 171
 zizyphinus, 171
Turritella terebra, 171

Zonites cellaria, 12

SCAPHOPODA.
Dentalium, 10
 entalis, 170

LAMELLIBRANCHIATA.
Anomia ephippium, 170
 var. *cylindrica*, 281
Axinus croulinensis, 170, 291
 flexuosus, 170

Cardium echinatum, 170
 edule, 171
 fasciatum, 170
 minimum, 170, 291
 nodosum, 170
 norvegicum, 171
Circe minima, 281
Corbula gibba, 170
Cyprina islandica, 170
Cyrena cor, 13

Lima excavata, 296
 hians, 218, 295, 296, 331, 366,
 383
 Sarsii, 296
Lucina borealis, 171
Lucinopsis undata, 170
Lutraria elliptica, 171

Mactra subtruncata, 170, 171
Montacuta bidentata, 170
Mya arenaria, 271
 truncata, 170, 171
Mytilus edulis, 171
 modiolus, 170

Nucula sulcata, 170, 291
 tenuis, 170

LAMELLIBRANCHIATA.

- Pecten, 219
 maximus, 83, 171
 opercularis, 170
 pusio, 281
 septemradiatus, 281
 tigrinus, 281
 varius, var. nivea, 281
 Pectunculus glycymeris, 171
 Pholas crispata, 37, 38
 Psammobia ferroënsis, 170

Saxicava rugosa, 38, 170
 var. arctica, 281

Scrobicularia alba, 170
 nitida, 170
 prismatica, 170

Solecurtus antiquatus, 170
 Solen pellucidus, 170
 siliqua, 171

Tapes pullastra, 171
 Tellina balthica, 171
 crassa, 171
 tenuis, 171

Thracia prætenuis, 170

Unio tristrami, 13

LAMELLIBRANCHIATA.

- Venus casina, 171
 exoleta, 171
 fasciata, 171
 gallina, 170, 171
 var. laminosa, 170
 lineta, 170

BRACHIOPODA.

Terebratula caput-serpentis, 281

ANNELIDA.

Balanoglossus, 133, 134

Lumbricus terrestris, 33
 trapezoides, 33

Tornaria, 133

ROTIFERA.

Melicerta ringens, 147

CÆLENTERATA.

Adamsia palliata, 366
 Aglaophenia myriophyllum, 83,
 162

INFUSORIA.

Stentor polymorphus, 147

BOTANY.

PHAENOGAMIA.

- Abies Douglasii, 273
 Mertensiana, 272
 pectinata, 85, 257
 Acacia, 182
 farnesiana, 186
 horrida, 373
 melanoxylon, 104
 Seyal, 189
 Acer campestre, 200, 366
 circinnatum, 366
 palmatum, 368
 platanoides, 366
 Pseudo-Platanus, 68, 85, 88, 90,
 101, 121, 123, 143, 262,
 279, 366
 Achillea Millefolium, 200
 Ptarmica, 200
 Aconitum Napellus, 200, 283
 Acorus Calamus, 200
 Ægopodium major, 105
 Podagraria, 26, 29, 66, 68
 Æsculus Hippocastanum, 94, 119,
 160, 255, 279
 Agrimonia Eupatoria, 87, 111,
 200
 odorata, 200, 361

PHAENOGAMIA.

- Agropyron caninum, 88
 junceum, 117, 200
 Agrostis alba, 200
 canina, 200
 vulgaris, 25, 275
 var. pumila, 25, 118, 154, 200
 Aira præcox, 200
 Ajuga pyramidalis, 200, 390, 391
 reptans, 200
 Alchemilla alpina, 40, 41, 42, 105,
 200, 365
 argentea, 41
 arvensis, 200
 conjuncta, 40, 41, 42, 43
 hybrida, 41, 42, 43
 montana, 41, 42, 327
 pentaphyllea, 41
 pubescens, 42
 var. minor, 42
 splendens, 42
 vulgaris, 40, 41, 42, 105, 162
 var. alpestris, 327, 345
 filicalis, 327, 345
 glabra, 42, 43
 montana, 200
 pratensis, 327, 345

PHAENOGAMIA.

- Alisma Plantago*, 46, 200
ranunculoides, 274
Allium Schönoprasum, 200
ursinum, 106, 200
vineale, 125, 200, 345, 377
Alnus glutinosa, 67, 152, 200
Alocasia crystallina, 100
metallica, 100
Alopecurus agrestis, 86, 200
geniculatus, 200
nigricans, 106
pratensis, 106, 200
Althaea officinalis, 293
Alyssum saxatile, var. *compactum*, 269
Amelanchier, 123
vulgaris, 280
Ammophila arundinacea, 47, 117, 200, 275, 291
baltica, 139
Anagallis arvensis, 201
var. *cærulea*, 125, 392
tenella, 201
Anchusa officinalis, 201
sempervirens, 105, 201, 369
Andromeda polifolia, 45, 86
Anemone alpina, 105
coronaria, 183, 184
nemorosa, 26, 201
Angelica sylvestris, 29
Anthemis arvensis, 201
Cotula, 201, 284
Anthoxanthum odoratum, 106
Puelii, 201
Anthriscus sylvestris, 29
Anthurium crystallinum, 361
Stevensi, 100
Veitchii, 100
Anthyllis Vulneraria, 117, 201, 369
var. *Allionii*, 329
coccinea, 328
micacea, 328
ovata, 329
Antirrhinum Orontium, 286
Apera Spica-venti, 139, 201, 286
Apium nodiflorum, 201
Aquilegia alpina, 394
vulgaris, 105
Arabis alpina, 28, 102, 178, 201, 269
sagittata, 201
Turrita, 44
Araucaria imbricata, 90, 253
Arbutus, 184
Unedo, 272
Arctium intermedium, 201
minus, 201

PHAENOGAMIA.

- Arctostaphylos alpina*, 201
Arenaria peploides, 29
trinervia, 29
Argyria canescens, 372
Aristolochia Clematidis, 287
Armeria alpina, 105
maritima, 228
Artemisia Absinthium, 141
campestris, 139
maritima, 201, 345
Arum maculatum, 88
Arundo donax, 192
Asarum europæum, 85, 102
Asperugo procumbens, 392
Asperula arvensis, 201, 377, 392
cynanchica, 154
odorata, 29, 105
Astragalus, 176
glycyphyllos, 345
hypoglottis, 345
Astrantia major, 105
Atriplex erecta, 201
laciniata, 201
Atropa Belladonna, 201
Aubretia purpurea, 269
Avena pubescens, 86, 201, 345
sativa, 25
Azalea mollis, 358
pontica, 106, 269
Azara microphylla, 368

Balanites Ægyptiaca, 185
Ballota nigra, 201
var. *alba*, 154
Barbarea stricta, 145, 201, 344
vulgaris, 389
Bartsia Odontites, 29, 88, 275
viscosa, 201
Bellis sylvatica, 180
Berberis Darwinii, 106, 268
vulgaris, 86, 106
Betula alba, 90, 153, 255, 368
nana, 201
Bidens cernua, var. *radiata*, 327
tripartita, 201
Bignonia capreolata, 365
Bœhmeria nivea, 104, 384
Borago officinalis, 201
Bossiaea scolopendria, 364
Bougainvillea spectabilis, 161
Brachypodium sylvaticum, 201
Brassica alba, 201
monensis, 345
Napus, 201
oleracea, 28, 201
Rapa, 201

PHÆNOGAMIA.

- Bromus arvensis*, 202
asper, 88, 201
macrostachys, 286
maximus, 286
racemosus, 202
secalinus, 202
tectorum, 202, 286
Bryonia dioica, 146
Buda rubra, 324-325
Bupleurum rotundifolium, 202,
 284
Bursa Bursa-pastoris, 324
Cakile maritima, 117, 202
Calamagrostis epigeios, 344, 346
Calamintha Clinopodium, 87
Calla æthiopica, 143
Callitriche autumnalis, 202
hamulata, 202
stagnalis, 202
Calotropis procera, 191
Caltha palustris, var. *minor*, 145,
 202
Calycotome villosa, 184
Calystegia Sepium, 325
Soldanella, 46, 202, 283
Camelina sativa, 202
Campanula lancifolia, 202
latifolia, 87, 274
rapunculoides, 117, 202
rotundifolia, var. *lancifolia*, 292
Capsella Bursa-pastoris, 28, 324
Caragana Altagana, 367
Cardamine amara, 272, 345
flexuosa, 202
hirsuta, 28
pratensis, 28, 134
Carduus crispus, 45
heterophyllus, 345
pycnocephalus, 377, 378
tenuiflorus, 345
Carex acuta, 47, 202
alpicola, 202
aquatilis, var. *Watsoni*, 283
arenaria, 47
atrata, 47, 297
binervis, 106, 108
Bœninghauseni, 145
Buxbaumii, 377
capillaris, 297
 var. *alpestris*, 329
major et robustior, 329
dioica, 145, 202
distans, 202
disticha, 47, 202
echinata, 108
Ehrhartiana, 202

PHÆNOGAMIA.

- Carex extensa*, 202
filiformis, 346
flacca, 329
 var. *erythrostachys*, 329
flava, 108, 329
fœtida, 106
fulva, 108
fusca, 377
glauca, 25, 106, 108
Goodenowii, 202
hirta, 202
irrigua, 162
lævigata, 202
limosa, 146, 162, 202
muricata, 106
ovalis, var. *bracteata*, 328
pallescens, 86, 106, 108, 202, 369
panicea, 108
 var. *tumidula*, 329
paniculata, 202
pauciflora, 202
pendula, 202, 270, 274, 280, 346
pilulifera, 108, 202
præcox, 202
pulicaris, 108
pulla, 202
punctata, 346
rigida, 202
riparia, 202
rostrata, 202, 329
 var. *brunnescens*, 329
rupestris, 134
salina, 106
sparsifolia, var. *borealis*, 329
spiralis, 329
stricta, 106, 202
strigosa, 106
sylvatica, 106
vesicaria, 116, 274, 282
Carlina vulgaris, 153, 202, 382
Carpinus Betulus, 85, 202, 258,
 366
Carum segetum, 160
Castalia speciosa, var. *minor*, 326
Castanea sativa, 90, 159, 203, 364
vulgaris, 123, 255
Catabrosa aquatica, 203
Catalpa syringefolia, 154
Catasetum tridentatum, 131
Caucalis nodosa, 203, 293
Cedrus, 86
Libani, 90, 153, 255, 364, 367
Centaurea montana, 105
nigra, 88, 118, 203
 var. *radians*, 344, 345
Scabiosa, 203
Centunculus minimus, 203

PHAENOGAMIA.

- Cephalanthera ensifolia*, 46
Cephalotaxus drupacea, 368
Cerastium arcticum, 203
 tetrandrum, 280
 triviale, 29
Cerasus Mahaleb, 367
Ceratophyllum demersum, 391
Ceratozamia mexicana, 104
Cereus grandiflorus, 110
Chærophyllum aromaticum, 105
Cheiranthus Cheiri, 29, 203
Chelidonium majus, 203
 var. *laciniatum*, 203
Chenopodium album, 30
 ficifolium, 162
Chrysanthemum coronarium, 190
 Leucanthemum, 203
Chrysosplenium alternifolium, 278, 345
 oppositifolium, 66, 203, 278
Cichorium Intybus, 203
Cicuta virosa, 203
Cineraria cruenta, 364
Cissus discolor, 292
Citrullus Colocynthis, 189
Cladium germanicum, 167, 203, 291, 345, 346
Clematis Vitalba, 146
Cnicus acaulis, 154
 arvensis, 145, 275
 sub-sp. *setosus*, 160, 284
 eriphorus, 154
 heterophyllum, 120, 283
 lanceolatus, 28
 palustris, 28
Cochlearia alpina, 203, 327
 anglica, 327
 var. *Hortii*, 145
 danica, 203, 327
 grœnlandica, 327
 micacea, 327
 officinalis, 45, 327
Cola acuminata, 105
Colletia ferox, 282
Conium maculatum, 87, 117, 203
Convallaria majalis, 203
Convulvulus arvensis, 117, 121, 203
 sepium, 325
 Soldanella, 345
Coriandrum sativum, 203
Cornus sanguinea, 125
Corydalis claviculata, 111, 203
 lutea, 102, 125, 203
Corylus Avellana, 203
Corynephorus canescens, 139
Cotyledon Umbilicus, 361

PHAENOGAMIA.

- Crambe maritima*, 203, 374
Cratægus Crus-galli, 367
 nigra, 367
 Oxyacantha, 68, 85
 tanacetifolia, 367
Crepis biennis, 203
 paludosa, 86
 virens, 389
Crithmum maritimum, 345
Crocus, 183
Cuscuta Epilinum, 382
Cyclamen, 183
Cymbidium eburneum, 100
 Loweianum, 100
Cynosurus echinatus, 286

Dabeocia polifolia, 392
Dactylis glomerata, 25
Dammara australis, 160
Datura Stramonium, 380
Daucus Carota, 45, 117, 203, 369
Delphinium Ajacis, 203
Dendrobium Brymerianum, 100, 358
 chrysotoxum, var. *superbum*, 100
 crassinode, 100
 Dalhousianum, 100
 densiflorum, 358
 fimbriatum, var. *oculatum*, 100
 nobile, 100
 var. *album*, 100
 Cooksoni, 100
 nobilius, 100
 Wardianum, 100
Deschampsia cæspitosa, 125
 montana, 203
Dianthus sylvestris, 295
Digitaria humifusa, 165
Dimorphandra Mara, 287
Dioscorea sativa, 285
Diplotaxis muralis, 117, 154
Dipsacus pilosus, 160
 sylvestris, 204
Dolichos lignosus, 365
Dondia Epipactis, 105
Doronicum Clusii, 105
 Pardalianches, 102, 105, 204
Draba incana, 204
 muralis, 204
 rupestris, 204
 verna, 178
Drosera anglica, 204
 intermedia, 204

Echinochloa Crus-galli, 204
Echium vulgare, 46, 370

PHAENOGAMIA.

- Elatine hexandra*, 204
Eleocharis acicularis, 116, 274
Elymus arenarius, 204
Empetrum nigrum, 361
Entada scandens, 292
Epilobium angustifolium, 120
 montanum, var. *minus*, 134
 obscurum, 204
 palustre x *obscurum*, 204
Epimedium alpinum, 102
Epipactis latifolia, 267, 274
 purpurata, 267
Eragrostis poaeoides, 286
Eranthis, 17
Erica carnea, 17
 ciliaris, 382
 cinerea; 108
 herbacea, 105
 tetralix, 108
Erigeron acre, 160
Erimostachys lanciniata, 192
Eriocaulon septangulare, 392
Eriophorum angustifolium, var.
 minus, 292
 gracile, 162
 latifolium, 204
Erodium cicutarium, 117, 204
 maritimum, 345
Erophila vulgaris, 98, 141
Eryngium maritimum, 204, 283
Erysimum cheiranthoides, 145, 204
 orientale, 392
Erythraea Centaurium, 87, 204, 274
 littoralis, 204
Erythronium, 17
Escallonia macrantha, 59
Eucalyptus rostrata, 365
Euonymus europæus, 204
Eupatorium Cannabinum, 111
Euphorbia amygdaloides, 146
 Cyprisias, 106, 204
 Paralias, 382
 Peplus, 389
 portlandica, 345
Euphrasia gracilis, 204
 officinalis, 29, 88, 118, 275
 var. *gracilis*, 292

Fagopyrum esculentum, 117
Fagus sylvatica, 68, 85, 89, 94,
 96, 102, 107, 115, 121, 122,
 254, 364
 var. *heterophylla*, 367
 tortuosa, 366
Ferula communis, 192
Festuca ambigua, 139
 elatior, 204

PHAENOGAMIA.

- Festuca fallax*, 204
 loliacea, 204
 ovina, 106
 pratensis, 88
 procumbens, 204
 rubra, 204
 sciuroides, 204
 sylvatica, 204
Ficus, 188
Filago germanica, 204, 274
 minima, 117, 274
Fraxinus americana, 367
 aurea, 367
 excelsior, 64, 94, 104, 107, 116,
 123, 253, 279
 heterophylla, 368
 juglandifolia, 367
 lentiscifolia, 367
Fuchsia cylindracea, 282
Fumaria confusa, 204
 densiflora, 204
 officinalis, 204
 pallidiflora, 204

Galanthus nivalis, 46
Galeopsis versicolor, 345
Galium anglicum, 139
 Aparine, 29
 boreale, 204
 Cruciata, 345
 erectum, 205
 Mollugo, 205, 274, 282
 var. *Bakeri*, 344, 345
 saxatile, 88
 uliginosum, 205
 verum, 29, 88, 118, 205, 275
Garrya elliptica, 269
Gaultheria Shallon, 159
Genista anglica, 205, 345
Gentiana acaulis, 269
 campestris, 117, 274
 excisa, 297
 lutea, 297
 nivalis, 283
 purpurea, 297
Geranium columbinum, 205
 dissectum, 205
 lucidum, 86, 205
 nodosum, 102
 phæum, 105, 205
 pratense, 345, 369
 Robertianum, 68, 180
 sanguineum, 111, 205
 sylvaticum, 86, 105, 109, 345,
 369
Geum intermedium, 109
 rivale, 105

PHAENOGAMIA.

- Ginkgo biloba, 367
 Glaucium flavum, 44, 111, 293
 Glomera jasminiflora, 100
 Glyceria aquatica, 115, 125
 distans, 205
 fluitans, 25, 88, 205
 plicata, 205
 var. pedicellata, 165
 Gnaphalium leontopodium, 105
 uliginosum, 205
 undulatum, 292
 Grevillea rosmarinifolia, 104
 Griselinia littoralis, 368
 Guaiacum officinale, 105, 365

 Habenaria albida, 108, 205
 bifolia, 108, 205, 369
 chloroleuca, 205, 369
 conopsea, 108
 viridis, 205
 Hedera Helix, 67, 205
 Hedysarum obscurum, 295
 Helleborus fœtidus, 205
 niger, 16
 viridis, 115
 Heracleum Sphondylium, var.
 angustifolium, 327
 Hesperis matronalis, 205
 Hieracium anglicum, 143, 205
 var. cerinthiforme, 143,
 205
 longibracteatum,
 143
 angustatum, 143, 206
 argenteum, 205
 atratum, 206
 aurantiacum, 369
 auratum, 205, 344
 Backhousii, 206
 boreale, 205
 Boswelli, 206
 buglossoides, 206
 cæsio-murorum, 206
 calliophyllum, 206
 centripetale, 143
 crocatum, 143, 205
 duriceps, 206
 Eupatorium, 205
 euprepes, 206
 eximium, 205
 flocculosum, 206
 Friesii, 206
 gothicum, 205, 344
 gravestellum, 206
 holosericeum, 205
 Langwellense, 206
 lingulatum, 205

PHAENOGAMIA.

- Hieracium Marshalli, 206
 murorum, 109, 143, 205
 nigrescens, 205
 nitidum, 206
 onosmoides, 206
 orarium, 206
 pallidum, 205
 Pictorum, 206
 prælongum, 206
 prenanthoides, 205
 reticulatum, 134
 rivale, 206
 rubicandrum, 143
 Scoticum, 206
 senescens, 143
 sinuans, 206
 Sommerfeltii, 143, 206
 sparsifolium, 109, 143, 205
 stenolepes, 206
 strictum, 205, 206
 submurorum, 206
 subscundum, 206
 sylvaticum, 26
 vulgatum, 205
 Hierochloa borealis, 282
 Hippophae rhamnoides, 154, 206
 Hippuris vulgaris, 206
 Holcus mollis, 25, 148
 Hordeum jubatum, 286
 maritimum, 377
 Hottonia palustris, 154
 Hutchinsia alpina, 297
 Hydrocharis Morsus-ranæ, 154
 Hyoscyamus niger, 206, 377
 Hypericum Androsæmum, 109,
 270, 345
 dubium, 120
 elodes, 206
 hirsutum, 87, 206
 humifusum, 206
 quadratum, 206
 Hypochaeris radicata, 88, 275

 Iberis amara, 206
 Ilex Aquifolium, 67, 68, 107, 257
 Ilex paraguensis, 105
 Inula crithmoides, 192, 345
 Helenium, 162
 Ixolirion montanum, 184

 Jasione montana, 117
 Juglans regia, 90, 101, 263, 366
 Juncus acutus, 143
 balticus, 106
 communis, 68
 effusus, 207
 Gerardi, 207

PHÆNOGAMIA.

- Juncus lamprocarpus*, 207
maritimus, var. *arabica*, 192
supinus, 207
tenuis, 297, 346
Juniperus communis, 207
 var. *nana*, 365
Knautia arvensis, 345
Kobresia caricina, 207
Koeleria cristata, 207
Kœlreuteria paniculata, 367
Lactuca muralis, 207, 283
virosa, 207
Lagurus ovatus, 286, 291
Lamium hybridum, 207
intermedium, 207
maculatum, 106, 207, 283
Larix europæa, 67, 85
Lathyrus Aphaca, 207, 377
macrorrhizus, 105, 284
Lawsonia alba, 190
Ledum palustre, 45, 286
Lemna minor, 207
Lentiscus, 184
Leontodon autumnalis, var. *pratensis*, 207
hispidus, 87, 207, 345
Lepidium Draba, 117, 207
latifolium, 207
runderale, 207
sativum, 207
Lepidium Smithii, 98
Lepigonum rubrum, 324
rupestre, 345
salinum, var. *neglectum*, 45
Leptospermum bullatum, 104
Ligusticum scoticum, 207
Ligustrum vulgare, 207
Lilium candidum, 288
Linaria Cymbalaria, 102, 207, 283, 365
minor, 124, 207
vulgaris, 207, 369
Linnæa borealis, 207
Linum catharticum, 118
usitatissimum, 207
Liriodendron tulipifera, 155, 262, 269
Listera cordata, 108, 207, 369
ovata, 207, 274
Lithospermum arvense, 207, 392
officinale, 207, 392
prostratum, 269
Littorella lacustris, 207
Livistona chinensis, 365
Lobelia Dortmanna, 116, 207

PHÆNOGAMIA

- Lolium temulentum*, 161, 207
Lonicera sempervirens, 365
Loranthus Indicus, 186
Lotus angustissimus, 286
corniculatus, 207
Lunaria biennis, 145
Luzula albida, 106, 274, 282
campestris, 106, 207, 275
maxima, 66
pilosa, 106, 207
Lychnis alba, 117, 207
diurna, 105
Flos-cuculi, 25, 208
Lycium barbarum, 102, 287
Lycopsis arvensis, 117, 208
Lycopus europæus, 111, 192, 208
Lysimachia Nummularia, 283, 361
thyrsiflora, 283
vulgaris, 116, 283
Lythrum Salicaria, 192, 208, 274, 296
Magnolia Soulangeana, 368
Malaxis paludosa, 208
Malva moschata, 45
rotundifolia, 125, 208, 345
sylvestris, 125
Mangifera indica, 104, 285
Marrubium vulgare, 287
Matricaria inodora, 26, 118, 208
 var. *maritima*, 208
Parthenium, 142
Meconopsis cambrica, 208
Medicago denticulata, 208
 var. *apiculata*, 284
falcata, 131
maculata, 208
minima, 139
sylvestris, 139
Melaleuca squarrosa, 365
Melampyrum montanum, 208
pratense, var. *montanum*, 344
sylvaticum, 208
Melica nutans, 109, 345
uniflora, 87, 88, 106
Melilotus alba, 208
altissima, 208
officinalis, 117, 131, 208
parviflora, 208, 284
Meliococca bijuga, 104
Mentha arvensis, 66
hirsuta, 208
sylvestris, 208
Menyanthes trifoliata, 208
Mercurialis annua, 208
Mertensia maritima, 45, 283, 345
Mespilus Smithii, 366

PHAENOGAMIA.

- Meum athamanticum*, 105, 269,
 283
Milium effusum, 106, 345
Mimosa, 182
 pudica, 367
Mimulus luteus, 208, 369
Monstera deliciosa, 100
Montia fontana, 389
Musa Ensete, 365
Muscari, 17
Myosotis arvensis, 26, 29
 var. *umbrosa*, 208
 repens, 208
 sylvatica, 106, 208
Myrica Gale, 46, 208
Mysiophyllum alterniflorum, 208
 spicatum, 208
Myristica moschata, 290
Myrrhis odorata, 105, 389

Narcissus Pseudo-narcissus, 46
Nardus stricta, 106
Nasturtium amphibium, 154
 officinale, 208
 palustre, 116
 sylvestre, 124, 208, 283
Neottia Nidus-avis, 46, 208
Nepenthes ampullaria, 383
 Hookerii, 100
 intermedia, 100
 Rafflesiana, 100
 Veitchii, 100
Nepeta Cataria, 154, 208
Nuphar luteum, 209, 324, 364
Nymphaea alba, 209, 324
 lutea, 324
 orientalis, 364

Odontoglossum Andersonianum,
 100
 var. *guttatum*, 100
 Cervantesii, 100
 crispum, 100, 139
 luteum, var. *purpureum*, 100
 Pescatorii, 100
 Rossii, 100
 triumphans, 100
Enanthe crocata, 209
 fistulosa, 209
 Lachenalii, 209, 361
Enothera biennis, 146
Olearia Haastii, 368
Oncidium carthaginense, 155
Onobrychis sativa, 146
Ononis repens, 209
 spinosa, 209
Opuntia, 182

PHAENOGAMIA.

- Orchis incarnata*, 209
 latifolia, 209
 pyramidalis, 345
Origanum vulgare, 87
Ornithogalum umbellatum, 106,
 209, 271
Ornithopus perpusillus, 117
Ornus europæa, 367
Orobanche ramosa, 378
 rubra, 209, 345
 speciosa, 378
Orobus repens, 105
Oxyria digyna, 209
 reniformis, 106, 178, 179
Oxytropis uralensis, 345

Papaver dubium, 117, 209
Papyrus antiquorum, 177
 syriacus, 177
Paris quadrifolia, 282
Paronychia argentea, 185
Passiflora edulis, 282
Pavia flava, 367
Peplis Portula, 45, 209, 274
Persea gratissima, 285
Petasites albus, 143, 209, 272
Petrocallis pyrenaica, 297
Peucedanum Ostruthium, 209
 palustre, 139
Phalaris canariensis, 209
 paradoxa, 286, 377
Phleum arenarium, 209
Phlox, 269
 canadensis, 105
 frondosa, 105
Phoenix dactylifera, 27
Phormium tenax, 105, 367
Phragmites communis, 47, 167,
 209
Phyllocactus, 365
Physalis Alkekengi, 142
Physostigma venenosum, 143
Phytelephas macrocarpa, 147
Picea nobilis, 369
 Nordmanniana, 273
 pectinata, 257
 Pinsapo, 272
 Webbiana, 273
Picris echioides, 160
Pilocereus senilis, 384
Pinguicula lusitanica, 209
Pinus Coulterii, 273
 halepensis, 184
 Lambertiana, 287
 ponderosa, 380
 sylvestris, 67, 86, 90, 101, 119,
 260, 279, 392

PHAENOGAMIA.

- Pisum sativum*, 29
Plantago major, 30, 147
 maritima, 226, 298
 var. *hirsuta*, 228
 media, 209, 293, 368
Platanus occidentalis, 366, 368
Poa alpina, 134, 330
 var. *alpestris*, 134
 var. *australis*, 134
 var. *lapponum*, 134
 Balfourii, 209, 328
 compressa, 209, 286
 glauca, 209, 328
 pratensis, 106, 209
Poinsettia pulcherrima, 138
Polemonium cæruleum, 105, 209
Polycarpon tetraphyllum, 286
Polygala vulgaris, 209
Polygonatum multiflorum, 209
 vulgare, 106
Polygonum amphibium, 209, 274
 var. *terrestre*, 209
 aviculare, 30, 118
 Bistorta, 106, 209
 Hydropiper, 25
 lapathifolium, var. *incanum*,
 134
 minus, 116, 209
 Persicaria, 25
 var. *glandulosum*, 134
 Roberti, 117, 118, 209
 Sachalinense, 367
Polyopogon monspeliensis, 154, 209,
 284
Populus alba, 93, 209, 261
 Euphratica, 185
 nigra, 102, 110, 153, 209, 261
Potamogeton Bennettii, 210, 300
 crispus, 46, 210
 filiformis, 210
 Friesii, 210
 heterophyllus, 210
 natans, 46, 210
 nitens, 210
 obtusifolius, 300
 pectinatus, 210
 perfoliatus, 210, 344
 polygonifolius, 162, 210
 var. *pseudo-fluitans*, 210
 prælongus, 210
 pusillus, 46, 210
 rufescens, 210
 Zizii, 75
Potentilla Comarum, 88, 210
 norvegica, 145, 210, 391
 procumbens, 210
 Salisburgensis, 105

PHAENOGAMIA.

- Primula integrifolia*, 297
 vulgaris, 45, 105
Prostanthera lasianthos, 104
Prunella vulgaris, var. *Webbiana*,
 376
Prunus Avium, 85, 94, 257, 279
 communis, 210
 Lauro-cerasus, 67, 284
 Padus, 345
Psidium cattleianum, 282
Ptelea trifoliata, 368
Pterocarya stenoptera, 366
Pulmonaria officinalis, 105
Pyrola arenaria, 210
 media, 210
 minor, var. *arenaria*, 274, 283
 rotundifolia, 210
Pyrus Aria, 210
 Aucuparia, 106, 261
 communis, 367
 japonica, 102
 latifolia, 210
 Malus, 85
 pinnatifida, 367
 salicifolia, 367
Quercus Cerris, 260, 367
 Ilex, 123, 260
 Robur, 90, 102, 122, 152, 259,
 380
Radiola linoides, 111, 274
Ranunculus aquatilis, 179
 Asiaticus, 184
 auricomus, 102, 345
 Baudotii, 210
 bulbosus, 210, 270, 272
 circinatus, 210
 Drouetii, 210
 Ficaria, 26, 29, 98, 211
 Flammula, 152, 326
 fluitans, 44
 heterophyllus, 210
 Lenormandi, 210
 Lingua, 210, 345
 var. *petiolaris*, 210
 peltatus, 274
 var. *penicillatus*, 210
 petiolaris, 326, 390
 pseudo-fluitans, 210
 repens, 26, 66
 reptans, 326
 Sardous, 210
 sceleratus, 44, 210
 trichophyllus, 210
Raphanus maritimus, 211, 369
 Raphanistrum, 211

PHAENOGAMIA.

- Reseda alba*, 130
Retama monosperma, 190
Rheum rhaponticum, 106
Rhinanthus Crista-galli, 29, 88, 211
 var. *Drummond-Hayi*, 327
Rhizophora mucronata, 163
Rhododendron aureum, 358
 ponticum, 178
 Veitchii, 100
Rhus cotinus, 287
Rhynchospora alba, 211
 fusca, 377
Robinia Pseud-acacia, 120, 253, 367
Rosa arvensis, 125, 211
 canina, var. *dumalis*, 211
 var. *verticillacantha*, 211
 involuta, var. *Sabini*, 211
 mollis, 211
 spinosissima, 45, 211, 376
Rubus cæsius, var. *umbrosus*, 211
 calvatus, 211
 carpinifolius, 211
 Chamæmorus, 211
 corylifolius, 211
 dumnoniensis, 211
 fruticosus, 66
 Idæus, 211, 284
 var. *Leesii*, 134
 mucronatus, 211
 nutkanus, 376
 plicatus, 211
 pulcherrimus, 211
 rosaceus, 211
 saxatilis, 86, 109, 116
 selmeri, 211
 Sprengelii, 345
 villicaulis, 211
Rumex Acetosa, 30
 aquaticus, 211
 obtusifolius, 211
Ruppia rostellata, 211, 271
 spiralis, 139

Sabal flabelliformis, 365
Sagina apetala, 111, 211
 Linnæi, 211
 maritima, 117
 nodosa, 361
 procumbens, var. *spinosa*, 134
 subulata, 211
Sagittaria sagittifolia, 211
Salicornia fruticosa, 191
 herbacea, 211
 radicans, 139
Salisburia adiantifolia, 104
Salix alba, 211, 263

PHAENOGAMIA.

- Salix Arbuscula*, 298, 328
 Caprea, 66, 212
 cinerea, 153, 212, 263
 var. *aquatica*, 212
 coriacea, 212
 Dicksoniana, 298
 fragilis, 211, 263
 var. *Russelliana*, 211
 herbacea, 212, 298
 lanata, 298
 lapponum, 212, 298
 ludificans, 212
 nigricans, 212, 293
 pentandra, 211
 phylicifolia, 298, 328
 purpurea, 211
 repens, 117, 212
 var. *fusca*, 212
 reticulata, 212
 rubra, 211
 simulatrix, 212
 spuria, 298
 Stephaniana, 298
 viminalis, 211
Salsola articulata, 191
 Kali, 117, 212
Salvia Verbenaca, 212
Sambucus nigra, 65, 212
Samolus Valerandi, 111, 212, 361
Sanicula europæa, 29, 212
Saponaria ocymoides, 295
 Vaccaria, 392
Saxifraga aizoides, 109
 cordifolia, 269
 crassifolia, 269
 Geum, 269, 369
 granulata, 103
 var. *flore-pleno*, 269
 hypnoides, 86, 269
 oppositifolia, 152, 212
 sponhemica, 212, 292
 stellaris, 109, 212
 Wallacei, 269
Scandix Pecten-Veneris, 212, 293,
 392, 395
Schoenus nigricans, 212
Scilla, 17
 autumnalis, 286
 nutans, 106, 145, 164, 212
 verna, 212
Scirpus fluitans, 212
 maritimus, 46, 212
 pauciflorus, 212
 rufus, 47, 107
 Savii, 212, 345
 sylvaticus, 345
 Tabernæmontani, 46, 212

PHAENOGAMIA.

- Scleranthus perennis*, 139
Scrophularia aquatica, 345
 nodosa, 30, 267
 vernalis, 125, 212
 umbrosa, 212, 291
Scutellaria galericulata, 111, 116
 minor, 46, 116, 212, 345
Sedum anglicum, 86, 111, 361
 reflexum, 212
 Rhodiola, 212, 345
 villosum, 86, 283
Senebiera Coronopus, 45
 didyma, 212
Senecio Jacobæa, 148, 293
 saracenicus, 114, 212
 viscosus, 120, 212
 vulgaris, 29
Sequoia gigantea, 94, 263
Sesleria cærulea, 106
Setaria verticillata, 165
Sherardia arvensis, 212
Silaus pratensis, 212
Silene acaulis, 213
 conica, 139, 392
 Cucubalus, 213, 392
 noctiflora, 213
Silybum Marianum, 377
Sison Amomum, 160
Sisymbrium officinale, 28, 213
 Thaliana, 213
Sium erectum, 213, 270, 280, 345, 395
 latifolium, 395
Smyrniolum Olusatrum, 213
Solanum Dulcamara, 86, 87, 111, 120
 Melongena, 367
 nigrum, 154, 213
 tuberosum, 28
Solidago Virgaurea, var. *angustifolia*, 213, 329
 var. *cambrica*, 213, 329
Sonchus asper, 29
Sparganium affine, 213, 300
 simplex, 213
Sparmannia africana, 100
Spartina stricta, 162
 Townsendi, 162
Spergula arvensis, 29
 sativa, 213
Spergularia rubra, 324
Spiræa Ulmaria, 213
Stachys Betonica, 125, 213
Statice auriculifolia, 345
Stellaria aquatica, 213
 Holostea, 105
 media, 29

PHAENOGAMIA.

- Stellaria nemorum*, 88, 105, 345
 uliginosa, 389
Sueda maritima, 213
Subularia aquatica, 143
Symphytum officinale, 105
 tuberosum, 105

Tamarindus indica, 365
Tamarix gallica, 382
Tamux communis, 131, 146
Taraxacum officinale, 27, 148
 palustre, 213
Taxus baccata, 96, 103, 115, 123, 264
Thalictrum flavum, 44
 minus, 213
Theobroma Cacao, 290
Thlaspi arvense, 213, 283
 rotundifolium, 297
Thymus Chamædryis, 213
Tilia europæa, 153
 grandifolia, 119, 153, 258
 vulgaris, 119, 258
Tragopogon pratensis, 285
Trientalis europæa, 213, 365
Trifolium alpinum, 295
 arvense, 117
 medium, 29, 88, 213
 minus, 29
 repens, 275
 resupinatum, 138, 213
 striatum, 45, 138, 345
Triglochin maritimum, 46
Trigonella purpurascens, 284
Trillium grandiflorum, 269
Trisetum flavescens, 213, 283
Tritelia uniflora, 269
Triticum vulgare, 25
Trollius asiaticus, 105
 europæus, 44, 105, 269
Tulipa sylvestris, 106
Tussilago Farfara, 66, 88, 118
Typha, 358
 angustifolia, 213
 latifolia, 213, 283

Ulex nanus, 382
Ulmus campestris, 119, 256
 montana, 94, 107, 110, 153, 256
Urginea Scilla, 183
Urtica dioica, 68
 pilulifera, 185
 urens, 30, 118, 152
Utricularia intermedia, 213, 292, 344
 neglecta, 213, 292
 vulgaris, 213, 274

PHAENOGRAMIA.

- Vaccinium Myrtillus*, 66
Oxycoccus, 86
 uliginosum, 213
Vitis-Idæa, 345, 365
Valeriana dioica, 105
 pyrenaica, 105, 123, 213
Valerianella olitoria, 213
Verbascum Thapsus, 361
Veronica alpina, 213
 Anagallis, 214
 Beccabunga, 30
 montana, 274
 persica, 213
 polita, 213
 saxatilis, 213
 scutellata, 213
 serpyllifolia, 389
 var. *humifusa*, 213
Viburnum Lantana, 214
Vicia angustifolia, 29
 hirsuta, 214
 lathyroides, 280, 345
 lutea, 345
 Orobus, 214
 sativa, 29
 sylvatica, 214, 274
 tetrasperma, 125
Vinca major, 105
 minor, 105
Viola canina, 214, 280
 Curtisii, 214
 lutea, var. *amena*, 284
 odorata, 88
 sylvatica, 118, 275
 tricolor, 88
Viscum album, 186
 cruciatum, 186
Vitis pterophora, 384
Volulus sepium, 325

Wahlenbergia hederacea, 214
Wellingtonia gigantea, 273
Wistaria chinensis, 368

Zanichellia palustris, 162, 214
Zizyphus, 186

FILICES.

- Acerostichum peltatum*, 292
Adiantum, 216
 Capillus-Veneris, 193
 var. *magnificum*, 100
Aspidium, 216
 aculeatum, 369
Asplenium, 216
 Adiantum-nigrum, 47, 201
 var. *Serpentini*, 201

FILICES.

- Asplenium marinum*, 47, 111, 361,
 369
 Ruta-muraria, 201
 Trichomanes, 47, 86, 102
 viride, 47

Botrychium Lunaria, 201, 270, 275

Ceterach, 193
 officinarum, 47, 131, 381
Cheilanthes fragrans, 193
Cibotium spectabile, 100
Cryptogramme, 216
 crispa, 47, 203
Cyathea dealbata, 268
 medullaris, 105
Cystopteris, 216
 alpina, 217
 fragilis, 86, 215, 217
 montana, 215, 287

Dicksonia squamosa, 100
Drymoglossum piloselloides, 292

Faydenia prolifera, 384

Gymnogramme, 217

Hymenophyllum, 216
 tunbridgense, 206, 369, 370
 unilaterale, 109, 206, 344

Lastrea dilatata, 271
 Oreopteris, 86
 spinulosa, 207
Lomaria, 216

Nephrodium, 216

Ophioglossum lusitanicum, 291
 vulgatum, 103, 209, 270
Osmunda, 216
 regalis, 48, 209

Polypodium, 217
Pteris, 216
 cretica, 193

Scolopendrium, 216
 vulgare, 47, 102

Trichomanes, 216
 demissa, 112
 radicans, 100, 112, 375
 reniformis, 112

FILICES.

- Woodsia*, 216
hyperborea, 131, 214, 291
ilvensis, 131, 291

EQUISETACEÆ.

- Equisetum arvense*, var. *alpestre*,
 293, 328, 374
limosum, 204
maximum, 204, 346
palustre, 204
pratense, 204

LYCOPODIACEÆ.

- Lycopodium alpinum*, 208
 var. *decipiens*, 292
complanatum, 208
inundatum, 275
phlegmaria, 384
Selago, 48, 208

SELAGINELLACEÆ.

- Isoetes lacustris*, 206, 292
Selaginella denticulata, 193

CHARACEÆ.

- Chara aspera*, 203
contraria, 203
fragilis, 203
 var. *barbata*, 203
 var. *capillacea*, 203
hispida, 203
polyacantha, 346
vulgaris, 203
 var. *melanopyrena*, 203
Nitella flexilis, 208
opaca, 209
translucens, 208

MUSCI.

- Amblystegium radicale*, 388
Amphoridium Mougeotii, 86
Andreaea alpina, 366
netrophila, 86
Rothii, 365-366
Ancectangium compactum, 86, 385
Antitrichia curtipendula, 389
Atrichum undulatum, 62
Aulacomnium androgynum, 159,
 160
palustre, 275
Barbula aloides, 270
lævipila, 279
muralis, 62
rigidula, 62
unguiculata, 62

MUSCI.

- Bartramia Halleriana*, 86
Blindia acuta, 86
Brachythecium albicans, 271, 275
populeum, 62
rivulare, 62
rutabulum, 62
Breutelia arcuata, 86, 391
Bryum annotinum, 275
capillare, 62
filiforme, 87
roseum, 385
Ceratodon purpureus, 62
Climacium sp. ?, 385
Climacium dendroides, 97, 275
Dichodontium flavescens, 62, 86
pellucidum, 86
Dicranella cerviculata, 117
heteromalla, 62
Dicranum Bonjeanii, 385
fuscescens, 152
scoparium, 62
Didymodon rubellus, 62
Diphyscium foliosum, 385
Ditrichium flexicaule, 389
Encalypta streptocarpa, 152, 283
Eurhynchium myosuroides, 62
prælongum, 62
striatum, 62
Teesdalii, 270
Fissidens adiantoides, 87
incurvus, 270
Funaria hygrometrica, 62
Grimmia apocarpa, 62
 var. *rivularis*, 86
funalis, 389
pulvinata, 62
Gymnostomum curvirostrum, 385
rupestre, 86
Habrodon Notarisii, 152
Hedwigia ciliata, 87
Hedwigidium imberbe, 385
Hylocomium squarrosum, 62
Hypnum aduncum, 359
cordifolium, 386
Crista-castrensis, 389
cupressiforme, 62
 var. *ericetorum*, 87
elodes, 279
micans, 388
molluscum, 87
resupinatum, 270

MUSCI.

- Hypnum stellatum*, var. *protensum*, 87
stramineum, 359
Isothecium myurum, 87
Leskea rufescens, 283
Meesia uliginosa, 152
Mnium cinclidioides, 359
hornum, 62
punctatum, 62
serratum, 87
undulatum, 62
Neckera complanata, 109
crispa, 152, 389
Oligotrichum hercynicum, 359
Oncophorus crenulatus, 346
virens, 389
Orthothecium intricatum, 87
Philonotis fontana, var. *capillaris*, 346
Plagiothecium denticulatum, 62
pulchellum, 87
undulatum, 62, 87
Pleurochoete squarrosa, 388
Pogonatum aloides, 62
Polytrichum formosum, 62, 87
Pottia Heimii, 271
Pterygophyllum lucens, 62
Ptychomitrium polyphyllum, 86, 359
Rhacomitrium heterostichum, 62
lanuginosum, 86
Rhynchostegium confertum, 62
ruscifolium, 62
Sphagnum squarrosum, 359
Splachnum ampullaceum, 109
Tetraphis pellucida, 160
Tetraplodon bryoides, 394
Tetrodontium Brownianum, 270
Thamnum alopecurum, 62
Thuidium recognitum, 388
tamariscinum, 62
Tortula princeps, 389
ruralis, var. *arenicola*, 271
Webera annotina, 160
Zieria julacea, 86, 385
Zygodon viridissimus, 279

HEPATICÆ.

- Anthoceros lævis*, 286
Blasia pusilla, 286
Fossombronina pusilla, 286
Lophocolea bidentata, 62
Marchantia polymorpha, 62
Nardia emarginata, 366
Pellia epiphylla, 62
Plagiochila asplenioides, 62
Riccia glauca, 286
Trichocolea tomentella, 62

FUNGI.

- Æcidium albescens*, 270
compositarum, var. *tussilaginis*, 66
depauperans, 284
periclymeni, 87
prenanthis, 87
tussilaginis, 87, 89
urticæ, 87
Agaricus æruginosus, 64
alkalinus, 63
arvensis, 64
butyraceus, 63
calolepis, 64
campestris, 64, 117
capnoides, 64, 395
carbonarius, 375
carcharias, 62, 159
cervinus, 63
clypeatus, 280, 362
conigenus, 63
corticatus, 63
cristatus, 119, 120, 361
crustuliniformis, 63
durus, 280
equestris, 320
fascicularis, 64, 89
flammans, 63, 320
flavidus, 395
flavobrunneus, 63
fragrans, 63, 89
fumosus, 369
galericulatus, 63
galopus, 63
geophyllus, 63, 89
granulosus, 62
hæmorrhoidarius, 319
hirsutus, 320

FUNGI.

- Agaricus hypnorum*, 63
 hystrix, 126
 infundibuliformis, 63, 119
 laccatus, 63, 89
 maculatus, 126
 mappa, 155, 320
 marginatus, 63
 melleus, 63, 89
 mitis, 362
 mollis, 63, 89
 muralis, 63
 muscarius, 62
 mutabilis, 280
 nebularis, 63
 obscurus, 63
 phalloides, 117
 pisciodorus, 63
 polygrammus, 63
 porrigens, 320
 prunulus, 63
 pterigenus, 63, 159
 purus, 63
 rimosus, 63
 rubescens, 89
 rugosus, 63
 saponaceus, 63
 scambus, 63
 semilanceatus, 64
 semi-orbicularis, 63
 serotinus, 63, 138
 spadiceus, 64
 speciosus, 110
 spectabilis, 63
 squarrosus, 89, 126
 stercorarius, 64
 sublateritius, 64
 sulphureus, 155, 319, 320
 tener, 63
 umbelliferus, 63
 vaccinus, 320
 variabilis, 63
 velutinus, 64
 velutipes, 63
 virosus, 155
Amanita mappa, 155
 muscarius, 62
 phalloides, 117
 rubescens, 89
 virosus, 155
Anthina flammea, 155
Arcyrea punicea, 66
Armillaria melleus, 63, 89
Ascobolus furfuraceus, 88
Asteroma juncaginearum, 140
Asterosporium Hoffmannii, 68, 140
Badhamia utricularis, 140

FUNGI.

- Bæomyces æruginosus*, 152
Beggiatoa alba, 287
Bolbitius bulbillosus, 353, 393
Boletus edulis, 65
 laricinus, 119
 luridus, 126
 luteus, 65, 89, 282
 olivaceus, 376
 pachypus, 320
 piperatus, 320
 scaber, 89
 variegatus, 126
 versipellis, 320
Calloria marina, 271
Calocera viscosa, 66, 89
Calonectria Plowrightiana, 281
Cantharellus cibarius, 65, 89
 infundibuliformis, 155, 320
Cenangium furfuraceum, 281
Ceuthospora phacidioides, 68
Chlorosplenium æruginosum, 126, 161
Claudopus variabilis, 63
Clavaria abietina, 319
 inæqualis, 66
 muscoïdes, 65
 rugosa, 66, 89
Claviceps purpurea, 275, 291
Clitocybe fragrans, 63, 89
 infundibuliformis, 63, 119
 laccatus, 63, 89
 nebularis, 63
Clitopilus prunulus, 63
Cochlearia badia, 155
Coleosporium euphrasiæ, 88, 118, 275
 sonchi, 88, 89, 118
Collybia butyraceus, 63
 conigenus, 63
 velutipes, 63
Coprinus atramentarius, 64, 89
 micaceus, 64, 89
Cordyceps militaris, 67
 ophioglossoides, 67, 291
Corticium incarnatum, 65, 280
 lividum, 65
Cortinarius armillatus, 126, 320
 bolaris, 274
 cinnamomeus, 64
 collinitus, 275
 elatio, 64, 89
 iliopodius, 64
Craterellus cornucopioides, 155, 319
Craterium minutum, 291
Crepidotus calolepis, 64, 375

FUNGI.

- Crepidotus mollis*, 63, 89
Cylindrosporium ficariæ, 26
Cyphella cernua, 65
Cystopus candidus, 28, 30
 spinulosus, 28, 30

Dacrymyces deliquescens, 66
 stillatus, 66
Dædalea quercina, 319
Dasyscypha calycina, 67
 nivea, 67
Dermocybe cinnamomeus, 64
Dialonectria sanguinea, 89
Diaporthe inæqualis, 270, 282
 pulla, 282
Diatrype disciformis, 68, 140
 stigma, 68, 140
Diplodina ammophilæ, 271

Elaphomyces granulatus, 320
 variegatus, 67, 68, 291
Encœlia furfuracea, 67, 281
Endophyllum euphorbiæ, 146
Entoloma rhodopoliis, 376
Entyloma calendulæ, 26
 canescens, 26
 clypeata, 280
 Fergussoni, 26
 matricariæ, 26, 118
 microspora, 26
 ranunculi, 26
 Ungerianum, 26
Erysiphe Martii, 88
Exidia glandulosa, 66

Fistulina hepatica, 65
Flammula scambus, 63

Galera hypnorum, 63
 tener, 63
Geoglossum hirsutum, 67
Grandinia granulosa, 65, 361
Graphiola phœnicis, 27

Hebeloma crustuliniformis, 63
Helotium citrinum, 67
Helvella crispa, 67, 362
 lacunosa, 320
Heterosporium algarum, 271
Hirneola auricula-Judæ, 66
Humaria granulata, 67, 88
Hydnum auriscalpium, 126
 ochraceum, 161, 280
 repandum, 65
 rufescens, 65
Hygrophorus calyptræformis, 64,
 126
 cerasinus, 319

FUNGI.

- Hygrophorus chlorophanus*, 64,
 89, 118
 coccineus, 64
 conicus, 88, 118
 hypothejus, 64
 pratensis, 64
 psittacinus, 64
 virgineus, 64
Hymenoscypha coronata, 67, 159
 cyathoidea, 270
Hypholoma capnoides, 64
 fascicularis, 64, 89
 sublateritius, 64
 velutinus, 64

Inocybe geophyllus, 63, 89
 obscurus, 63
 rimosus, 63

Kneiffia setigera, 65

Lachnea scutellata, 67, 88
Lachnella calycina, 67
 nivea, 67
Lactarius blennius, 64, 89
 camphoratus, 376
 deliciosus, 64, 376
 fuliginosus, 155
 glyciosmus, 64, 376, 395
 mitissimus, 64
 quietus, 64
 rufus, 64
 subdulcis, 64
 turpis, 64
 uvidus, 320
 vellereus, 64, 275
 vietus, 320
 volemus, 320
Lecythea caprearum, 66
Lentinus cochleatus, 155
 lepideus, 394
Leotia lubrica, 67, 362, 376
Lepiota carcharias, 62, 159
 cristatus, 119, 120
 granulosus, 62
Leptoglossum viride, 67, 159
Licea fragiformis, 66
Lophodermium arundinaceum,
 271
 pinastri, 67
Lycogala epidendrum, 270, 282
Lycoperdon gemmatum, 66
 pyriforme, 118

Marasmius oreades, 118
 porreus, 376
Melampsora farinosa, 66

FUNGI.

- Melampsora hypericorum*, 126, 270
 lini, 118
 vacciniorum, 66
Merulius tremellosus, 65
Mollisia arenevaga, 275
 cinerea, 67
 sphærioides, 270
Mucor fusiger, 66
Mycena alkalinus, 63
 galericulatus, 63
 galopus, 63
 polygrammus, 63
 pterigenus, 63, 159
 purus, 63
 rugosus, 63
Myxadium elatior, 64, 89

Næmatelia encephala, 66
 virescens, 270
Naucoria semi-orbicularis, 63
Nectria cinnabarina, 67
Niptera cinerea, 67
Nolanea pisciodorus, 63
Nyctalis parasitica, 65, 320, 376

Odontia fimbriata, 65
Oidium erysiphoides, 89
Ombrophila sarcoides, 67
Omphalia muralis, 63
 umbelliferus, 63
Oospora ovalispora, 68
Ovularia primulana, 270

Panus stipticus, 65, 159, 270
Paxillus atrotomentosus, 320
 involutus, 64, 275
Peronospora alsinearum, 29
 alta, 30
 arenariæ, 29
 calotheca, 29
 densa, 29, 275
 effusa, 30
 ficariæ, 29
 grisea, 30
 lactusæ, 29, 30
 myosotidis, 29
 nivea, 29, 89
 obovata, 29
 parasitica, 29, 30
 rumicis, 30
 sordida, 30
 trifoliorum, 29
 urticæ, 30, 118, 152
 vicinæ, 29
Peziza badia, 155
 granulata, 67, 88
 leucoloma, 126

FUNGI.

- Peziza macropus*, 320
 majalis, 126
Phallus impudicus, 66
Phebia contorta, 65
Pholiota durus, 280
 flammans, 63
 marginatus, 63
 mutabilis, 280
 spectabilis, 63
 squarrosus, 89
Phoma laminariæ, 271
Phragmidium fragariastris, 87
 rubi-idei, 126
 subcorticatum, 88
 violaceum, 66
Phyllacora junci, 68
 podagrariæ, 68
Phytophthora infestans, 28, 30
Pistillaria puberula, 66
Pleurotus corticatus, 63
 serotinus, 63
Pluteus cervinus, 63
Podosphæra oxyacanthæ, 89
Polyporus abietinus, 65
 adustus, 89, 126
 annosus, 65, 89
 brumalis, 65
 cæsius, 65
 fragilis, 155
 giganteus, 362
 igniarius, 320
 intybaceus, 65
 melanopus, 361
 perennis, 126, 155, 320
 radiatus, 65, 138
 Schweinizii, 320
 squamosus, 65, 121, 373
 sulphureus, 126
 vaporarius, 65
 versicolor, 65
Propolis versicolor, 140
Protomyces hieracii, 26
 Fergussoni, 26
 macrosporus, 26, 66
 pachydermus, 27
Psaliota arvensis, 64
 campestris, 64, 117
Psilocybe semilanceatus, 64
 spadiceus, 64
Puccinia ægra, 284
 campanulæ, 126
 caricis, 87
 centaureæ, 88, 118
 chrysosplenii, 66, 126, 159
 epilobii, 87
 festucæ, 87
 galii, 118, 275

FUNGI.

- Puccinia glomerata*, 148, 270
 hieracii, 88, 275
 lapsanæ, 87, 89
 menthæ, 66
 oblongata, 66, 275
 poarum, 66, 87, 89, 118
 primulæ, 270
 ribis, 287
 rubigo-vera, 88
 suaveolens, 87, 145, 275
 valantiæ, 88
 variabilis, 148
 violæ, 88, 118, 275
Pyrenopeziza arenevaga, 275
 rubi, 284

Radulum orbiculare, 65
Ramularia calcea, 140
 urticæ, 68, 140
Rhopoglyphus filicinus, 164
Rhytisma acerium, 68, 88
Russula alutacea, 65
 delica, 64
 emetica, 64, 89
 fellea, 64, 89
 fragilis, 65
 nigricans, 64, 89
 ochroleuca, 64
 sardonia, 395
 vesca, 89

Schizophyllum commune, 134
Scleroderma vulgare, 66
Sclerotium clavus, 275
Scutellinia scutellata, 67, 88
Sepedonium chrysospermum, 68
Septoria petroselini, 140
 stachydis, 89
Solenia ochracea, 65
Sparassis crispa, 320
Spathularia flavida, 319
Sphaerella rumicis, 270
Spinellus fusiger, 66
Steganosporium pyriforme, 282
Stegia ilicis, 67
Stemonitis fusca, 361
Stereum hirsutum, 65
 rugosum, 65
 purpureum, 65
 sanguinolentum, 65
Stigmatea robertiani, 68, 89, 270
Stilbospora macrosperma, 282
Stropharia ærginosus, 64
 stercorarius, 64

Tapesia fusca, 291
Telamonia iliopodius, 64
Thelephora laciniata, 65, 126

FUNGI.

- Thyrsidium botryosporum*, 68
 hedericolum, 140
Tilletia caries, 25
 decipiens, 25, 118, 154, 275
 sphaerococca, 25
 striæformis, 25, 148
 tritici, 25
Torrubia, 291
Trametes mollis, 65, 161, 361
 pini, 320
Tremella albida, 66
 foliacea, 66
 mesenterica, 66
 tubercularia, 66
Tremellodon gelatinosum, 155
Trichia chrysosperma, 66
Trichobasis oblongata, 66, 275
 rubigo-vera, 88
 suaveolens, 87
Tricholoma flavobrunneus, 63
 saponaceus, 63, 376
 sulphureus, 155
 virgatus, 376
Trichoscypha coronata, 67, 159
Trochila craterium, 67, 140
 lauro-cerasi, 67, 284
Tubercularia vulgaris, 68, 89
Tubulina cylindrica, 66
Typhula erythropus, 66

Uredo hypericorum, 126
 intrusa, 87
 potentillæ, 87
 rhinanthacearum, 88, 275
 tussilaginis, 88
 vacciniorum, 66
Urocystis anemones, 26, 66
 pompholygodes, 26
Uromyces alchemillæ, 87
 fabæ, 284
 polygoni, 118
 scillarum, 164
 trifolii, 275
Ustilago antherarum, 25
 carbo, 25
 caricis, 25
 longissima, 25, 88
 receptaculorum, 285
 Salveii, 25
 segetum, 25
 urceolorum, 25
 utriculosa, 25
 violacea, 25
Ustilina vulgaris, 155, 291

Volvaria speciosa, 110

Xylaria hypoxylon, 67, 89

LICHENES.

- Cetraria aculeata*, 87, 118, 152
Cladina rangiferina, 87, 142
 uncialis, 142
Cladonia cervicornis, 87
 pyxidata, 87

Evernia prunastri, 87

Lecanora atra, 87, 270
 ferruginea, 87
 parella, 87, 270
 sulphurea, 87
Lecidea aromatica, 270
 carneo-lutea, 284
 cupularis, 284
 decolorans, 87
Lichina confinis, 142
 pygmæa, 142

Parmelia conspersa, 87
 fuliginosa, 87
 olivacea, 87
 omphalodes, 87
 perlata, 87
 physodes, 87
 saxatilis, 87
 scortea, 87, 270
 tristis, 152
Peltidea aphthosa, 165
Peltigera canina, 87
 horizontalis, 165
 rufescens, 87
Pertusaria dealbata, 87
Physcia aquila, 142, 271
 parietina, 142, 270
Placodium murorum, 87

Ramalina fraxinea, 87
Rhopoglyphus filicinus, 164
Ricasolia lætevirens, 284

LICHENES.

- Sphærophoron compressum*, 126
 coralloides, 87
Sphinctrina turbinata, 284
Squamaria saxicola, 87
Stereocaulon coralloides, 87

Usnea barbata, 87

ALGÆ.
Aphanothece stagnina, 272
Ascophyllum Mackaii, var.
 Robertsoni, 376

Batrachospermum moniliforme,
 123
Bonnemaisonia asparagoides, 172,
 293
Botrydium granulatum, 280

Chroolepus aureus, 161

Fucus ceranoides, 271
 nodosus, 80

Halicystis ovalis, 174, 295

Laminaria bulbosa, 80, 81
 digitata, 81
Lithothamnion coralloides, 174
 var. *sub-simplex*, 174

Melobesia, 220

Ptilota asplenioides, 393
 filicina, 393

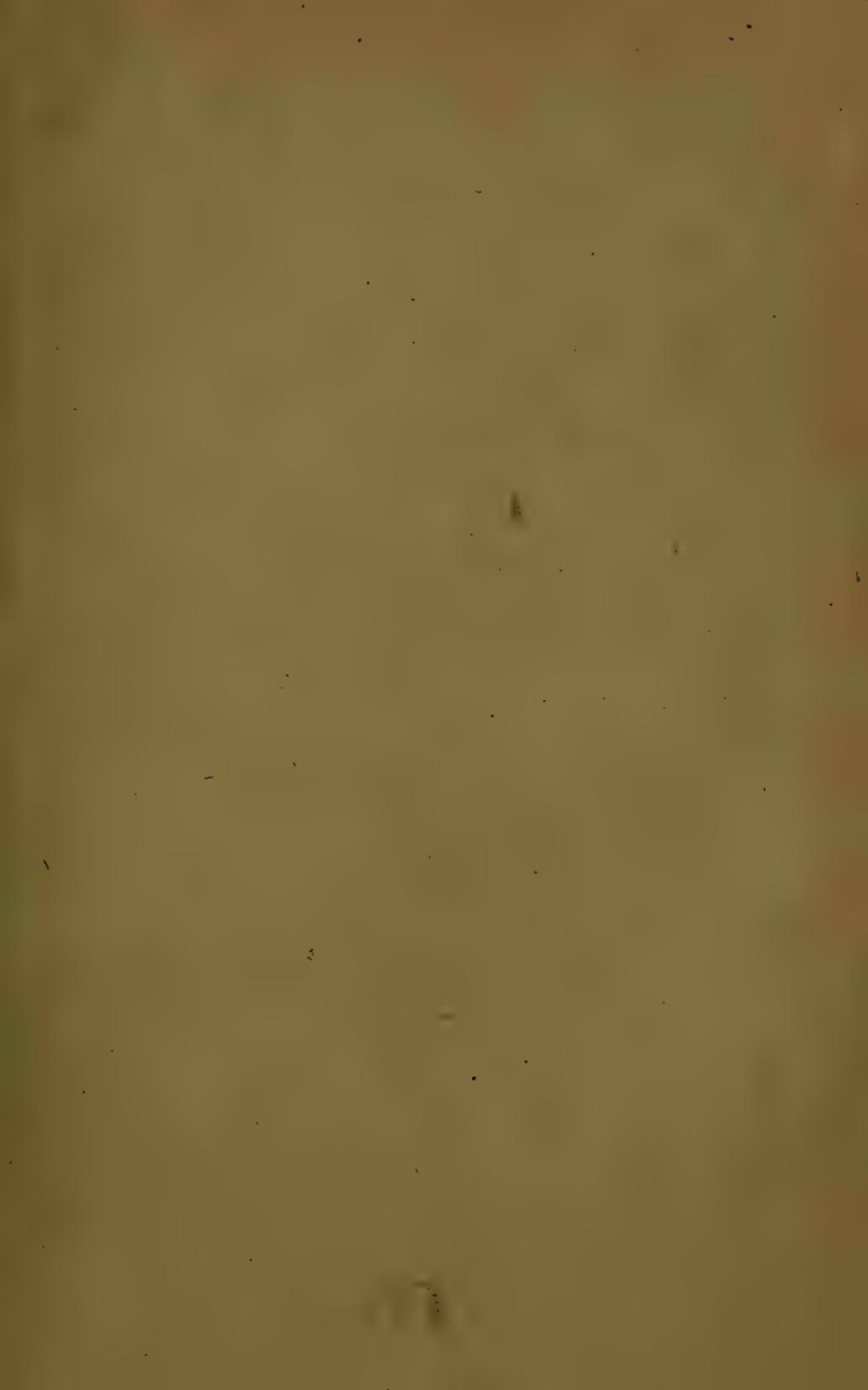
Sargassum bacciferum, 300

Volvox minor, 391

Presd

15 JUN. 97.





PUBLICATIONS

OF THE

NATURAL HISTORY SOCIETY OF GLASGOW.

PROCEEDINGS—

Vol. I.	Part 1.	228 pp.	3 Plates.	1859-68.	(Out of print.)
"	"	2.	4 "	1865-69.	(Out of print.)
Vol. II.	Part 1.	164 pp.	1 "	1869-71.	Price 3/6.
"	"	2.	2 "	1871-75.	" 4/6.
This Part contains Titles and Contents for Vols. I. and II.					
Vol. III.	Part 1.	100 pp.	-	1875-76.	" 2/3.
"	"	2.	2 Plates.	1876-77.	" 2/.
"	"	3.	1 "	1877-78.	" 3/6.
This Part contains Title and Contents for Vol. III.					
Vol. IV.	Part 1.	114 pp.	4 Plates.	1878-79.	(Out of print.)
"	"	2.	2 "	1879-80.	Price 4/6.
This Part contains Title and Contents for Vol. IV.					
Vol. V.	Part 1.	154 pp.	2 Plates.	1880-81.	" 4/.
"	"	2.	3 "	1881-82.	" 3/.
"	"	3.	71 pp.	1882-83.	" 2/.
This Part contains Title and Contents for Vol. V.					

INDEX TO PROCEEDINGS, Vols. I. to V. - - - 1851-83. Price 3/.

PROCEEDINGS AND TRANSACTIONS (New Series)—

Vol. I.	Part 1.	136 pp.	-	1883-84.	Price 3/.
"	"	2.	3 Plates.	1884-85.	" 4/6.
"	"	3.	3 "	1885-86.	" 5/6.
This Part contains Title and Index for Vol. I.					
Vol. II.	Part 1.	182 pp.	2 Plates.	1886-87.	" 4/6.
"	"	2.	1 "	1887-88.	" 6/.
This Part contains Title and Index for Vol. II.					
Vol. III.	Part 1.	112 pp.	1 Plate.	1888-89.	" 3/.
"	"	2.	1 "	1889-90.	" 3/.
"	"	3.	-	1889-92.	" 4/6.
This Part contains Titles and Index for Vol. III.					
Vol. IV.	Part 1.	158 pp.	1 Plate.	1892-94.	" 4/.
"	"	2.	2 Plates.	1894-95.	" 4/.
"	"	3.	3 "	1895-96.	" 4/.
This Part contains Title and Index for Vol. IV.					

THE FAUNA OF SCOTLAND, with special reference to Clydesdale and the Western District:

Mammalia.	By E. R. Alston, F.Z.S., F.L.S.,	- - -	Price 1/6.
Crustacea—Part I. Ostracoda.	By David Robertson, F.L.S., F.G.S.,	- - -	Price 1/6.
Hymenoptera—Part I.	By Peter Cameron, F.E.S.,	- - -	" 1/6.
"	" II. " " "	- - -	" 1/6.

THE DECAPOD AND SCHIZOPOD CRUSTACEA OF THE FIRTH OF CLYDE. By J. R. Henderson, M.B., F.L.S., - - - Price 2/.

A CONTRIBUTION TOWARDS A CATALOGUE OF THE AMPHIPODA AND ISOPODA OF THE FIRTH OF CLYDE. By David Robertson, F.L.S., F.G.S., - - - Price 3/6.

A FURTHER CONTRIBUTION TOWARDS A CATALOGUE OF THE AMPHIPODA AND ISOPODA OF THE FIRTH OF CLYDE AND WEST OF SCOTLAND. By David Robertson, F.L.S., F.G.S., - - - Price 1/6.

A CONTRIBUTION TOWARDS A NEUROPTEROUS FAUNA OF IRELAND. By James J. F. King, F.E.S., - - - Price 1/6.

A CATALOGUE OF THE BRITISH TENTHREDINIDÆ. By Peter Cameron, F.E.S., - - - Price 1/.

Printed on one side of the paper, for the use of Collectors.

NOTES ON THE FAUNA AND FLORA OF THE WEST OF SCOTLAND, with Lists. Compiled for the Meeting of the British Association, Glasgow, September, 1876. Small 8vo, - - - (Out of print.)

Copies of any of the above may be had from the Hon. Librarian, Mr. JAMES MITCHELL, 222 Darnley Street, Pollokshields, Glasgow.

