James Grieve Lorrain

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PREFACE.

THE SCOTTISH NATURALIST having now completed the second year of its existence, the Editor avails himself of the conclusion of the first volume to congratulate his friends—the contributors and subscribers—and himself on the amount of success that their magazine has attained.

In the matter of contributions, suggestions have been made that more papers of a "popular" nature should be introduced. The Editor has no objections to insert such papers, always provided that science and truth be not relinquished (as is too often the case) for the sake of "popularity." Complaints, too, have been received from some botanical readers, that their department is not sufficiently represented. While admitting that such is unfortunately the case, the Editor would suggest that the remedy lies in the complainers' own hands,—let them provide the papers, he will be only too happy to give them admission.

Financially *The Scottish Naturalist* has been also successful. Not only are all expenses of publication defrayed, but, if subscribers would kindly remember that their subscriptions are *due in advance*, there would be a sufficient surplus to allow of more frequent illustrations, or even of an increase of size without an increase of price.

In returning thanks for all the kind assistance received, the Editor hopes that the supporters of the magazine will continue their help, and endeavour to increase the circulation more and more.

September, 1872.

INDEX.

	Page		Page
PREFACE,	iii.		
GENERAL INDEX	v.	SPECIAL INDEX—	
SPECIAL INDEX—	xi.	Plants	xvii.
Mammals	xi.	GENERA, SPECIES, &c., NEW TO SCIENCE	xix.
Birds	xi	,, ,, SCOTLAND	xix
Fishes	xii	LIST OF CONTRIBUTORS	xx.
Molluscs	xii	ILLUSTRATIONS	xxi
Insects	xii	ERRATA	xxii
Crustacea	xvii		

GENERAL INDEX.

	Page
Acentropus niveus in Scotland	20
Additions to the Scottish Insect-Fauna	42
Address, Editorial	1
Affection of Polyommatus Artaxerxes for blue flowers	43
Albino Wild Duck	269
Allan-Water, On the "Yellow-fins" of the	227
Altitudes attained by certain plants, The	119, 160
Anacalypta latifolia in Perthshire, Occurrence of	272
Anthomyia Jacobææ	254
,, sonchi	209
Anticlea sinuata taken in Scotland	42
,, , Another Scottish locality for	215
Araucaria imbricata, Flowering of	96, 235
Arrival of the Squirrel in Sutherland	82
,, Swallow, Early	226
Association in Edinburgh, The British	129
Aster longifolius	23
Attraction for Moths, On Light as an	212
Baleen Whales of the North-east of Scotland, The	102
Bedeguar of the Rose, The	116
Bembidium paludosum near Glasgow	177
Betula	197
Birds at Aberdeen, Rare	226
,, in Aberdeenshire, Rare	154

Birds of Aberdeenshire 82
,, ,, , Notes on certain . . . 83
,, of the North-east of Aberdeenshire, The . . 47
,, in Fyvie, Aberdeenshire, Rare . . . 226
,, Extinction of rare 81
,, of the east of Fife, Rare 78
,, found at Rosslyn and neighbourhood . . 152
Bohemian Wax-wing in Aberdeenshire . . . 154
,, ,, in Fife 226
Bombus terrestris 19
Breeding of the Jacksnipe in Aberdeenshire . . 83
British Association in Edinburgh, The . . . 129
,, Species of Crambus, The . . . 135, 169

Capercaillie, The 43
,, Note on the 82
Capture of Noctua ditrapezium in Scotland . . 267
,, Noctua sobrina 42
,, Notodonta trepida 154
,, Xylophasia Zollikoferi . . . 267
Captures of Lepidoptera at Rannoch . . . 117
,, ,, Early 176
Carabus nitens 20
Cat suckling kittens, rabbits, and squirrels at one time, A . 155
Cats, Wild 155, 182
Cause of Deafness, Rare 212
Cerastium triviale var. alpinum 128
Chaffinch, Early singing of 182
Chœrocampa celerio 116
Coleoptera of Scotland, The . . . 202, 242, 277
,, the Scotch Fir, The . . . 36
Conyza squarrosa near Perth 272
Correction of Error 160
Corrections to list of Rosslyn Birds . . . 181
Cotton Gall of the Oak, The 117
Crambus myellus in Aberdeenshire . . . 117
,, The British Species of 135, 169
,, Warringtonellus 19
Crustacea of the north-east of Scotland, The Stalk-eyed . 182
Crymodes exulis, Note on the habits of . . . 266
Cucullia chamomillæ in Fife 116
Cynips lignicola 181, 266

Dasypolia templi, Capture of 20, 42
Deafness, Rare cause of 212
Deilephila livornica at Bridge of Allan . . . 268
Description of a Scottish Fungus new to Science . . 192
"Devonshire Woody Gall" of the Oak . . . 116

Diptera, Memoirs on Scottish 117, 209
Dog, Insanity in a 118
Domesticated Robins 268
Dyschirius æneus, Scottish locality for . . . 212

Early arrival of the Swallow 226
,, captures of Lepidoptera 176
Entomology, Popular 266
,, The Study of 249
Extinction of rare birds 81

Family, A happy 155
Flora, The Student's; (Review) . . . 21
Flowering of Araucaria imbricata . . . 235
Formica rufa and its Inhabitants, The Nest of . . 216, 258
Fungi 125
Fungus Feast 25
,, new to Science, Description of a Scottish . . 192
Flora of the north-east of Scotland, Recent additions to the . 272

Gall of the Oak, The Devonshire Woody . . . 116
,, The Cotton 117
Galls, Scottish 123, 156, 192, 234
,, in Scotland 154
,, Note on Leaf 266
General Information 20
Glaucous Gull, The 47
Greenland Shark, The 47
Grimmia, A new British 23

Habits of Crymodes exulis, Note on . . . 266
Happy Family, A 155
Helix lapicida near Hawick 268
" nemoralis, Reversed variety of . . 155
Hemiptera, Notes on Scottish 223, 263
Hybrid between Capercailzie and Black Grouse . . 96, 115
Hylophila prasinana, Note on the Sound made by . . 213

Improved Method of preparing plants for the Herbarium, An 270
Improvement of Loch Trout, A suggestion for the . . 94
Information, General 20
Insanity in a dog 118
Insecta Scotica, Introduction to . . . 161
Is a Parr a young salmon? 26

Jack-snipe in Aberdeenshire, Breeding of the . . 83

Lasciocampa potatoria, Note on . . . 176
Lepidoptera at Rannoch, Captures of . . . 117
,, Early captures of 176

Lepidoptera, Notes on 115
,, of Ayrshire, The 75
,, of Scotland . . . 162, 198, 238, 273
,, of the Scotch Fir, The . . . 86
Lepigonum rupestre in Scotland . . . 57
Leucopis obscura 256
Light as an attraction for moths, On . . . 212
Local Plant-names 128

Madness in Animals 49
Maigre at Aberdeen, The 58
Megachile centuncularis 222
Memoirs on Scottish Diptera . . . 177, 209, 254
Microscopical Puzzles 237
Misletoe in Scotland, The 73
Mixodia Bouchardana, New locality for . . . 176
Mollusca of the North-east of Scotland, The ; (Review) . 14
Monstrosity of Scabiosa succisa 128
Mosses found in the vicinity of Forres, List of . . 54, 88
Museum of Natural History, Bridge of Allan . . 94
,, Paisley Free 50

Natural Science Chairs in our Universities . . . 2, 60
Nest of Formica rufa and its Inhabitants, The . . 216, 258
Nesting of the Ptarmigan 112
New British Grimmia, A 23
Nidification of the Tree-Sparrow, Note on . . 19, 46
Noctua ditrapezium in Scotland, Capture of . . 267
,, sobrina, Capture of 42
Noctuæ occurring in Morayshire, List of . . . 16
Note on Acilius fasciatus 265
,, Lasciocampa potatoria 176
,, Leaf Galls 266
,, the habits of Crymodes exulis . . . 266
,, the record in Gray's "Birds of the West of Scotland" of the occurrence of the Little Crake . . 269
,, the sound made by Hylophila prasinana . . 213
Notes on Scottish Hemiptera 223, 263
,, Various . . . 93, 128, 160, 197, 236
Notodonta trepida, Capture of 154
Nuphar pumila 73

Occurrence of the Maigre at Aberdeen . . . 58
,, Vanessa polychloros in Scotland . . 267
On light as an attraction for Moths . . . 212
On the "yellow-fins" of the Allan-Water . . . 227
Ophiodes lunaris, Capture of 215
Origin of Species, The 98

Paisley Free Museum 50
Pararge Megæra 267
Peewit, The 50
Persistent Vitality of a Shark's Heart . . . 49
Plant-names, Local 128
,, Scottish 52
Polyommatus Artaxerxes, Habit of . . . 43
Popular Entomology 266
Preparing plants for the Herbarium, An improved method of . 270
Ptarmigan, Nesting of 112
Puzzles, Microscopical 237
Pyrochroa pectinicornis 20, 43

Rainfall of Soctland, The 160
Rare birds at Aberdeen 226
,, ,, Fyvie, Aberdeenshire . . . 226
,, Cause of Deafness 212
Recent additions to the Flora of the North-east of Scotland . 272
Report on the Open-air Vegetation of the Edin. Royal Botanic Garden 95
Reversed variety of Helix nemoralis . . . 155
Reviews and Notices of Books :—
"A Gallovidian Encyclopedia," J. M'Taggart, 1824 . 53
"Botanical Exchange Club Report for 1871" . . 92
"Catalogue of the Mollusca of the counties of Aberdeen, Banff, and Moray, and of the neighbouring seas," R. Dawson, A.M. 14
"Feuille des Jeunes Naturalistes" . . . 197
"Grevillea" 197
"Handbook of British Fungi," M. C. Cook, M.A. . 125
"Journal of Botany" 237
"Journal of the Scottish Meteorological Society" . 160, 237
"List of Fungi collected near Forres," Rev. J. Keith, M.A. 125
"Petites Nouvelles Entomologiques" . . 197
"The Birds of Europe," Messrs. Sharp & Dresser . 93
"The Entomologist's Monthly Magazine," vol. 7 . 93
"The Student's Flora of the British Isles," J. D. Hooker, C.B., M.D. 21
Rose, The Bedeguar of the 116
Rosslyn Birds, Correction to list of . . . 181

Scabiosa succisa, Monstrosity of . . . 128
Scotch Fir, The Coleoptera of 36
,, The Lepidoptera of . . . 86
Scotland, The Coleoptera of . . . 202, 242, 277
,, The Lepidoptera of . . . 162, 198, 238, 273
Scottish Diptera, Memoirs on . . . 177, 209, 254
,, Form of Zygæna exulans, The . . . 174
,, Fungus new to Science, Description of a . . 192
,, Galls 123, 156, 192, 234

Scottish Hemiptera, Notes on 223, 263
,, Locality for Anticlea sinuata, Another . . 215
,, ,, Dyschirius æneus . . . 212
,, Plants, Notes on 92, 157
Scottish Societies, Proceedings of—
Aberdeen Natural History Society . . . 58
Alloa Society of Natural Science and Archæology . 28
Botanical Society of Edinburgh . . . 59, 95
Dundee Microspical Society . . . 27
Geological Society of Glasgow . . . 27
Natural History Society of Glasgow . . 26
Perth Literary and Antiquarian Society . . 60
Perthshire Society of Natural Science . . 24, 60, 96
Royal Physical Society of Edinburgh . . 26
Scottish Spiders 191
Sesia bembeciformis in Fife 154, 176
,, philanthiformis in Aberdeenshire . . . 87
Sound made by Hylophila prasinana, Note on . . 213
Species, The Origin of 98
Sperm-Whale of the north-east of Scotland, The . . 142
Sphinx convolvuli in Orkney 118
Spiders, Scottish 191
Squirrel in Sutherland, Arrival of the . . . 82
Squirrels 19
,, in the north of Scotland . . . 49
Stalk-eyed Crustacea of the north-east of Scotland, The . 182
Steganoptycha augustana, Capture of . . . 176
Student's Flora, The; (Review) . . . 21
Study of Entomology, The . . . 249
Sugaring—How, When and Where to do it . . 29
Sugaring near Paisley 18
Suggestion for the Improvement of Loch Trout, A . . 94
Swallow, Early arrival of 226

Tetraonidæ of Perthshire, The 112
Trechus longicornis, Capture of . . . 212
Tree-sparrow, Note on the nidification of . . . 19, 46
Trout, A suggestion for the Improvement of Loch . . 94

Vanessa Antiopa in Aberdeenshire . . . 267
,, ,, Berwickshire . . . 266
,, ,, Forfarshire 267
,, ,, Morayshire 267
,, ,, Perthshire 266
Various notes . . . 93, 128, 160, 197, 236

Wax-wing in Aberdeenshire, Bohemian . . . 154
,, Fife, ,, . . . 226
Whale of the North-east of Scotland, The Sperm . . 142

Whales of the North-east of Scotland, The Baleen . . 102
Wild Cats 155
Wild Duck, Albino 269
Wilson's American Ornithology, Original Drawings of . 51
Wood Warbler, The 269
Work and Influence of Local Natural History Societies . 9

Xylophasia Zollikoferi, Capture of . . . 267

"Yellow-fins" of the Allan-Water, On the . . 227

Zelleria, A new British 176
Zoophytes from the North-east of Scotland, Hydroid . 190
Zygæna exulans, The Scottish form of . . . 174

SPECIAL INDEX.

MAMMALS. Page

Balæna biscayensis . 104
,, mysticetus . 102
Balænoptera musculus . 105
,, rorqual . 108
,, rostrata . 110
,, Sibbaldii . 106, 108
,, sulcata . 108
Broad-nosed Whale . 108
Cachalot . . 142
Dog . . . 118
Greenland Whale . 102
Johnston's Humpbacked Whale 105
Megaptera longimana . 104, 149
Physalus antiquorum . 104, 105
Physeter cotodon . 146
,, macrocephalus 142
,, microps . 146
,, tursio . . 147
Pike Whale . . 110
Razor-backed Whale . 105
Sperm Whale . . 142
Squirrel . . 19, 49, 82
Wild Cat . . 155, 181

BIRDS.

Bernicle Goose . . 80
Black-bird (albino) . 269
Black-cap . . 85
Black-cap Warbler . 226
Black Grouse . . 113
Black Tern . . 26
Blue-throated Redstart .
Bohemian Wax-wing . 154, 226
Capercaillie . 43, 82, 114
Chaffinch . . 182
Common Bittern . 79
Dotterel . . 79
Fieldfare . . 181
Forked-tailed Petrel . 81
Fringilla spinus . . 181
Fulmar Petrel . . 81
Glaucous Gull . . 47
Golden Eagle . . 85
Goosander . . 80
Grasshopper Warbler . 84
Great Grey Shrike . . 79
,, Northern Diver . 81
,, Plover . . 79
,, Shrike . . 85
,, Snipe . . 154
,, Spotted Woodpecker 79, 154
Greater Willow-wren . 85
Greenshank . . 80, 83
Green Woodpecker . 47
Heron . . . 82
Honey Buzzard . . 79
Jacksnipe . . 83, 181
Jay . . . 79
Little Bustard . . 79

Little Crake . . 269
Peewit . . . 50
Peregrine Falcon . 78
Pied Flycatcher . 84, 226
,, Woodpecker . 85
Pink-footed Goose . 80
Pintailed Duck . . 80
Ptarmigan . . 112
Purple Sandpiper . 26, 80
Red Grouse . . 113
Red-backed Shrike . 79
Red-necked Grebe . 81
,, Phalarope . 26
Redwing . . 181
Robin . . . 268
Rose-coloured Pastor . 79
Shore Lark . . 79
Shoveler . . 80
Siskin . . . 82
Smew . . . 80
Spotted Crake . . 85
Storm Petrel . . 81
Swallow . . 226
Tree-Sparrow . 19, 46, 82
Turtle Dove . . 85
Water Rail . . 85, 226
White-tailed Eagle . 78
Wood Lark . . 83
,, Warbler . . 226
Wild Duck (albino) . 269

FISHES.

Greenland Shark . 48
Hirling . . . 229
Loch Trout . . 94
Maigre . . . 58
Salmo brachypoma . 229
,, fario . . 232
,, salar . . 232
,, trutta . . 229
Salmon . . . 26
Whitling . . 233
"Yellow-fin" . . 227

MOLLUSCS.

Helix lapicida . . 268
,, nemoralis (reversed var.) 155
Limnæa glabra . . 26
Littorina rudis . . 16
Lucina pennsylvanica, . 15
Mytilus edulis, . . 15
Pecten islandicus, . 14
Purpura lapillus, . 15
Solen siliqua, . . 15
Tellina calcarea, . . 14

INSECTS.

*Those marked * occur in 'Insecta Scotica.'*

Coleoptera.

Acanthocinus ædilis . 41
Acilius fasciatus . . 265
* Acupalpus . . 279
Agathidium nigrinum . 38
,, rhinoceros . 38
,, rotundatum 38
Aleochara fungivora . 42
* Amara . . 248, 277
,, Quenseli . 42
Anacœna variabilis . 42
* Anchomenus . . 245
* Anisodactylus . . 278
Anthonomus varians . 40
Asemum striatum . 41
Athous undulatus . 38
* Badister . . 243
Baptolinus alternans . 37
Bembidium paludosum . 177
Blastophagus piniperda . 40
* Blethisa . . 205
Brachonyx indigena . 41
Brachyderes . . 42
* Bradycellus . . 279
* Broscus . . 243
* Calathus . . 244
* Carabidæ . . 204
* Carabus . . 206
,, nitens . 20
Cetonia floricola . 261
Ceuthorhynchus sulcicollis 234
* Chlænius . . 244
* Cicindela . . 204
* Cicindelidæ . . 204
* Clivina . . 207
Clythra 4-punctata . 261
* Cychrus . . 205
* Cymindis . . 243

Dendrophagus crenatus . 39
Dendrophilus pygmæus . 261
*Dichirotrichus . . 278
Dinarda Mäerkeli . 261
*Dromius . . 208
*Dyschirius . . 208
,, æneus . 212
*Elaphrus . . 205
Elater tristis . . 39
Epuræa angustula . 38
,, oblonga . 38
,, pusilla . . 38
Ernobius mollis . . 40
,, nigrinus . 40
Eros aurora . . 39
Gymnetron campanulæ . 158
*Harpalus . . 278
Homalium brevicorne . 42
,, inflatum, . 37
,, pineti, . 37
,, pusillum, . 37
Homolota anceps, . 261
,, flavipes, . 261
,, talpa, . . 261
Hylastes ater, . . 40
" palliatus, . 40
Ips ferrugineus . . 38
,, 4-pustulatus . 38
Lathrobium angusticolle 212
*Lebia . . . 242
*Leistus . . 207
Leptacinus formicetorum 261
Liodes castaneus . 38
,, glaber . . 38
*Loricera, . . 243
Magdalinus duplicatus . 40
,, Heydenii . 40
*Metabletus . . 242
*Miscodera . . 243
Monotoma conicicollis . 261
Mymedonia canaliculata 261
,, humeralis . 261
Myrmetes piceus . 261
*Nebria . . . 206
*Notiophilus . . 204
Ocalea latipennis . 42
*Olisthopus . . 246
Oxypoda formiceticola . 261
,, hæmorrhoa . 261
,, longipes . 42
*Patrobus . . 280
*Pelophila . . 207
Philonthus rufipennis . 280
Pissodes notatus . 41
,, pini . . 41
Placusa denticulata . 42
,, pumilio . 37
*Pogonus . . 280
*Pristonychus . . 244
*Pterostichus . . 246
Pteryx suturalis . 38
Ptilium myrmecophilum 261
Pyrochroa pectinicornis . 20, 4£
Pytho depressus . 40
Quedius brevis. . . 261
,, lævigatus . 37
,, xanthopus . 37
Rinomacer attelaboides . 41
Rhizophagus ferrugineus 39
,, depressus . 39
Rhyncolus chloropus . 40
* Sphodrus . . 243
* Stomis . . 246
* Taphria . . 244
Thanasimus formicarius . 39
Thyasophila angulata . 261
Tomicus nigritus . 42
Trechus longicornis . 212
Xantholinus distans . 42
,, lentus . 37
Xyloterus lineatus . 40

Diptera.

Anthomyia Jacobææ . 254
,, lactucarum . 211
,, sonchi . 209
Cecidomyia campanulæ 158
,, floricola . 157
,, marginemtorquens, 193
,, veronicæ . 158
,, ulmariæ . 196
,, urticæ . 159
Cheilosia chalybeata . 177
,, flavicornis . 180

Cheilosia ruficornis . 177
,, scutellata . 180
Diplosis botulariæ . 197
Hormomyia juniperina . 104
,, piligera . 235
Leucopis obscura . 256

Hemiptera.

Adelges abietis . . 235
,, corticalis . 256
,, piceæ . . 256
,, strobilobius . 235
Ætorhinus bilineatus . 224
Agalliastes Wilkinsoni . 225
Bryocoris pteridis . 225
Dipsocoris alienum . 223
Idolocoris pallicornis . 224
Teratocoris Saundersi . 226
,, viridis . 225
Miris calcaratus . 264
,, holsatus . . 264
,, lævigatus . 264
,, ruficornis . . 265
Monanthia cardui . 265
,, humuli . 265
Piezodorus purpureipennis 264
Piezostethus formicetorum 260
Ulopa obtecta . . 263

Hymenoptera.

Andricus curvator . 234
,, ramuli ("Cotton Gall") 117
Aulax sabaudi . . 196
Bombus lucorum . 19
,, terrestris . 19
Cynips divisa . . 234
,, gemmæ . . 234
,, Kollari . . 117
,, lignicola (Kollari) 181 234
Formica congerens . 222
,, rufa . . 222
Megachile centuncularis 222
Nematus saliceti . 197
Neuroterus lenticularis . 196
,, numismatis . 196
Rhodites eglanteriæ . 196
,, rosæ . . 196
,, spinosissimæ . 196
Sirex . . . 266
Spathegaster baccarum (galls on upper side of leaf) 266
Teras terminalis . 235

Lepidoptera.

Abraxas grossulariata . 28
Acentropus niveus . 20
Anarta cordigera . 18
Anisopteryx æscularia . 116, 176
* Anthocharis cardamines 75, 240
Anticlea sinuata . 42, 215
Aplecta herbida . 118, 154
,, occulta 18, 19, 117, 118
* Aporia cratægi . 240
Arctia caja . . 213
* Argynnis Adippe . 168
* ,, Aglaia . 77, 168
* ,, Euphrosyne . 77, 168
* ,, Niobe . 198
* ,, Pales . 198
* ,, Paphia . 198
* ,, Selene . 77, 168
Asphalia flavicornis . 176
Boarmia abietaria . 86
Cedestis farinatella . 87
,, Gysselinella . 87
Chesias obliquaria . 116, 118
Cidaria suffumata var. . 118
* Cænonympha Davus, 76, 117 201
* ,, Laidion 202
* ,, Pamphilus, 76 201
* ,, Tiphon . 201
* ,, ,, ab. Isis 202
* ,, ,, var. Philoxenus 201
* ,, Typhon 202
* Colias Edusa . . 75, 241
* ,, Palæno . 240
Crambus alienellus . 139
,, alpinellus . 137
,, cassentiniellus 140
,, cerusellus . 137
,, chrysonuchellus 141
,, conchellus . 169
,, contaminellus . 172
,, craterellus . 140
,, culmellus . 171

Crambus deliellus . 173
,, dumetellus . 139
,, ericellus . 138
,, extinctellus . 138
,, falsellus . 136, 141
,, fascelinellus . 136, 171
,, fulgidellus . 170
,, furcatellus . 170
,, geniculeus . 172
,, hamellus . 138
,, Heringiellus . 139
,, hortuellus . 136, 140
,, inquinatellus . 171
,, jocundellus . 171
,, latistrius . 170
,, lithargyrellus . 174
,, luctiferellus . 170
,, luteellus . 173
,, maculalis . 141
,, margaritellus, 117, 136 170
,, ,, var. anglicanus 170
,, myellus . 117, 169
,, mytilellus . 169
,, pascuellus . 138
,, pedriolellus . 171
,, perlellus . 171
,, permutatellus . 170
,, pinellus . 136, 169
,, pinetella . 169
,, pratellus . 136, 139
,, pyramidellus . 170
,, radiellus . 171
,, ramosellus . 171
,, rhombellus . 169
,, rorella . 140
,, rostellus . 174
,, selasellus . 173
,, speculalis . 170
,, spuriellus . 171
,, sylvellus . 138
,, tristellus . 173
,, truncatellus . 141
,, uliginosellus . 139
,, Warringtonellus 19, 174
Crymodes exulis . 266
Cucullia chamomillæ . 116
Cymatophora flavicornis 17, 176
Dasydia obfuscata 115, 117, 118
Dasypolia templi 20, 42, 213
Deilephila galii . . 24
,, livornica . 268
Ellopia fasciaria . 86
,, prosapiaria . 86
Epigraphia avellanella . 176
* Erebia Æthiops . 238
* ,, Blandina 76, 117, 238
* ,, Cassiope . 238
* ,, Epiphron . 238
* ,, Euryale . 239
* ,, lappona . 238
* ,, Ligea . . 239
* ,, Medusa . 239
Eupithecia abietaria . 87
,, indigata . 86
,, lanceata . 87
,, togata . 87
Fidonia conspicuata . 117
,, pinetaria . 117
,, piniaria . 86
Gelechia confinis . 42
Gnophos obscuraria . 115
Grapholitha coniferana . 87
,, cosmophorana 87
,, tedella . 87
Heliothis marginata . 18, 24
* Hepialus ganna . 276
* ,, hecta . . 276
* ,, humuli . 275
* ,, ,, var. hethlandica 275
* ,, lupulinus . 276
* ,, sylvinus . 275
* ,, velleda . 276
* ,, ,, ab. gallicus 276
* Hesperia comma . 275
* ,, linea . 274
* ,, lineola . 275
* Hesperia sylvanus . 275
* ,, Thaumas . 274
Hybernia leucophæaria . 176
Hylophila prasinana . 213
,, quercana . 213
Lasiocampa potatoria . 176
* Lasiommata Egeria . 75, 199
* ,, Megæra . 75, 200

* Lycæna Ægon . 273
* ,, Argiolus . 273
* ,, Alexis . 78, 241
* ,, Alsus . . 78, 241
* ,, Artaxerxes . 241
* ,, Astrarche . 241
* ,, Icarus . 241
* ,, Medon . 241
* ,, minima . 241
Macaria liturata . 86
Melanthia rubiginata var. plumbata . . 117
* Melitæa Artemis 77, 117, 167
* ,, Aurinia . 167
Myrmecocela ochraceella 259
* Nemeobius Lucina . 239
Noctua depuncta . 17, 24
,, ditrapezium . 267
,, sobrina . . 42, 117
Nonagria fulva . 17, 19, 21£
,, lutosa . . 118
Notodonta trepida . 154
Ocnerostoma piniariella . 87
Œcophora similella . 87
Ophiodes lunaris . 215
* Pararge Ægeria var. Egerides 199
* ,, Megæra . 200, 267
* Parnassius Apollo . 240
* Pieris brassicæ . 75, 239
* ,, napi . . 75, 240
* ,, rapæ . . 75, 239
Phigalia pilosaria . 118 176
Phlogophora meticulosa 18, 19, 42, 213
Phycis abietella . . 87
* Polyommatus Artaxerxes 42, 78, 241
* ,, Phlæas . 75, 273
Retinia duplana . . 87
,, resinella . 87
Sarrothripa revayana . 176
* Satyrus Hyperanthus . 76, 201
* ,, Hyperantus . 201
* ,, ,, ab. Arete 201
* ,, Janira . 75, 200
* ,, ,, var. splendida 200
* ,, Semele . 75, 200
* Satyrus Tithonus . 76, 200
Scopula ferrugalis . 118
Selenia illustraria . 117
Sesia bembeciformis . 54, 176
,, philanthiformis . 24, 87
Smerinthus ocellatus . 117
Sphinx convolvuli . 118
Spilodes sticticalis . 118
Steganoptycha augustana 176
,, Bouchardana 87, 176
,, cruciana 176
,, Ratzeburgiana 87
Swammerdamia nanivora 42
* Syrichtus alveolus . 274
* ,, malvæ . 274
Tæniocampa cruda . 176
Tephrosia crepuscularia 115
*Thanaos Tages . 78, 274
*Thecla quercus 77, 115, 274
* ,, rubi . 77, 115, 273
Thera firmata . . 87
,, variata . . 87
Trachea piniperda 18, 19, 86, 176
Trichiura cratægi . 117
Triphæna orbona, var. Curtisii 118
*Vanessa Antiopa 199, 266, 267
* ,, Atalanta . 76, 199
* ,, cardui . 76, 199
* ,, Io . . 76, 198
,, polychloros . 267
* ,, urticæ . 77, 198
Xylophasia Zollikoferi . 267
Zelleria saxifragæ . 176
Zygæna exulans . 174
,, ,, var. subochracea 175
,, ,, var. vanadis 175

SPIDERS AND MITES.

Batoneus populi . 155
Clubiona reclusa . . 191
Epeira bella . . 191
,, prominens . 191
Linyphia cauta . . 191
,, circumspecta . 191
,, crypticolens . 191
,, decolor . 191
,, ericæa . 191

Linyphia gracilis . 191
Oribata geniculata . 155
Theridion . . 191
Walckenæra depressa . 191
,, nemoralis 191
,, nudipalpis 191
,, punctata 191

CRUSTACEA.

Acanthocaris . . 185
,, Livingstoneana 185
Gammarus pulex . 94
Rhoda . . . 187
,, Jardineana . 187
Thysanoessa aberdonensis 188

PLANTS.

Those marked † occur in the lists of Scottish Galls.

† Abies communis . 194, 235
† Achillea millefolium . 157
† ,, ptarmica . 157
Agaricus campestris . 25, 26,
,, procerus . 26
,, rubescens . 26
Allium carinatum . 93
† Alnus glutinosa . 194
Amanita strobiliformis . 25
Anacalypta latifolia . 272
Araucaria imbricata . 96, 235
Aster brumalis . . 23
,, longifolius . 23
,, novi-belgii . 23
,, prenanthoides . 23
,, puniceus . . 23
,, salignus . . 23
Betula humilis . . 197
,, intermedia . 197
,, nana . . 197
Bird-cherry . . 54
Boletus edulis . . 25, 26
† Brassica oleracea . 195, 235
Bullace . . 53
Bullister . . 53
Butomus umbellatus . 59
Campanula rapunculoides 23
† ,, rotundifolia . 157
Cantharellus cibarius . 25
† Carduus arvensis . 156
Carex aquatilis var. Watsoni 93, 272
Carsons . . 54
Centaurea jacea . 24
,, pratensis . 24
Cerastium triviale var. alpinum, 128, 272
Cheiranthus cheiri . 22
Chenopodium rubrum, var. pseudo-botryoides 92
Cleavers . . 53
Coltsfoot . . 53
Conyza squarrosa . 272
Coprinus comatus . 25
Cotton Thistle . . 54
Crab apple . . 54
Cranberry . . 53
Cratægus oxyacantha . 23
Cuscuta trifolii . . 92
† Cytisus scoparius . 195
Dishalago . . 53
Dodjell Reepan . 54
Doronicum pardalianches 160
Earth-nuts . . 53
Echium vulgare . 23
† Equisetum . 195, 235
Eriophorum alpinum . 160
Exobasidium vaccinii . 160
† Fagus sylvatica . 235
Fistulina hepatica . 127
Fows . . . 53
† Fraxinus excelsior . 158, 196
French Sourock . 53
† Galium boreale . 156
† ,, palustre . 156
† ,, verum . 156
Gall-busses . . 53
Geranium pyrenaicum . 23
Grimmia Ungeri . 23
Gowlans . . 53
Gowlins . . 53
Hagberry . . 54
Hech-how . . 53
Hemlock . . 53
Hesperis matronalis . 22
† Hieracium boreale . 157, 196
,, collinum . 92

Hieracium dubium . 92
,, pedunculatum 92
,, prælatum . 92
,, stoloniferum 92
Honeysuckle . . 54
Hornecks . . 53
House-leek . . 53
Hydnum repandum . 26
Juncus biglumis . 93
† Juniperus communis . 194
Lactarius deliciosus . 26
Lady's Clover . . 54
Lamium album . 22
Lepigonum marinum . 57
,, neglectum . 57
,, rupestre . 57
Lepiota procerus . 25
Ligustrum vulgare . 23
Linaria cymbalaria . 23
Listera nidus-avis . 23
Lychnis alpina . . 128
Maianthemum bifolium . 93
Malva rotundifolia . 22
Marasmius oreades . 25
Meadow-rocket . . 54
† Mercurialis perennis . 158
Monkshood . . 54
Moonog . . . 53
Morchella esculenta . 25
Mountain Ash . . 54
,, Flax . . 54
Mount Caper . . 54
Musk Thistle . . 54
Myrrhis odorata . . 23
Nasturtium sylvestre . 22
Nuphar pumila . . 93
Œnanthe pimpinelloides 24
Old Wives' Mutches . 54
Pasper . . . 53
Pimpinella magna . 24
† ,, saxifraga . 125
Pimroses . . 53
Pinguicula lusitanica . 23
Plumrocks . . 53
Potamogeton nitens . 93
Poterium sanguisorba . 23
Primrose . . 53
† Prunus communis . 124, 196
† Prunus padus . . 124
Pyrus malus . . 23
,, scandica . . 92
Ragwort . . 54
Reseda lutea . . 22
,, luteola . . 22
Rhamnus frangula . 23
Robin-rin-the-hedge . 53
Rosa arvensis . . 23
† ,, canina . . 124, 196
,, rubiginosa . . 23
† ,, spinosissima . 124, 196
Rumex conspersus . 93
,, hydrolapathum . 92
† Salix alba . . 159
† ,, arbuscula . 193
† ,, aurita . . 192
† ,, caprea . . 159
† ,, fragilis . . 159, 197
† ,, lapponum . 193
† ,, nigricans . 192
† ,, repens . . 192
† ,, viminalis . 193
Samphire . . 53
Saxifraga tridactylites . 23
Scabiosa succisa . 128
Scheuchzeria palustris . 25
Schœnus mariscus . 160
"Scotch Thistle" . 54
Scribe Tree . . 54
Sedum reflexum . 23
Sloe . . . 53
Solanum dulcamara . 23
Sourock . . . 54
Spear Thistle . . 54
† Spiræa ulmaria . 124, 196
Sweet-Gale . . 53
Symphytum officinale . 23
† Thymus serpyllum . 158
Tormentil . . 54
† Trifolium repens . 195
† Triticum junceum . 195
† ,, repens . 194
† Urtica dioica . . 159
Utricularia minor . 23
† Vaccinium vitis-idæa . 158, 160
Venturia atramentaria . 192
,, Dickei . 192

Venturia myrtilli . 192
Verbascum thapsus . 23
† Veronica chamædrys . 158
† Vicia sepium . . 124
† Viola canina . . 124
Weeby . . . 54
Woodbine . . 54
Wood-sorrel . . 54

LIST OF NEW GENERA, &c., described in this Volume.

INSECTS.

Diptera.

Anthomyia Jacobææ *Hardy* 254
,, sonchi *Hardy* 209

Hemiptera.

Teratocoris viridis *D. & S. (fem.)* 225

Lepidoptera.

† Crambus hortuellus *H.*, ab. fuscescentellus *Buchanan White* . . 140
† Crambus margaritellus *H.*, var. anglicanus *Buchanan White* . . 170
Epinephele Janira *L.*, var. (and ab.) splendida *Buchanan White* 200
Zygæna exulans *Hchwh.*, var. subochracea *Buchanan White* . . 175

CRUSTACEA.

ACANTHOCARIS *Sim* . 185
A. Livingstoneana *Sim* . 185
RHODA *Sim* . . 187
R. Jardineana *Sim* . 187
Thysanoessa aberdonensis *Sim* 188

PLANTS.

Venturia atramentaria *Cooke* 192

† *Described but not named before.*

ADDITIONS TO THE SCOTTISH FAUNA AND FLORA brought forward in this Volume.

*Those marked * are additions to the British list.*

BIRDS.

Sylvia suecica . . 226

MOLLUSCS.

Helix lapicida . . 268

INSECTS.

Coleoptera.

Dinarda Märkeli . 261
Myrmetes piceus . 261
Quedius brevis . . 261
Trechus longicornis, . 212

Diptera.

* Anthomyia Jacobææ . 254
* ,, sonchi . 209
Leucopis obscura . 256

Hemiptera.

Monanthia humuli . 265
* Piezostethus formicetorum 260
* Teratocoris viridis *(female)* 225
* Ulopa obtecta *(winged)* 263

Hymenoptera.

Andricus curvator . 234
,, ramuli, (Cotton Gall) 117
Cynips lignicola (Kollari) 116
Rhodites eglanteriæ . 196
,, spinosissimæ . 196

Lepidoptera.

Anticlea sinuata . 42
* Epinephele janira, var. splendida . . 200
Noctua ditrapezium . 267

Ophiodes lumaris . 215
Steganoptycha augustana 167
Vanessa polychloros . 267
Xylophasia Zollikoferi . 267
* Zelleria saxifragæ . 176
* Zygæna exulans, var. subochracea . . 175

SPIDERS.

Clubiona reclusa . 191
Epeira prominens . 191
Linyphia cauta . . 191
,, circumspecta . 191
,, crypticolens . 191
,, decolor . 191
,, ericæa . . 191
Walckenæra depressa . 191
,, nemoralis . 191
,, nudipalpis . 191
,, punctata . 191

CRUSTACEA.

* Acanthocaris . . 185
* A. Livingstoneana . 185
* Rhoda. . . 187
* R. Jardineana . 187
* Thysanoessa aberdonensis 188

PLANTS.

* Cerastium triviale, var. alpinum 128
Lepigonum rupestre . 57
* Venturia atranentaria, . 192

LIST OF CONTRIBUTORS.

Barrett, C. G. . . 163
Birchall, E. . . 163
Bloomfield, Rev. E. N., M.A. 35
Bold, T. J. . . 212
Bond, F., F.Z.S. . 163
Britten, J., F.L.S. . 128
Brown, J. A. Harvie . 46, 82
Buckler, W. . . 35, 166
Burnett, S. M. . . 83
Buxton, E. C. . . 163
Cameron, P. . 177, 265, 266
Cameron, W. . . 163
Chapman, Algernon, M.D. 163
Chapman, T. . . 163
Cooke, M. C., M.A. . 192
Cooke, N. . . 163
Cooper, J. . . 163
Dale, J. C., M.A., F.L.S. 163
Davidson, A. . . 163
Doubleday, Henry . 181
Drummond Hay, Col. H. M. 269, 270
Duncan, J. P. . . 75, 163
Duncanson, J. J. Kirk, M.D. 212
Dunsmore, J. 18, 163, 176, 204
Forbes, H. O. 47, 116, 190
Fraser, Rev. J., M.A. 235
Garrow, James 82, 154, 267
Gill, Battershell, M.D. 163
Gordon, Rev. G., LL.D. 19, 94, 163 204
Gray, Robert . . 43, 47
Gurney, J. H., jr., F.Z.S. 82, 269
Guthrie, A. . . 163
Guthrie, W. G. . 268
Hardy, J. 116, 163, 167, 181, 191 209, 254
Harker, J. Allen 9, 19, 20, 50, 73 249
Herd, W. . 20, 115, 155, 163
Hislop, R. . 20, 204, 212
Hodgkinson, J. B. . 163
Hutchinson, T. 42, 117, 163
Jamieson, Melville, jr. . 154
Jardine, Miss . . 163
Jardine, Sir W., Bart., F.R.S. 163
Jenner Fust, H., jr. . 163, 176
Keith, Rev. J., M.A. . 54, 88
Kelly, A. . . 163
Lamb, J. . . 163
Lennon, W. . . 163
Lindsay, W. Lauder, M.D., F.R.S.E., F.L.S. 2, 60
Lumsden, James . 269
Marshall, T. . . 163, 215
Meek, E. G. . . 163
Moncreiffe, Sir T., Bart. 163, 176

Morison, D. P. . . 163
Müller, Albert, F.L.S. . 266
M'Intosh, William C., M.D., F.R.S.E., F.L.S. 227
Norman, G. 16, 154, 163, 181, 182 267
Paterson, W. D., M.D. 163, 268
Paton, R. . . 112, 155
Peebles, J. W. . . 163
Robinson, W. Douglas 163, 226, 266
Roy, John . . 272
Scott, A. T. . . 116, 226
Sharp, D., M.B. 36, 43, 118, 202 242, 277
Shaw, W. . . 266
Sim, G. . 154, 182, 226
Sim, George . . 226
Sim, John . . 272
Simpson, A. . . 42, 163
Simson, W. B. . 267
Stainton, H. T., F.R.S., &c. 193
Stewart, James . . 43, 163
Stewart, John . . 163, 176
Syme, J. Boswell, LL.D., F.L.S. 20, 42, 116, 154, 163, 176
Thomson, J. . . 163
Traill, J. W. H., M.A. 48, 87, 117 118, 123, 155, 156, 163, 192, 212, 234, 267, 269
Walker, R., F.G.S.E. 78, 102, 142 222
Wedderburn, Lieut.-Col. J. M. 192 181
Wilson, A. . . 163
White, F. Buchanan, M.D. 29, 42 57, 86, 117, 119, 128, 135 157, 161, 169, 174, 176, 198, 204, 213, 216, 238, 258, 263, 266, 267, 273

ILLUSTRATIONS.

* **Plate I.**—North Sea, showing the 40 fathom line along the coasts of Scotland and north of England . 15

Plate II.
1. Balæna fœmina pinis et cauda sinuatis . 145
2. Balæna Macrocephala in faciem obversa, ut dorsum appareat 145
3. Eadem in latus decumbens . . 145
4. Pediculus ceti, Bocconi . . . 148
5. Vertebra. Front view . . . 151
6. ,, Side view . . . 151

Plate III. Map of Scotland showing the divisions adopted in the "Insecta Scotica" . . . 161

Plate IV.
A. 1. Rhoda Jardineana, Sim . , 187
2. External antennæ . . . 187
3. Tail 188
4. One of the first pair of feet . . 188
5. External pedipalps . . . 188
6. Eye 187

B. 1. Acanthocaris Livingstoneana, Sim . 185
2. External antennæ . . . 185
3. Second and succeeding pairs of feet . 186

* *In the 2nd Edition this plate does not appear.*

	4. Anterior margin of carapace and eye .	185
	5. Telson	186
	6 Posterior margin of carapace . .	185
	7. One of the first pair of feet . .	186
Plate V.	1. Thysanoessa aberdonensis, Sim . .	188
	2 Internal antennæ . . .	189
	3. One of the first pair of feet . .	189
	4. Tail	189
	5. External pedipalps . . .	189
	6. Carapace	188
	7. Form of second and succeeding pairs of feet	189
	8. External antennæ and scale . .	188
	9 Supposed additional species . .	189
Plate VI.	Microscopical puzzles . .	237

ERRATA.

Page		line		from		for	is to be	read	is not to be.
,,	48,	,,	5	,,	bottom,	,,	*Larneopoda*	,,	*Lerneopoda.*
,,	57,	,,	4	,,	,,	,,	*neglecta*	,,	*neglectum.*
,,	84,	,,	18	,,	top,	,,	*Gullinago*	,,	*Gallinago.*
,,	157,	,,	8	,,	,,	,,	Winnering	,,	Winnertz.
,,	158,	,,	7	,,	bottom,	,,	Brami	,,	Bremi
,,	160,	,,	3	,,	top,	,,	*Dorouicum*	,,	*Doronicum*
,,	160,	,,	19	,,	bottom,	,,	metereological	,,	meteorological.
,,	190,	,,	14	,,	top,	,,	6, one	,,	7, one.
,,	191,	,,	5	,,	bottom,	,,	;	,,	—
,,	208,	,,	15	,,	top,	,,	Dumfrie	,,	Dumfries.
,,	217,	,,	7	,,	,,	,,	*Sesleria*	,,	*Molinia.*

THE SCOTTISH NATURALIST.

"The hand of Nature on peculiar minds
Imprints a different bias, and to each
Decrees his province in the common toil."

THOMSON.

THERE has never before, we believe, been any attempt to establish a Scottish Journal of Natural History; it is therefore with much diffidence that the Perthshire Society of Natural Science has undertaken a task, possibly more suited to the strength of an older and more influential Society.

The great tendency of the age is centralization. All information must be sent to, and emanate from, the metropolis. We do not say that this is altogether wrong, but, at the same time, a necessary consequence is, that many valuable observations and facts relating to Scottish Natural History are scattered in the transactions of the various learned societies, or in the different scientific magazines, and being mixed up with numerous British and Foreign notices, lose much of their local interest, and often altogether escape the notice of Scottish readers.

Without trespassing on the fields occupied by the many more or less valuable scientific journals published in Britain, we purpose devoting the pages of the "*Scottish Naturalist*" to the following objects:—

(*a*) The publication of original articles, either communicated directly to the "*Scottish Naturalist*," or (if read before any Society) not already, or to be, published.

These articles in every case to bear upon Scottish Natural History.

(b) A record of captures and discoveries made in Scotland, whereby, in course of time, much valuable information regarding the geographical distribution of species in this part of Britain may be accumulated.

(c) Reports of the meetings of Scottish Natural History Societies, giving the titles, and, when possible and desirable, short abstracts of the papers read; thus forming an index to the work done by the various societies.

(d) General information likely to be interesting or useful to Scottish Naturalists.

(e) Correspondence; Notes and Queries upon Scottish Natural History subjects.

(f) Lists of species for distribution or exchange.

"In order to make the "*Scottish Naturalist*" successful, we earnestly ask for the co-operation and encouragement of all who bear the name, in whatever department of the work they may labour; without this assistance success is impossible, with it, a certainty. Let no one shrink from the task of contributing to its pages, under the impression that he is incompetent to do so. Any observations of Natural Phenomena, if made carefully, truthfully, and simply as they occur, are worthy of preservation, and will assist in filling up the great storehouse of facts, from which at some future time important generalizations may be made."

NATURAL SCIENCE CHAIRS IN OUR UNIVERSITIES.

BY W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

IN accepting the invitation of the Editor of a new Natural History Serial,† to contribute a Paper to its first number, I have selected—instead of a subject purely scientific and

† To which I cordially wish every success: and whose advancement I am desirous of assisting in any way—in which—it may be pointed out by its Editor—it lies in my power to forward its interests.

technical, that would appeal to but a very few readers —one that I believe to be of interest to all who are concerned in the progress of Science-education in our country : and there are few thoughtful educated men of the present day who are not. A strong public feeling is rapidly growing up—if it has not been already fully developed—in favour of the introduction of Science-teaching into even our elementary schools. The superiority of the cultivation of the *Sciences of Observation*—not only as a means of mental training, but as tending to lead to the due utilisation, in commerce, manufacture, or the arts, of the superabundant natural products of our own and other countries*—is being fully recognised or admitted. A Royal Science Commission is presently at work deliberating on the best means of bringing about a *State* recognition of the claims of Science.† Oxford and Cambridge, of old consecrated to the Classics and Mathematics, are throwing open their portals to the study of the Natural Sciences, and are bestowing high academic honours on their successful cultivators. The leading Ministers of the crown, and Members of parliament, in giving an account of their stewardship; the Lord Rectors‡ and Principals of Universities ; Mr. Buckmaster, from the Department of Science and Art ; and many other authorities—as well, unfortunately, as many who are no authorities,—are at present constantly haranguing the public, or select portions thereof, regarding the claims of Science as an element in both primary and higher education, and its importance in relation to a nation's welfare and progress. And throughout the country the Ancient Classics are being at least partially superseded, in all grades of schools, by Natural History, Chemistry and Physics.

*I devoted a Lecture to the subject of "The Place and Power of Natural History in Colonisation ;" which was published in Dunedin, New Zealand, in January, 1862, and reprinted (in part), in the "Edinburgh New Philosophical Journal," for April and July, 1863.

†"The Royal Commission on Scientific Instruction, and the Advancement of Science"—whose headquarters are 6 Old Palace Yard, London, S. W. (in Nov., 1870,)—contains among its Members men so eminent in different departments of Science as Professors Huxley, and Sharpey, and Sir John Lubbock.

‡ Only the other day, (November 18, 1870,) Mr Grant Duff, M.P., in his Rectorial address before the University of Aberdeen, made a special plea on behalf of Natural History (especially Botany and Geology),—in contrast with the Dead Languages,—as a feature of a general University curriculum.

The present seems, then, a proper time for considering the condition of what are almost the only scientific prizes to which the foremost Naturalists, in this "free and enlightened" country of ours, can aspire. I refer to our *University Chairs of Natural Science.* It is desirable here to explain that Natural History as taught in our Universities, includes the following Sciences :—(1) Botany : (2) Zoology : (3) Geology : (4) Mineralogy : (5) Meteorology : (6) Hydrology : and (7) Physical Geography. Palæontology is usually included in Geology, though it belongs equally to Botany and Zoology. Zoology embraces sometimes Comparative Anatomy. Meteorology and Hydrology are usually associated with Physical Geography : which again may be included in surface Geology. Mineralogy, too, is frequently embraced under Geology. So that the general practical division of Natural History, as regards the teaching of it in this country, is tripartite—into Botany, Zoology, and Geology.

In the present Paper I can but *outline* my subject. It would be unbefitting the character of such a serial as the "*Scottish Naturalist*," especially in relation to the space that can be allocated to individual contributions, to do more. In so far, further, as the Editor has invited me to discuss certain of the details in subsequent numbers, it will suffice meanwhile to indicate the general bearings and importance of the subject to which I am desirous of directing attention, viz.:—the imperative necessity for *Reform* in the constitution or status of our University Professorships of Natural Science,—that is to say, Chairs of general Natural History, or of the special Sciences (such as Botany, Zoology, or Geology,) into which it is conventionally divided. It is pretty generally acknowledged now, that reform is necessary as regards Natural Science teaching in our schools. In other words, it is generally admitted that their educational curriculum should be so enlarged as to admit of the object-teaching of Natural History, as well as of Chemistry, Physiology, and Physics. And there are, perhaps, a few University authorities who admit the desirability of changes in the modes of teaching Natural History in our highest seats of learning. But little is, I believe, known of the *kind or degree of reform* that is imperatively required in our Universities, as regards the status of their Chairs of Natural Science, and their occupants.

I have given attention to the constitution of Chairs of Natural

History for nearly twenty years,—inquiring into their duties and emoluments, on the one hand, and the qualifications of their occupants, on the other,—in a considerable number of Universities, not only in the three kingdoms, but in our Colonies, (such as Australia, New Zealand, and Canada), and in many continental countries, (such as Norway, France, Prussia, Switzerland, Austria, and Italy.) My general conclusions, so far as concerns Great Britain and Ireland, are these—*inter alia* : that

I. Whereas the *Qualifications of a Professor of Natural Science shonld consist in,—*

ESSENTIAL.
1. Knowledge of the subject to be taught.
2. Ability to teach a given subject or subjects.
3. Ability to enforce discipline, and command respect, among students.

ACCESSORY.
4. Distinction as an author.
5. Popularity both as speaker and writer.
6. The power of pictorial illustration, and of demonstrational manipulation.

II. *The real grounds of appointment, or, at least, causes of success, are too frequently the utterly irrelevant matters of,—*

1. Political influence.
2. Church influence : religious belief : denominational intrigue.
3. Personal influence : partizanship : party rivalry and struggle for power.

III. *Reform is desirable, or necessary, in the following directions,—*

a.—As regards the *Professors-elect,—*
1. The possession of the necessary qualifications.

b.—As regards their *Chairs,—*
2. Classification or subdivision of subjects.
3. Proper endowments and status.
4. Provision of class properties (apparatus : diagrams : specimens.)
5. Provision of the necessary adjuncts and adjuvants of—

Museums : botanical or zoological gardens : herbaria : libraries : laboratories.

6. Adequate assistance.
7. Abolition of incongruous duties.
8. Adequate superannuation allowance: and early superannuation.
9. Mode of teaching : substitution of the tutorial or demonstrational system.

c.—As regards the *Mode of appointment*,—

10. Merit should be the sole ground : selection of the fittest.
11. Provision of adequate holiday leisure, with facility for foreign travel and study.
12. Open competition : abolition of obsolete or mischievous restrictions.
13. Invitation or gift in exceptional cases.
14. Abolition of personal canvas.
15. Abolition of the Testimonial nuisance.
16. Appointment of duly qualified, unbiassed, patrons or electors : abolition of close monopolies.
17. Establisment of Fellowships and Special Lecturerships.
18. The just appropriation or allocation of Bursaries.
19. Uniformity in the value of Degrees, and in the principle of their bestowal : abolition of the practice of sale without examination.

In all probability, very few educated men will be found who object to the proposition, that it is desirable to appoint *the best qualified man* to a vacant University chair, as to any other species of appointment. And yet it is a fact, according to my experience—so far as regards Britain and her Colonies—that very rarely indeed are Chairs of Natural Science bestowed on the only ground on which they should be conferred—that of *merit* :† very seldom does the best qualified man get the appointment for which he is—perhaps eminently—fitted. That he fails to do

† The *Lancet* of November 26, 1870 (p. 749), in commenting on the Testimonial Nuisance, remarks, that in medical, as in scientific, appointments now-a-days, "the choice that is made usually turns upon some question that only those understand who are *behind the scenes!*"

so, is usually—or, at least, too frequently—due to some such irrelevant cause as I have above specified under Head II. (the "*Real grounds of success.*") To some such reasons we owe it, I believe, that certain of the foremost Naturalists of the age—(for instance, Agassiz and Huxley)—are not now Professors in Scottish Universities.

The best men frequently do not offer themselves as candidates, because they are unwilling to subject themselves to the humiliation of *personal canvass* amongst ignorant ill-mannered electors—especially with the probability facing them of being defeated by opponents inferior both in ability and integrity—unscrupulous, perhaps, in the use of the means whereby only they can gain their ends. Or, a candidate, confident in his own qualifications, declines to compete upon other terms than on the ground of merit,—deficient, as he probably is, in the political or church influence that is too likely to carry the day: he refuses his assent even to intrigue, and the unworthy means so usually employed in the contests for supremacy or success in professorial vacancies. Or, the emoluments of the Chair are such that all but men of independent means are precluded from becoming candidates. Or, lastly, some ancient restrictions connected with Patrons' or Founders' wills, or University charters, exclude all but the graduates of this or that University—the possessors of this or that irrelevant qualification—from competition. Very different is the condition of matters in America (United States), and on the Continent: where vacancies are frequently *offered*, in the most flattering way, as honours or prizes, to those who have distinguished themselves in particular walks of scientific research!

I have frequently been much struck, while reading the biographies of eminent scientific men, by the fact of their remarkable defeats and disappointments in contests for University Chairs, at the hands of competitors infinitely their inferiors in ability. There is this advantage in the consideration of such cases,—that the whole history of the contest is generally exposed: the actors having themselves disappeared from the scene, their actions have become the subject of public and unbiassed criticism, and we are favoured with a "full, true, and particular" account of the *real causes of success and failure.* The last case of the kind that occurred in the course of my reading

was that of Sir David Brewster. His biographer tells us that the keenest disappointment of his life was his failure to obtain the Professorship of Natural Philosophy in the University of Edinburgh, when his successful competitor was a young man of family, then quite "unknown to fame." It is explained to us, that all Brewster's wonderful scientific reputation failed before mere party or personal influence. This was not, however, one of those cases in which, as occasionally happens, the successful candidate was a comparative nobody: for the late Principal Forbes unquestionably became a Physicist of the first class; and the reputation he built up for himself subsequent to his appointment may be held in a sense to have justified the selection. None the less, however, was it the case that, at the period of the competition, Forbes' claims were utterly trivial as weighed against Sir David's; and the cause of his success was *not his superior qualifications, but his superior influence.* There is nothing, unfortunately, peculiar in this biographical incident, relating to two eminent Scottish Physicists recently deceased. The same sort of story has been told over and over again,—frequently to our sorrow, and sometimes to our shame! I have myself been privileged to hear the plaint of some of our most eminent Naturalists—living or now dead—as regards their non-success in candidatures for coveted vacancies—for which they were pre-eminently fitted,—but in which they either failed in, or were deterred altogether from, competition, by some of the irrelevant causes before referred to.†

Again, in connection with his Presidentship of the recent meeting of the British Association at Liverpool, (August, 1870,) Professor Huxley's critics and admirers, in their biographical notices of the hero of the day, tell us how he failed in obtaining the Professorship of Natural History in the University of Toronto, which fell to the lot of a much older, though less able, Naturalist; and they do so apparently in order to point out the blindness of the Canadians to their own

† It would, however, be invidious and improper to introduce incidents relating to living Professors, or their Chairs, in illustration of my criticisms; and I confine myself, therefore, to circumstances that are already public property, having become the subject of published record, in various forms of Biographical Memoir, in Parliamentary Blue Books, University Calendars, or other printed official documents.

interests, in the selection made. It is fortunate for Britain that such a disappointment occurred; for it has secured to his own country the services of one of her most eminent living Naturalists. Not the less is it the fact, however, that he was beaten in his own particular field by a competitor who has acquired a greatly inferior reputation, though he is nevertheless a Naturalist of whom the Canadians have every reason to be proud. But Huxley's case is not a parallel to Brewster's; for he had not, when a candidate for Toronto, achieved the same kind or degree of distinction to which Sir David could point when he contested with Forbes the Edinburgh Natural Philosophy Chair.

On the other hand, the University of Cambridge, Massachusetts, showed an example to all the world, when it *offered* its Chair of Zoology to the Swiss Naturalist, Louis Agassiz, and so secured for that enlightened commonwealth the services of a Professor of cosmopolitan reputation!

WORK AND INFLUENCE OF LOCAL NATURAL HISTORY SOCIETIES.*

BY J. ALLEN HARKER.

THE opening meeting of another session seems a not unfitting occasion on which to set before you a few considerations on the work which local societies for the study of Natural History appear specially adapted to perform, and on the benefits which I consider them capable of conferring, not only on their members, but on those who may be occasionally brought in contact with them, and whom they may in some degree be expected to influence. Having clearly apprehended the nature and extent of the whole work, it will be well further to indicate those methods of employing the resources at our command, which a little experience suggests as best suited to the attainment of the objects we have in view. It is not necessary at present to enter into the history of societies of a nature similar

**Abridged from a Paper read before the Perthshire Society of Natural Science, 1st September, 1870.*

to our own ; it will be sufficient for our purpose to gather from the experiences of the most prominent and successful of our co-temporaries, material wherewith to construct a solid and permanent edifice for ourselves. At the outset I may mention that the following remarks refer more especially to provincial societies, such as the Perthshire Society of Natural Science ; since, in large towns, the seats of universities, or where there are valuable museums, elements enter into the working of Natural History Societies which cannot here be taken into consideration, and a different plan of action must obviously obtain precedence.

Most, if not all, local Natural History Societies, have had their origin either in the desire felt by a few ardent students for a medium for the interchange of thoughts and experiences, a common ground on which to meet and ask and take assistance from each other ; or in the wish cherished by a few enthusiastic Naturalists, that means should be taken for more generally promoting the study of Natural History, and affording to earnest enquirers opportunities of receiving that assistance from the experienced, which in the study of Nature, is so very essential. Already those societies have, in these directions, answered the expectations of their founders and supporters. The monthly or fortnightly meeting is looked forward to with interest by those members who have met with difficulties, which they will then be aided to surmount, or by those who have obtained specimens with which they are unacquainted, and which will then be named and commented upon for them. A proportion of the papers read will be devoted exclusively to detailed directions either for finding specimens, or for manipulating them when obtained ; and the exhibition of specimens, and record of noteworthy observations will be a source of interest and instruction to all. These meetings are fraught with valuable benefits to every class of members ; the beginner is encouraged, and induced to persevere ; the more advanced are wisely guided, and stimulated to renewed exertions ; while the most learned and experienced are certain to gain some additional information.

The subjects which present themselves to the members of a local society for consideration and discussion will naturally have reference to the productions of the immediate neighbourhood, and the specimens to be found in the district of which

the society is the centre, will come to receive most special attention. It suggests itself at once, that the study of the Fauna and Flora of this district is the occupation for which a society is most fitted. A local society should therefore be most ardently devoted to this object, and should not consider its task completed until lists of every species to be found within its boundaries have been made, and all facts as to their distribution, times of appearance, &c., are known and recorded.

Each member should devote himself to one special group of beings, and work it out; or, where it is possible, a number of members devoted to the study of the same group, should form themselves into a section, having their own chief member or president, and conduct their labours apart from the general business of the society, occasionally reporting the results of their researches at the meetings. In a large society composed of hard-working members, where this system of labouring in sections could be thoroughly carried out, a very few years of earnest application would produce, at least, an approximation to a knowledge of the Fauna and Flora of a district.

The careful compilation of exact lists of the species inhabiting different parts of the country, is by no means a work of little account. The science of Zoology, in the directions which it has of late years taken, has thrown new and startling light on the question of distribution of species; and the solution of great problems may now rest on the occurrence or non-occurrence of particular forms, in this or that region of country. In pursuing this line of research, then, you may contribute in some small degree to the general cause and progress of science.

The greatest thinkers in Natural Science positively need the assistance of a large number of observers, to enable them to pursue with accuracy their line of thought, and eliminate their theories. Take for example, Mr. Darwin's work on "Animals and Plants under domestication": see what a vast accumulation of facts and observations are recorded in elucidation of the doctrines he propounds; one man—ten men—could not in a life time have personally made these observations; they are, in truth, the work of a varied army of labourers, each member deserving of much praise, which the master-spirit who collected and arranged their contributions in wondrous sequence, is not slow to acknowledge.

There is another sphere of action upon which, it may be submitted, Natural History societies are called at the present time to enter. I allude to the opportunity they have, in the absence of such a course of training in our schools, of imparting a modicum of instruction in Natural History to what we term "the young and rising generation." The gospel of Scientific Education for many years has not lacked able and zealous preachers, but as yet has been received the reverse of gladly. We are all satisfied of the grand truth of Bacon's words,—"Knowledge and power go hand in hand,"* but with singular selfishness people greedily seize every discovery in science which is useful to them, which they can turn into money, but are very loath to render assistance, pecuniary or otherwise, to the cause of scientific investigation.

How very many have we known who could, and do, heartily echo Carlyle's words, when he says, "For many years it has been one of my constant regrets, that no schoolmaster of mine had a knowledge of natural history, so far, at least, as to have taught me the grasses that grow by the wayside, and the little winged and wingless neighbours that are continually meeting me with a salutation which I cannot answer,—as things are."

Until that time comes which he loves to prophecy of, when every schoolmaster in Britain will be required to possess the power of teaching his youthful charges something of zoology and botany, it is a duty imposed by the very fact of its existence, upon a society of naturalists to strive to cultivate and foster in the young the love of a study of nature.

We have now to consider for a little, in detail, the actual proceedings of a local society, which may be summed up under three heads:—its published transactions (the main results of its meetings); its excursions; and its collections.

The Papers read at the meetings will consist, for the most part, of contributions to the knowledge of the species existing in the society's district. A proportion will be devoted to instructions and directions to beginners, and a few will be on subjects of more than local interest, and of general scientific value.

The excursions made by the several sections, independently of each other, are those best calculated to produce satisfactory results, and cannot occur too frequently during the summer

* Scientia et potentia humana in idem coincidunt.—Nov. Org. I.

months. For on such occasions must be collected all the information necessary to the compilation of the lists already alluded to, and the specimens which are to form the collection of the society. I would suggest that each section should undertake the self-imposed task of making a certain number of excursions in the year, and that the presidents of each should give in to the general secretary a report of every excursion so made, and, if possible, a series of the specimens collected.

Lastly, a few words on the subject of collections. On the character of these will depend the positon which a society will attain. There are very few museums indeed which entirely answer the requirements they may be made capable of doing. We seem not yet to have learnt that they might become an educational power in the community, instead of a mere indiscriminate show of curiosities, without connection or meaning.

The museum of a local society should aim first at a complete representation of the natural productions of its own district; and the energies of the members should be devoted most ardently to this object. At the same time, it must be borne in mind that the kingdom of nature is a grand unit; and if, as may be submitted, the first function of a Natural History Museum is to exhibit the relationship which exists among all forms of life, a collection of the species peculiar to any one district alone would fail to answer this most important requirement. While, therefore, the local collection should have most attention paid to it, no opportunity should be neglected of storing up specimens from districts outside our own, or from foreign countries generally, and in process of time sufficient material will be accumulated to form a *typical* general collection, in addition to the more perfect local one.

The work here sketched out for a local Natural History Society, may at first appear a task too arduous for men whose labour in scientific pursuits is but the occupation of their leisure hours—for the majority of the members of a local society must always consist of those who have only a small portion of their time to devote to researches not immediately connected with their every-day business life—but a careful consideration will show, that such a plan of action as has been indicated (perhaps, with slight modifications), must be pursued, if useful and worthy results are to be obtained.

ZOOLOGY.

THE MOLLUSCA OF THE NORTH-EAST OF SCOTLAND.*

TO draw up and publish lists of the animals and plants of their own districts, should be one of the principal objects of all local natural history societies; and the Aberdeen Society by the publication of a catalogue of the Mollusca of the north-eastern counties has shown that it understands what its work is. That this list is sufficiently exhaustive may be judged from the fact that out of 686 species recorded as natives of Britain and the adjacent seas, 374 are included in the catalogue now before us. Of these 71 are land and fresh-water shells, being only 7 less than the number (78) known as natives of Scotland. We notice, however, that of 5 of these 71 species no recent captures appear to have been made, but that of 4 other species only one or two specimens of doubtful origin (possibly, as is suggested, introduced with ballast) have been found. Mr. Dawson has nevertheless thought proper to include these species in case they should hereafter be found alive.

In his introductory remarks the author describes the depth of the sea, and the structure of the sea-bottom adjacent to the north-east coast: mentioning where, and what species of, fossil shells are found in it, and giving his opinion as to the various geological changes, to the action of which the present structure of the sea-bottom is due.

"Towards the close of the glacial period and during the second condition, when

* "Catalogue of the Mollusca of the counties of Aberdeen, Banff, and Moray, and of the neighbouring seas." A Paper comunicated to the Aberdeen Natural History Society, by R. Dawson, A.M., Cruden. Printed for the Society.

NORTH SEA

SHOWING THE 40 FATHOM LINE

along the coasts of

SCOTLAND and NORTH of ENGLAND.

Drawn by Robert Dawson 1848 John Wilson, sculp. Taylor & Henders Aberdeen

the land was below its present level, and the climate of our country and sea was much colder than it is now. *Tellina calcarea*, *Pecten Islandicus*, and other mollusca now living only in the arctic seas, found a climate congenial to their nature; our brick clays containing the remains of these animals were deposited, and that extensive fossiliferous bed formed, which stretches along our coast and appears again in the Moray Firth. After this state of things had continued for a lengthened period of time, the land emerged, whether gradually or otherwise it is difficult to say, but it appears to have attained an elevation of at least 240 feet above its present level. The forty-fathom line shows what would have been the southern shore of the North Sea at the time when the land was thus elevated. The deep channel stretching out into the Moray Firth would have formed an estuary, or rather a bay, receiving the waters of the Deveron, the Spey, the Lossie, &c. The Buchan deeps would have been another estuary, receiving at its south end the waters of the Esks, and afterwards those of the Dee and Don, &c.; and the Long Forties would thus have been a peninsula, bounded on the west side by the estuary just mentioned, and on the east by the North Sea. A great extent of the former sea bed being now dry land, and the climate of the country vastly improved, the Arctic species of shells were exterminated, leaving their remains imbedded in the clay, as one proof of the severity of the former climate. Their places were then occupied by the species now inhabiting the British seas, and the Long Forties, now a shore, was the habitat of the littoral species. That during this elevation of the land, the climate was as warm, if not more so, than at the present time, is, I think, clearly shown by the extensive beds of submarine forest and peat which here and there crop out at the shore from under the waves. These beds, which must have been formed during this period, contain the remains of plants and trees, as the oak, the birch, the alder, &c., which, in the present day, have a hard struggle for existence along our coast.

"The land now became submerged again to nearly its present level, and the shores of the North Sea became almost what they now are. The littoral species of mollusca inhabiting the former shores, being incapable of living in deep water, in their turn died, and left their wasted remains accessible to the dredge, attesting their previous existence, and the probable position of the shores of the North Sea at the time that they lived."

In corroboration of this, Mr. Dawson remarks,—

"On examining the dredgings obtained in 1865 by the Rev. Mr. Gregor and myself from different places on the top of this bank [*i.e.* the Long Forties], we noted at the time that there were none of the Arctic fossils so abundant on the nner plain, but on further examination, we found in a decayed and apparently semi-fossil condition, the following littoral shells, viz.: *Purpura lapillus*, one specimen; *Littorina rudis*, one; *Solen siliqua*, two; *Mytilus edulis*, one large but imperfect valve, and many fragments of the small shore variety. Before it occurred to us that these fragmentary fossils might be interesting in a geological point of view, the greater part of our dredgings had been examined. It is quite possible, therefore, that other specimens may have escaped notice. All these species are highly characteristic of the shore, *Littorina rudis* in particular, being only found on rocks at or above high water marks. If only one specimen or one species had been found, it might have been accounted for by a similar

accident to that which brought the *Lucina Pennsylvanica* into the same day's dredgings, but as four species were obtained, and of some of them several specimens, it appears very probable that they lived and died at or near the place where they were found."

A LIST OF THE NOCTUÆ OCCURRING IN MORAYSHIRE.

BY GEORGE NORMAN.

OWING to bad health, some three years ago, I first came to Morayshire, and since then have resided, more or less, at the Cluny Hill Hydropathic Establishment at Forres.

For an occupation and amusement I took to my old study, Entomology, after a long lapse of above twenty-five years. For the entomologist—or indeed, I may say, general naturalist—no county in Britain affords a richer, more varied, and beautiful hunting ground.

Word painting not being my forte, I refer those who wish to know more about the scenery of this glorious country to the works of the late C. St. John, in "Murray's Home and Colonial Library," and for more recent Natural History reports, to a few notes of my own occasionally contributed to "The Zoologist."

My object in the present notes is to point out to entomologists the richness of the country round Forres for *Lepidoptera*, and more especially the *Noctuidæ*, to which my attention has been almost exclusively directed.

To the admirable list of Morayshire *Lepidoptera* contributed to "The Zoologist" in 1861, by the Rev. Dr. Gordon of Birnie, I have added many species of *Noctuæ*, bringing the number up to nearly the half of the recorded British species. With few exceptions, the whole of the insects have been obtained by sugaring, in the beautiful wooded grounds attached to the Cluny Hill Hydropathic. When the high moors, the Culbin Sands, and the Forests of Darnaway and Altyre, have been more thoroughly explored, beyond doubt the list of species will be considerably augmented.

Thyatira batis, not uncommon, Cluny Hill ; *Cymatophora duplaris*, common ; *C. or*, on aspens, Cluny Hill ; *C. flavicornis*, not uncommon ; *Acronycta psi*, very common ; *A. leporina*, occasionally at rest, also larvæ on birch ; *A. ligustri*, common at sugar, Cluny Hill, Califer, and also near the Ferry ; *A. rumicis*, very frequent, Cluny Hill, also on the Califer ; *A. myricæ*, took one specimen at rest, on a house near Dallas, and Mr. Longstaff took one larva on the Califer Hill ; *Leucania conigera*, very common ; *L. lithargyria*, a perfect pest to sugarers ; *L. impura*, occasionally ; *L. pallens*, swarming at sugar ; *Nonagria sp.*, I saw several specimens flying over a marshy pond, and fancy it may have been *fulva*, but did not take the insects ; *Hydræcia nictitans*, in profusion, especially at sugar, near the Ferry ; *H. micacea*, very common at Cluny Hill ; *Xylophasia rurea*, very common at sugar ; *X. polyodon*, swarming everywhere at sugar, the dark varieties range in colour from bistre brown to coal black ; *Dipterygia pinastri*, taken by Mr. Dunbar Dunbar, of Seapark, near Forres ; *Charæas graminis*, very common some years, on ragwort flowers, especially near Kinkorth and the sea ; *Cerigo cytherea*, not unfrequent on a "*Cossus*" birch, Cluny Hill ; *Luperina testacea*, everywhere ; *Mamestra abjecta*, occasionally ; *M. furva*, not unfrequent at sugar ; *M. brassicæ*, common ; *M. anceps*, not uncommon ; *Apamea basilinea*, abundant ; *A. gemina*, not unfrequent ; *A. fibrosa*, taken occasionally at sugar, Cluny Hill, also more frequently near the Ferry,—I have not hitherto discovered the food plant in the neighbourhood, but it probably does grow in the low grounds near the "Claddy Moss" ; *A. oculea*, very common ; *Miana strigilis*, common at sugar ; *M. literosa*, common at sugar ; *M. faciuncula*, swarming at sugar, and often by day on ragwort ; *Caradrina blanda*, not unfrequent ; *C. cubicularis*, swarming in the hay fields ; *C. alsines*, occasionally at sugar near the Ferry ; *Rusina tenebrosa*, abundant ; *Agrotis valligera*, not uncommon at sugar, Cluny Hill,—also on ragwort, near the Culbin Sands ; *A. suffusa*, common ; *A. segetum*, common ; *A. saucia*, taken occasionally at sugar on the Cluny Hills ; *A. lunigera*, not unfrequent at sugar ; *A. exclamationis*, common ; *A. corticea*, common ; *A. cursoria*, not uncommon, by beating out of the "bents," Culbin Sands ; *A. nigricans*, common ; *A. tritici*, swarming some years ; *A. aquilina*, rare at sugar, Cluny Hill ; *A. agathina*, very abundant, flying over heather on the Califer Hill,—very rarely at sugar, Cluny Hill ; *A. porphyrea*, swarming wherever heather grows ; *A. præcox*, occasionally at Cluny Hill, larvæ very abundant on *Salix repens*, on the Culbin Sands,—they require digging up by day ; *A. pyrophila*, several specimens, "Edgehill," at rest, others by beating the "bents" on the Culbin Sands ; *Triphæna ianthina*, very abundant, Cluny Hills, and near the Ferry ; *T. fimbria*, very common ; *T. orbona*, swarming at sugar,—the beautiful black and red varieties are quite common on the Cluny Hills, and near the Ferry ; *T. subsequa*, not uncommon at sugar, Cluny Hill, also frequently at a "*Cossus*" birch near the greenhouse ; *T. pronuba*, abundant ; *Noctua glareosa*, plentiful by sugaring ; *N. depuncta*, some years abundant,—not rare on Cluny Hill, but certainly more common near the Ferry ; *N. augur*, everywhere ; *N. plecta*, occasional ; *N. C-nigrum*, common ; *N. triangulum*, not common ; *N. brunnea*, very frequent ; *N. festiva*, abundant at sugar, Cluny Hill ; *N. conflua*, very common ; *N. rubi*, common ; *N. umbrosa*, very common, especially on ragwort, near the Ferry ; *N. baia*, common ; *N. xanthographa*, swarming ; *N. neglecta*, not uncommon at sugar, and on the heather, Califer Hill ; *N. Dahlii*, swarming at sugar, especially on the Cluny Hills ; *Trachea piniperda*, swarming in the Chapeltown Muir Wood,—also on sallow bloom ; *Tæniocampa gothica*, abundant ; *T. rubri-*

cosa, not uncommon, especially on a large sallow on the Califer Hill ; *T. instabilis*, abundant ; *T. stabilis*, abundant ; *Orthosia suspecta*, rare ; *Anchocelis rufina*, abundant ; *A. litura*, abundant ; *A. macilenta*, common ; *Cerastis vaccinii*, in the utmost profusion,—some very pretty varieties, suffused with black blotches, or relieved with lake blue, are common on the Cluny Hills ; *Scopelosoma satellitia*, very common ; *Xanthia cerago*, common at sugar, especially near the Ferry,—the pale variety, *flavescens*, also common ; *X. silago*, occasionally on the Cluny Hills ; *X. ferruginea*, everywhere ; *Eupetia fulvago*, not uncommon, on the Cluny Hills, at sugar ; *Cosmia trapezina*, abundant ; *Dianthœcia capsincola*, abundant, flying over the flowers of *Lychnis vespertina*,—the larvæ abundant in the capsules ; *D. cucubali*, larvæ on *Silene inflata*, near the Bay of Findhorn ; *Polia chi*, abundant, very conspicuous by day at rest on the pine trees ; *Epunda lutulenta*, several on flowers of heather, and one under a stone on Scrapehard Farm ; *E. nigra*, abundant at sugar, Cluny Hill ; *Miselia oxyacanthæ*, abundant at sugar ; *Agriopis aprilina*, frequent, Cluny Hill ; *Phlogophora meticulosa*, abundant ; *Euplexia lucipara*, not unfrequent, especially on the Califer Hill ; *Aplecta occulta*, occasionally on the Cluny Hills ; *A. nebulosa*, not uncommon ; *Hadena adusta*, not uncommon ; *H. protea*, abundant ; *H. glauca*, occasionally ; *H. dentina*, not unfrequent ; *H. pisi*, larvæ near the Water Reservoir,—also the moth, at Edgehill ; *H. oleracea*, common ; *H. thalassina*, common ; *H. contigua*, at sugar occasionally, near the Ferry ; *H. rectilinea*, at sugar on the Califer Hill ; *Calocampa vetusta*, common at sugar, Cluny Hill ; *C. exoleta*, swarming, as many as ten on one tree ; *Xylina rhizolitha*, rare, Cluny Hill ; *Cucullia umbratica*, over flowers. Cluny Hill ; *Heliothis marginata*, at sugar, near the Ferry,—*Ononis arvensis*, the food plant, grows in profusion there ; *Anarta myrtilli*, very frequent wherever heather abounds ; *A. cordigera*, recorded from "Knock Frink" ; *Brephos parthenias*, very common, flying over birches in Altyre Woods ; *B. notha*, with the preceding ; *Habrostola urticæ*, rare, Cluny Hill ; *Plusia chrysitis*, occasionally ; *P. bractea*, taken by the Rev. Dr. Gordon at Birnie ; *P. festucæ*, over flowers of *Lychnis vespertina* ; *P. iota*, rare, Cluny Hill ; *P. V.-aureum*, common over *Lychnis* ; *P. gamma*, abundant ; *P. interrogationis*, took a specimen on the Califer Hills,—no doubt it is more common on the high grounds near Dallas ; *Gonoptera libatrix*, has occurred in the district ; *Amphipyra tragopoginis*, common ; *Mania typica*, very abundant near the Ferry, but has not occurred on the Cluny Hills ; *Stilbia anomala*, abundant, Cluny Hill ; *Phytometra ænea*, on the Califer Hill, also among heather near the Culbin Sands.

"Sugaring" near Paisley.—The following is a list of *Noctuæ*, which came to sugar between the middle of June and end of October this season. *A. pisi*, common ; *A. rumicis* and *L. impura*, not rare ; *pallens*, common ; *H. nictitans*, several ; *petasitis*, one specimen ; *micacea*, not rare ; *A. putris*, several ; *X. rurea*, *lithoxylea*, and *polyodon*, in swarms ; *M. anceps* not rare ; *brassicæ*, *A. basilinea*, *gemina*, *oculea*, *M. strigilis*, and *fasciuncula*, all common ; *areuosa*, rare (at sugar) ; *C. blanda*, rare ; *cubicularis*, abundant ; *R. tenebrosa*, *A. suffusa*, *segetum*, and *exclamationis*, common ; *porphyrea*, not rare ; *T. orbona*, *pronuba*, *N. augur*, *plecta*, *C-nigrum*, abundant ; *brunnea*, several ; *festiva*,

not common ; *conflua*, *rubi*, and *umbrosa*, rare ; *xanthographa*, common ; *T. piniperda*,* one specimen ; *O. lota*, not rare ; *macilenta*, rare ; *A. litura*, swarming ; *rufina*, rare ; *C. vaccinii*, not rare ; *S. satellitia*, several ; *X. silago* and *cerago*, rare ; *ferruginea*, swarming ; *C. trapezina*, rare ; *M. oxyacanthæ*, common ; *A. aprilina*, occasional ; *P. meticulosa*, common ; *E. lucipara*, abundant ; *A. occulta*, two specimens ; *H. adusta*, occasional ; *glauca*, rare ; *dentina* and *oleracea*, common ; *pisi*, rare ; *thalassina*, *C. vetusta*, and *exoleta*, occasional ; *G. libatrix*, rare ; *A. tragopoginis*, occasional ; *M. typica*, common ; *maura*, several. I shall be glad to learn if *N. fulva* is taken at sugar in other localities. I have tried for it, with no success, in a marsh where the insect flies somewhat commonly. The "bait" this season, in addition to the extensive list above, attracted an unusual number of *Geometræ* and *Micro-lepidoptera*, besides *Coleoptera*. snails. and toads ; the latter, of course, feasted not on the sugar, but on the insects which settled on it within their reach.—JOHN DUNSMORE, Castlehead, Paisley, Nov., 1870.

Crambus Warringtonellus.—I found this species very common along the shore near Troon last August.—*Id.* [Prof. Zeller in his "*Chilonidarum* et *Crambidarum* genera et species," places *C. Warringtonellus* as var. c. of *C. perlellus*, and remarks, "*Warringtonellum* nihil esse nisi varietatem minorem et obscuratam, quod Lederer jam dudum asseveravit, Wocke videtur demonstravisse." Did Mr. Dunsmore observe *C. perlellus* at the same time and place as *C. Warringtonellus*?]

Bombus terrestris, Linn.—How far north in the island is this species of bee annually found? *B. lucorum* Linn., by far the most abundant *Bombus* on the northern side of the Grampians, is apt to be mistaken for *B. terrestris*. The tawny apex of the latter, and the white apex of the former are the best distinctive marks.—Rev. G. GORDON, Manse of Birnie, Elgin, Nov. 18, 1870.

Squirrels.—In Ross and Moray, where they were previously unknown, these animals have, within about the last five and twenty years, so increased, as to become most destructive to the Scotch-fir and the larch. On one property, six thousand five hundred and seventy-one have been killed as vermin, in nine years. Has a like increase been observed in any other part of Scotland?—*Id.*

Note on the Nidification of the Tree Sparrow.—This bird is of very rare occurrence in Scotland, and the instances of its nesting here still more rare As, however, it has occasionally occurred, a note on its habits of nidification may be interesting, more especially as they appear not to be very well known. The name "tree sparrow" leads to the supposition that the bird nests in trees, but this is very seldom the case, and as an indication of any general habit, the qualification of "tree" is almost valueless. This is also the case with the tree pipit, which, I think, always nests on the ground. Out of more than a dozen nests of the tree sparrow which I have seen, not one was situated on a tree, although I have heard of a single instance of one nesting in a hole in a decayed trunk. A hole in an old bridge or ruined building is the site generally chosen

* We are assured by Mr. Dunsmore that there is no mistake about the date of this capture. *T. piniperda* in the latter half of June is not an everyday occurrence.—ED. *Sc. Nat.*

by this bird for its warm nest of feathers and moss, or hay, and if not disturbed, the birds return year after year to the same spot. The quantity of feathers employed in making up the nest is enormous. The eggs (five or six in number) are dark coloured, speckled with brown or black, on a dirty white or grey ground; some I have are almost quite black. Thus the eggs of the tree sparrow furnish an exception to the almost universal rule that birds which nest in holes or make covered or domed nests, lay white or light coloured eggs. I do not remember another exception among British birds. The tree sparrow is occasionally eccentric in its choice of a situation for purposes of nidification. Twice I have found its nest and eggs in the deserted hole of a sand martin, and in both cases the eggs were very dark, and the nest composed of a greater proportion of moss and hay than feathers.—J. ALLEN HARKER, Glasgow, Nov., 1870.

Carabus nitens.—I am not aware that the occurrence of this beetle in the West of Scotland has been previously reported. A specimen was obtained last spring, from the hills above Strone, a locality closely resembling Chat Moss in Lancashire, the best known habitat of this most beautiful British *Carabus.—Id.*

Acentropus niveus in Scotland.—I find this interesting little moth common wherever *Potamogeton filiformis* abounds, in Loch Leven, Kinross, and Loch Gelly, etc., in Fife.—J. BOSWELL SYME, Balmuto House, Kirkcaldy, Nov. 17.

Capture of Dasypolia templi.—I recently captured two specimens (male and female) of *Dasypolia templi* among stones in Perth. Has this moth been taken in Scotland before?—W. HERD, Scoonie Burn, near Perth, Nov. 20.

[We took a specimen off a street lamp in Perth a few years ago. *D. templi* has also been taken at Aberdeen, and at Balquhidder in Perthshire, but we know of no other Scottish localities for it.]

Pyrochroa pectinicornis.—I should be obliged to any Coleopterist who could tell me at what time of the year this beetle appears in the perfect state. I have often found the larvæ, but have sought in vain for the imago.—R. HISLOP, Blair Bank, Falkirk, Nov. 17.

GENERAL INFORMATION.

WE learn that a work on the "Birds of Scotland," by Mr. Robert Gray, Secretary to the Glasgow Natural History Society, is in the press.

We hear that Mr. Howie, Secretary of the Largo Naturalists' Field Club, is drawing up, for publication, a Catalogue of the Plants of Fifeshire.

PAISLEY MUSEUM.—The work of fitting up cabinets for the reception of the Natural History Collection in this handsome building is rapidly approaching completion, and we look forward with interest to the opening, which is expected to take place shortly. The zoological and botanical specimens are mostly, if not all, British, and will form a valuable reference collection for students. We hope, at some future time, to give a detailed description of the portion of the Museum devoted to Natural History. The large and valuable reference library will contain a choice selection of scientific works.

PHYTOLOGY.

THE STUDENT'S FLORA.*

DR. Hooker, following the example of his illustrious father, has published a Flora of the British Isles. Those who have not yet seen the "Student's Flora," must not think that it is merely a new edition of Hooker and Arnott's British Flora: it is quite a new work, and though resembling in some respects the above-mentioned Flora by Hooker and Arnott, contains, in addition, much information not before brought together in any one manual of British plants. The object of the Student's Flora is "to supply students and field-botanists with a fuller account of the plants of the British Islands than the manuals hitherto in use aim in giving," and for this purpose Dr. Hooker has not only given descriptions (mostly original) of the plants, but has also indicated area and altitude (when above 1,000 feet) that each plant attains,—these particulars of course being taken from Watson's works, and, for Ireland, from the "Cybele Hibernica." The exotic distribution is also given, as well as estimates of the number of genera in each order, and of the species in each genus, &c. The latest edition of the "London Catalogue" has been followed almost entirely in regard to the number and kinds of plants composing the British Flora ; Dr. Hooker not caring apparently to enter into the difficult question of what are indigenous and what are naturalized plants. Upwards of 200, however, are placed in an appendix of excluded species : two or three words as regards the reason for exclusion being alloted to each. Many of these plants, proved never to have been found in Britain, are well placed here—preparatory, we hope, to being omitted altogether in the next edition—but for some of the others (being either probably native or well naturalized) room for

*"The Student's Flora of the British Isles," by J. D. Hooker, C.B., M.D., &c., London, Macmillan & Co., 1870.

description in the body of the text might profitably have been made. We do not see why *Mimulus luteus*, *Claytonia perfoliata*, *Rumex alpinus*, *Vinca major*, &c., (all considered as naturalized plants) should have been described, while *Angelica Archangelica Asperula taurina*, *Petasites albus*, *Nardosmia fragrans*, *Prenanthes purpurea*, *Veronica peregrina*, &c., are dismissed with two or three words.

Dr. Hooker, departing from the method adopted in the majority of the manuals of British plants, has reduced many species (so-called) to the rank of "sub-species." This plan has no doubt its conveniences, but for our part we do not quite believe in the terms "sub-species" and "sub-genus" (the latter however not being used in the "Student's Flora." It may be noticed that the Batrachian *Ranunculi* are (following the views of Boswell Syme), reduced to three species—*aquatilis* (five sub-species), *Lenormandi* and *hederaceus*; *Rubi* to four species, *Chamæmorus*, *saxatilis*, *Idæus*, and *fruticosus* (twenty-one sub-species, arranged by Baker); the genus *Rosa* to five species, (also revised by Baker), *spinosissima*, *villosa*, *rubiginosa*, (each with three sub-species), *canina*, (three series and twenty-nine varieties), and *arvensis*, (two sub-species); *Hieracium*, (also revised by Baker), to eleven species, (several sub-species); *Salix* to seventeen species, (the species according to Andersson, the varieties by Syme); and *Carex* to fifty-eight species, (eight sub-species).

There are many other points of interest that we should like to notice, but our space will not admit of doing so at present. Botanists will find that the "Student's Flora" is worthy of its name, and no one should neglect to avail himself of this valuable addition to the number of British Manuals.

We give a few extracts relating to Scottish plants; the remarks within [ ] are our own.

Ranunculus sceleratus, rare in the north; [Is it ever found inland in the north?] *Cheiranthus Cheiri*, old walls, naturalized; [Very abundant on the rocks of Kinnoull and Moncrieffe Hills, etc., in Perthshire, and perhaps native there.] *Nasturtium sylvestre*, from the Forth and Dumfries, southwards; [Abundant near the Tay.] *Hesperis matronalis*, not even naturalized; [If Dr. Hooker will visit the above mentioned hills he will, we think, find cause to change his opinion.] *Reseda luteola*, doubtfully native in Scotland; [Apparently native in Perthshire.] *Reseda lutea*, from Haddington, southwards; [From Fife, southwards.] *Malva rotundifolia*, rarer in Scotland; [Generally near the sea?]

Geranium Pyrenaicum; [Is not mentioned for Scotland, but is naturalized in several counties.] *Rhamnus frangula*, [also in Ross-shire.] *Poterium Sanguisorba*, from Perth and Forfar, southwards; [Has this any claim to be native in Perthshire?] *Rosa rubiginosa (vera)*, probably an escape in Scotland; [Wild in Perth?] *R. arvensis*, from Haddington, southwards; [From Perth?] *Pyrus Malus*, from Forth and Clyde, southwards,—an escape in Scotland; [From Ross-shire, where it appears to be wild.] *Cratægus oxyacantha*, from Moray, southwards; [Certainly wild north of the Caledonian Canal.] *Saxifraga tridactylites*, East of Scotland, from Caithness; [Only near the sea?] *Sedum reflexum*, England, Wales, and Ireland—not indigenous; [Quite naturalized in Perthshire.] *Myrrhis odorata*, northwards to Renfrew; [Common in Perth.] *Campanula rapunculoides*, from Fife, southwards; [From Perth.] *Ligustrum vulgare*, naturalized in Scotland; [Is it? and where?] *Echium vulgare*, an alien or colonist in Scotland; [Wild in Perth?] *Symphytum officinale*; [Is this native in Scotland?] *Solanum dulcamara*, a denizen in Scotland; [A native?] *Verbascum Thapsus*, a denizen in Scotland; [A native?] *Linaria Cymbalaria*, from Clyde and Forth, southwards; [From Perth.] *Lamium album*, rare and local in Scotland; [?] *Pinguicula Lusitanica*, West of Scotland; [East of Ross.] *Utricularia minor*, rare in Great Britain; [The commonest *Utricularia* in Scotland.] *Listera Nidus-avis*; [Ascends to about 1,000 feet in Perthshire.] *Luzula arcuata*; [In Inverness.]

A New British Grimmia.—In "Science Gossip" for December, the Rev. J. Fergusson of New Pitsligo records the occurrence of *Grimmia Ungeri* Juratska in Aberdeenshire. This moss, which resembles *Grimmia Donniana, G. montana, and G. alpestris*, was discovered by Dr. Unger in Cyprus, and had not (before its discovery in Aberdeenshire) been found elsewhere. Mr. Fergusson suggests the probability of its occurrence elsewhere in Britain.

Aster Longifolius, Lam.—In an excursion made to Perth in September, in which I had the benefit of the guidance of Mr. John Sim, he pointed out to me the *Aster* which had been sent to Professor Babington, and pronounced by that botanist to be *A. salignus*, Willd. The plant grows in great abundance over the couple of miles of bank which we traversed, and Mr. Sim assured me that it extended much further down the river side. As I stated in my last report, A. *salignus* is a doubtful plant, but if the Tay-side plant be *A. salignus*. that name is one of the numerous synonyms of the American *A. longifolius* Lam. Professor Babington is doubtless right in considering the Tay-side plant distinct from the Derwent-water *Aster*, sent to the club last year by Miss Edmunds. Along with *A. longifolius* there grow on the banks of the Tay several other species of *Aster* in small quantity, among which are *A. puniceus*, L., *A. prenanthoides*, Muhl., and a broad-leaved species which I believe to be *A. Novi-Belgii*, L., but which Mr. H. C. Watson inclines to call an abnormal growth of *A. brumalis*, Willd., a plant, which according to Torrey and Gray, is not certainly known to exist in North America, and is perhaps derived from *A. Novi-Belgii*.—Dr. BOSWELL SYME in "Botanical Exchange Club's Report for 1870."

SCOTTISH SOCIETIES.

Perthshire Society of Natural Science, 1st Sept., 1870.—J. DAWSON, ESQ., *Vice-President*, in the Chair.—Mr. T. Marshall exhibited a larva of *Deilephila galii*, found by him near Stanley, feeding on *Galium verum*. This insect had not been taken in Perthshire since 1859. The Chairman intimated that the volume of "Proceedings" of the Society, for 1869-70, was now ready for issue. A vote of thanks was given to Mr. Dawson for editing the "Proceedings." Mr. J. Allen Harker read a Paper upon the "Work and Influence of Natural History Societies." (Vide p. 9.) A Paper upon "Autumn Work," by Dr. Buchanan White, was then read.

7th October.—DR. BUCHANAN WHITE, *President*, in the Chair.—The President exhibited specimens of *Sesia philanthiformis*, Ls., from Galloway and the Isle of Man, and remarked that the Gallovidian examples were somewhat larger and more brightly coloured than the Manx. He also exhibited specimens of a probably undescribed *Gelechia*, which he had reared from larvæ found in moss in the neighbourhood of Perth. Mr. T. Marshall mentioned the capture of nineteen more larvæ of *Deilephila galii*, and exhibited specimens of *Noctua depuncta* and *Heliothis marginata*, from the neighbourhood of Stanley. These species had not been taken previously in Perthshire. Mr. J. Sadler, F.R.P.S., read some notes on two plants new to the Scottish Flora—1. *Centaurea pratensis*, Thuill. Mr. Dawson, during an excursion in Strathearn, directed Mr. Sadler's attention to a plant near Forgandenny, which Mr. Sadler first referred to *Centaurea nigra* b. *radiata*, but subsequently to *C. jacea*. To settle the question (as there was some doubt about the plant), a specimen was sent to Dr. Boswell Syme, who replied as follows :—"Your *Centaurea* is one of a series connecting *C. nigra* with *C. jacea*, and which the French call *C. pratensis*. I got the same plant, but not radiate, on the banks of the Tay, about a month ago." Dr. Syme places it as a variety of *C. nigra*, while the continental botanists make it a variety of *C. jacea*. 2. *Œnanthe pimpinelloides*, L., was found by Professor Dickson and Mr. Sadler, in meadow ground near Hamilton House, in the pass of Leny. It occurred sparingly, intermixed with *Pimpinella magna*. Mr. Dawson remarked that there were a number of curious plants growing in the neighbourhood of Hamilton House, probably introduced by the late Mr. Buchanan Hamilton, and that possibly the occurrence of the plant in question might be thus accounted for. Specimens of the plants were exhibited by Mr. Sadler. The President said that Dr. Hooker, in his "Student's Flora," ignored the occurrence of *Pimpinella magna* in Scotland. Mr. Sadler then gave an account of a Botanical Excursion from Edinburgh to the neighbourhood of Perth, on July 2, 1870. The party numbered about fifty, and went by the Tay and Almond to Methven Bog. Upwards of 200 species of plants were

collected, including the rare *Scheuchzeria palustris*. In reference to this plant Mr. Sadler observed that he regretted to say that an attempt had been made to drain and plant the "Bog," which, if successful, would probably result in the extinction of the *Scheuchzeria* in this, its only Scottish station. Dr. Buchanan White read a Paper on "Sugaring for Moths: how, when, and where to do it." (Vide p. 29.) At the close of the Meeting, the Members of the Society had a "Fungus Feast," for the purpose of testing the esculent qualities of several Fungi found in the neighbourhood of Perth.*

* With reference to this the following appeared in "Punch." We hope that the numerous readers of our contemporary will profit by the advice given :—

"MYCOPHAGY AND MYCOLOGY."

SWEET MR. PUNCH,

How do you think you would have relished the repast mentioned in the subjoined extract from a newspaper? One can imagine it to have been the counterpart of a genuine "Dinner after the Manner of the Ancients"; particularly the Ancient Romans :—

"PERTH.—SOCIETY OF NATURAL SCIENCE.—At a meeting of the Perthshire Society of Natural Science, held on Friday evening, a paper was read by MR. SADLER, assistant to PROFESSOR BALFOUR, Edinburgh, entitled 'Contributions to the *Flora* of Perthshire,' and one by DR. BUCHANAN WHITE, President of the Society, on 'Sugaring for Moths.' After the meeting, the members adjourned to the Moncreiffe Arms Hotel, where supper was prepared, consisting of different species of funguses, cooked in almost every conceivable manner. The dishes most relished were *Boletus edulis, Coprinus comatus*, and *Agaricus campestris*.

"*Sunt tibi boleti, fungos ego sumo suillos.*" Your friend MARTIAL (I don't mean CAPTAIN DYNGWELL) drew a distinction not understood by modern mycologists and mycophagists. Every *boletus* nowadays is a *fungus*, though not every *fungus* is a *boletus*. Of course you know that a great variety of funguses are eatable; but few Britons dare venture upon any but the Common Mushroom (*Agaricus campestris* above named.) Very likely their fear may be heightened by apprehension of injury to their teeth in table-talk over things with such crackjaw names as those of which the foregoing are mild examples. It is an exertion, for epicures at least, to articulate them. You may find no difficulty in saying *Tricholoma gambosus, Amanita strobiliformis*, or *Lepiota procerus*. But some of your readers will have a little. However, there is no help for it. We have hardly any trivial name for any fungus but the Common Mushroom aforesaid. The *Marasmius Orcades* is called in English-French "Champignon," the *Cantharellus cibarius*, in the same tongue, "Chantarelle"; we name the *Morchella esculenta* "Morel," and the *Tuber æstivum* "Truffle," but otherwise almost every fungus which the people do not call a Mushroom, they call a toadstool. The *Boletus edulis* enjoyed by the Perthshire naturalists would be "to the general" a toadstool of the fattest and most frightful species; the more knowing inhabitants of Bordeaux regale themselves upon it as a delicacy under the name *cep*, so called, I fancy, because thereabouts it likes to grow at the foot of the vine. They, you see, don't make a mouthful of the word, but they eat the thing. Do likewise if ever you have a chance, which you may have early next summer, please Jupiter Pluvius, and if you like, you can also explore the woodlands and see where it grows, with other things of the same sort equally good, no less tough to the organs of speech, and equally tender to the nerves of taste, if you will vouchsafe to be guided by your ancient

SMELFUNGUS."

3d November.—Dr. Buchanan White, *President*, in the Chair.—The Chairman exhibited specimens of *Limnæa glabra*, found near Perth. This shell had not been detected in Perthshire before. Mr. T. Marshall read a Paper entitled "Is a Parr a young Salmon?" The author traced the history of the young salmon from the time when the ova were taken out of the adult fish, up to the period when, as a smolt, it went down to the sea. He noticed the curious fact that the young male parr had often fully-developed milt, but that the young female parr had never been seen with *developed* roe, though several anglers (not naturalists) had stated that they had seen parr with developed roe. So sure was he of this, that he had no hesitation in offering half-a-sovereign for every specimen of parr with mature roe. As for the parr bred naturally in the rivers, they were zoologically identical with the parr bred artificially, and were one and the same species. In Mr. Marshall's opinion, it was fully proved that a parr was a young salmon. At the conclusion of his paper, Mr. Marshall pointed out, in recent examples, the difference between a parr and a young yellow-trout. In reply to enquiries as to whether parr had ever been seen in rivers to which salmon had no access, Mr. Marshall stated that he knew of no instances in which it had been proved that parr had ever been seen in rivers where there were no salmon, though such had been stated. In the Tummel, above the Falls, parr were found, and salmon were said not to be found, but he had himself watched salmon getting over the Falls. Mr. J. M'Farlane read a Paper upon "Certain Fungi found near Perth." He remarked that Fungi, in addition to the interest which they possessed in common with all plants for the botanist, had a special one of their own,—namely, the esculent properties of many species. Mr. M'Farlane then proceeded to give the names, localities, and properties, of several species which he had found in the neighbourhood. Among those mentioned were, —*Agaricus rubescens*, *A. campestris*, *A. procerus*, *Coprinus comatus*, *Boletus edulis*, *Hydnum repandum*, *Lycoperdon giganteum*, and *Lactarius deliciosus*, most of which he had eaten, and thought highly of.

Royal Physical Society of Edinburgh, 29th November, 1870.—Professor Duns, *President*, in the Chair.—The retiring President, Professor Duns, gave his valedictory address, in which he traced the history of the Society from its commencement, and mentioned the names of many illustrious men of science who had been members. He referred to the loss the Society had sustained in the death of Sir James Y. Simpson. In conclusion, Professor Duns made some remarks on the methods of pursuing the study of Natural Science.

Natural History Society of Glasgow, 29th November, 1870.—E. R. Alston, Esq., F.Z.S., in the Chair.—Mr. Alston exhibited a specimen of the Barbastelle Bat from Norfolk, and a Black Tern *(Sterna fissipes)* from the Firth of Forth. In the opinion of Mr. Gray, this bird was a regular spring and autumn visitant to our shores. It had been obtained in the following counties in Scotland,—Dumfries, Berwick, Haddington, Fife, and Aberdeen, The Secretary, Mr. Gray, exhibited a young Red-necked Phalarope *(Phalaropus hyperboreus)* shot near Aberdeen. M. J. A. Harvie Brown exhibited two specimens (females in breeding plumage) of the Purple Sandpiper *(Tringa maritima)* obtained in May last, in the Outer Hebrides, by Captain H. W. Fielding, who thought

that a few bred there. Mr. Gray made some remarks on the shell mounds of the Outer Hebrides, and mentioned some grounds for suspecting that these mounds might not be of greater age than 200 or 300 years. Mr. J. S. Dixon read a notice of an ancient canoe found near Kirkintilloch. The notice was illustrated by drawings.

Geological Society of Glasgow, 3d November, 1870.—J. YOUNG, Esq., *Vice-President*, in the Chair.—Mr. J. Thomson, F.G.S., exhibited three fossils, new, at least, to the west of Scotland. These were *Acanthoides Wardii* from Airdrie, *Athyris pisum* from Brockley, and *Anomia corrugata* from Dalry. Mr. Thomson pointed out the distinctive characters, &c. Mr. D. C. Glen, C.E., communicated notes upon a shell-bed found in the boulder-clay in excavating a new dock at Cartsdyke, near Greenock. From certain appearances presented by the bed, he was inclined to think that it was not in its original position but had been dug from some neighbouring part of the shore and laid down in its present position many years ago, when the policies, where the excavation occurred, were formed. The chairman remarked that the boulder-clay and shell-bed in question were of great interest. The boulders were sand-stone of local origin, and granite, trap, and schist, from distant localities. Many of these boulders were beautifully smoothed and striated by ice-action. The bed was very rich in organic remains,—about 140 species, including some rare, and many well-known Arctic forms, having been found in it. After some further discussion, arrangements were made for an excursion to the excavation.

1st December.—J. YOUNG, Esq., *Vice President*, in the Chair.—Mr. Young exhibited a block of Carboniferous Sand-stone from Gilmorehill Quarry, about nine inches in thickness, and showing in that space thirty-two well-defined alternate white and dark brown stripes. The brown stripes were caused by the sand having become mixed with bituminous matter previous to its disposition, and the layers of white and brown sand had evidently been deposited as such at irregular intervals over the area in which this striped sandstone is found. Mr. T. Naismith exhibited several drawers of fish remains, principally from the coal-fields near Glasgow. Among these were specimens of *Rhizodus Hibberti* from the iron-stone at Possil, *Megalichthys Hibberti* and *M. rugosus* from Airdrie, and a few fragments of reptilian crania, vertebrae, etc., from Airdrie and Hamilton. The Chairman made a few remarks on certain specimens in the collection, and Mr. J. Thomson, F.G.S., called attention to the reptilian remains, which he said belonged to two new species of *Labyrinthodon*, specimens of which, found by him, were at present in the hands of Professor Huxley for examination. Mr. Thomson further remarked that the *Labyrinthodons* were Batrachian reptiles, and had been, from the singular combination of batrachian and crocodilian forms, termed sauroid batrachians. The genus got its name from the singular structure of the teeth, whose curious convolutions Mr. Thomson described. Mr. D. C. Glen, C.E., exhibited specimens of oil shale from Canada, and also samples of petroleum distilled from it. These shales received their bituminous ingredients from the immense quantities of trilobites, entomostraca, and other organisms contained in them.

Dundee Microscopical Society, 31st August, 1870.—Mr. Adie read a paper upon "Local *Diatomaceæ*. Specimens of various species of *Diatomaceæ* found in the district, were exhibited.

14th September —The subject of discourse at this fortnightly meeting, was "The Theory of the optical part of the Microscope."

12th October.—Mr, Dingwall read a paper on the "Hive Bee." Specimens of various species of bees and their combs were shown in illustration of the paper.

26th October.—Mr. J. Brown, Inland Revenue (late analyst in the Inland Revenue Laboratory, London), read the first of a series of papers on "Adulteration." The subject of Mr. Brown's remarks this evening, was the adulteration of starch, and in illustration, about fifty varieties of starch were exhibited under the microscope. These specimens had been mounted by Mr. Brown about six years ago, in diluted glycerine, and had undergone little change since. The author alluded to the well-marked characters afforded by the various varieties of starches, and said that microscopists, instead of almost entirely confining their studies to the examination of diatoms, &c., might profitably turn their attention to the detection of adulterations. He would therefore be happy to teach the members of the society to detect adulterations, and purposed devoting several evenings to the examination of teas, coffees, mustards, tobacco, &c., procured by the members from the dealers in these articles.

9th November.—Subject of discussion : "The Laws of refraction."

23d November.—Mr. Brown read the second of his papers upon adulteration, the subject of which was "Tea, Coffee, Chicory and Cocoa." As tea was often imported in an adulterated state, it was difficult to bring proof of adulteration by persons in this country. Specimens of pure and adulterated teas were shown—one of the latter being a green tea, in which the green colour had been produced by some mineral colouring matter, as was shown by rubbing the damped leaf on white paper. Other examples were exhausted teas re-dried and made up,—these have been sold either alone or else mixed up with good tea. The microscopic characters of coffee were very distinct, and thus it could be easily distinguished from chicory, dandelion root, beet-root, locust beans, etc., with all of which it was sometimes adulterated. Specimens of roasted and unroasted coffee were exhibited under the microscope, as well as examples of the various substances used to adulterate it. Cocoa was generally sold as a manufactured article, and purposely adulterated, and little could be done by the members in detecting the adulteration, so long as the public preferred to buy cocoa in the form in which it is commonly sold. Mr. Brown exhibited specimens of theine and caffeine, the alkaloids of tea and coffee, under the polariscope.

Alloa Society of Natural Science and Archæology, Sept. 6, 1870.—The Rev. A. S. MATHESON, *President.* in the Chair.—Mr. Borthwick read the first of a series of papers on injuries caused by insects. This paper, which was on "Our garden pests," treated of the ravages caused in gardens by various insects, among which the author mentioned the larvæ of *Abraxas grossulariata*, which during the past season had been very abundant in Alloa, and done much damage in some gardens to the gooseberry and other bushes. Still more destructive had been the larvæ of the gooseberry saw-fly. The best means of preventing their ravages is to examine well the leaves in spring, for the eggs of the fly, which are laid along the veins on the underside of the leaf, or, when the caterpillars had appeared, to dust the leaves with hellibore, or water them with a strong decoction of digitalis. Among other insects referred to were various species of beetles, attacking different kinds of fruit trees, the apple moth, the American blight, etc. The paper was illustrated with diagrams.

4th October.—A. F. PATON, Esq., *Vice-President*, in the Chair.—Dr. Duncanson read a paper upon "Some points of similarity between children and savages."

1st November.—The Rev. A. S. MATHESON, *President*, in the Chair.—Dr. Brotherston read a paper entitled "Our Holiday in the Harris," and exhibited specimens of birds obtained during his excursion to the Western Isles.

"SUGARING"—HOW, WHERE, AND WHEN TO DO IT.*

BY F. BUCHANAN WHITE, M.D.

Firstly,—HOW TO SUGAR.—Some thirty or forty years ago, collectors observing that some kinds of moths resorted to various wild berries, such as those of the yew and service tree, for the purpose of feeding on the juice, bethought them that sugar might possess some similar attractive power, and tried the effect of placing an empty sugar barrel in the woods. The sugar barrel having been found successful in attracting insects, but at the same time, rather too bulky to form part of the usual equipment of a collector, some one "to fame unknown" (at least I have never seen any record of the discoverer† of "sugar"), invented a composition which would have all the attractive qualities of the sugar barrel, but at the same time be more portable.

This composition is known to lepidopterologists by the name of "sugar," and many receipts exist for the manufacture thereof. With these I need not trouble you further than to mention that into their composition enter,—sugar, "foots," honey, ale, rum, whisky, water, essential oil of bitter almonds, ratafia, aniseed, spruce beer, birch wine, essence of jargonelle pears or of ginger grass; and that, as substitutes for "sugar," rotten apples, dead cats, and putrid soapsuds, have been recommended.

One of the most highly commended receipts‡ for making sugar runs thus:—

Boil up equal weights of foots, sugar, and treacle, in a sufficient quantity of stale beer to bring the mixture to the requisite consistency; add a *small* quantity of rum immediately before use.

I find, however, a more simply compounded sugar very efficacious.

To some coarse treacle add a very little whisky, four or five drops of essential oil of bitter almonds, mix well, and, if necessary, dilute with a little water.

Having made your sugar, the next thing to be considered is how to convey it to the sugaring ground. This is a matter of no great importance, the chief

*An abstract of a paper communicated to the Perthshire Society of Natural Science, 7th October, 1870.

†Since writing the above I have seen it stated that Mr. Doubleday was the inventor of "sugar."

‡Those who are acquainted with Dr. Knaggs' excellent "Lepidopterist's Guide," will perceive the use that I have made of his advice on sugaring. I can corroborate from my own experience most of his statements.

things to be looked to, being to prevent the scent evaporating, and to ensure as much cleanliness to one's hands as is possible in laying on the sugar.

For my part, I prefer a tin of a flat oval shape (so as to fit the pocket), provided with a handle, and having a brush attached to the lid, inside. The brush should be about an inch in diameter, and not too soft.

Having then made our sugar, we will discuss the next point.

Secondly,—"WHERE TO SUGAR."

This admits of two divisions.—(1) The localities most likely to be productive. (2) The objects best suited for placing the sugar on.

(1) The localities most likely to be productive are, I think, beyond doubt, the neighbourhood of woods. It is of little use sugaring in the thick parts, but along the edges, or in the glades or drives, a very large harvest may be reaped. Then for particular species (or if we have no other choice), we may try moors, marshes, sandhills, or any uncultivated pieces of ground.

In selecting the scene of our operations, it should be borne in mind that ground over which we may find it easy enough to walk in daylight, may be quite the reverse at midnight; therefore, we should make a mental note of any obtrusive stumps or stones,—such things, when run against forcibly, being by no means conducive to the preservation of one's temper, or of the skin of one's shins (not to mention the chance of frightening some rare moths by the bad language probably elicited thereby, or of squashing one's lantern by falling heavily upon it.) If possible, therefore, remove the obstacles, or avoid places likely to lead to such sad results. When bracken, or other high plants, impede the progress, it is well to devote a little time in daylight to get rid of them—the path thus formed being, moreover, useful in guiding us from one patch of sugar to another.

(2) The objects on which to place the sugar.—Of these by far the best are tree trunks with a rough bark, (on a smooth bark the moths are not able to sit so well, and the sugar runs off, or dries up sooner Select trees about five or ten yards apart, following the edge of the wood, a path or other line that may be easily detected in the dark, and if necessary, distinguish the sugared trees by pieces of white paper, or other conspicuous marks. This is a good plan to adopt when sugaring on new ground; after a night or two one does not readily forget the sugared trees, and thereby waste time by looking for them, or lose some good moths by not examining them at all.

Having fixed upon your trees, clear away, with an axe or strong knife, any twigs, leaves, moss, or loose bark, likely to interfere with your operations.

As we have now to put the sugar on, we must return for a moment to the first point of consideration,—"How to sugar."

Having then the sugar pot in one's left hand, the brush in the right hand, and the net under the left arm (for often a moth may be disturbed, and we should be prepared to capture it) we proceed to apply the sugar to the bark; first, however, making sure that we do not sugar some desirable insect at rest upon the tree—a not unlikely circumstance, especially if the tree has been sugared before.

Selecting then the sheltered side of the tree, we should put on the mixture in long narrow perpendicular stripes, say from two to three feet long, and at a convenient height for examination. One stripe will generally be found sufficient, especially if we put a dab slightly exposed to the wind, so as to insure the carriage of the odour of the sugar; but if any particular tree is on experience found to be very productive, we may place four or five stripes on the different

sides. On putting on sugar for the first time on a tree, it should be well rubbed into the crevices of the bark, but afterwards a less quantity of the compound and a slighter brushing will do. I may mention here that trees which have been frequently sugared are generally more productive than trees sugared for the first time: it follows, therefore, that we should not change our sugaring ground too frequently, or without good reason.

If we can find no trees, we must sugar some other objects, such as flowers, leaves, posts, or stones.* Of flowers, ragwort and thistles are about the best; and on them the sugar may be dabbed, while on stones it may be applied in stripes.

If none of these can be found, it has been suggested that bunches of grass, such as bent on sandhills, should be tied together and sugared, but in preference, I would be inclined to try the effect of rags soaked in the mixture, and tied to short sticks.

Thirdly,—"WHEN TO SUGAR."

This may be considered under several aspects:—

(1) The time to put on the sugar.
(2) The time to examine it.
(3) The seasons most productive.
(4) The weather best suited,
(5) The occasions on which *not* to sugar.

(1) The time to put on the sugar should be immediately before dark. It is possible (if we cannot do otherwise) to put it on several hours before dusk, and to find the sugar productive, but as the scent is likely in a great degree to be dispersed in that case, it is better to wait until the last moment of daylight. Sugar put on after dark is probably (I say "probably" for I have not tried it), still less productive than that put on too soon, for the reason that the scent has not time to be spread about enough, not to mention the obvious difficulties attendant on the application of the mixture. That sugar put on some hours before dark is not unproductive, is evident, because "old sugar" (*i.e.*, sugar put on the previous night) is often worth examining.

(2) The examination of the sugar may begin as soon as it is pretty dark, and be carried on at intervals till dawn. Different moths have different hours of flight, and up to midnight we find a constant succession of new arrivals. After midnight, (according to Dr. Knaggs), the order of arrival is reversed, till just before dawn we find the same species that came just after dusk. As few of us, however, have sufficient energy to continue examining the sugar all night, two, or perhaps three rounds, will be sufficient, especially if we begin our examination not immediately, but half or three quarters of an hour after dark. My usual number is two rounds, except when a very productive night tempts me to try more.

(3) "Which is the most productive season?" is a question not very easily answered, as opinions differ thereon. In every month in the year I have taken moths at sugar, but of course some months are much more productive than others, The question arises, "Which are these months?" If I was to answer from my own experience, I should say June and part of July, but I know that while I have been finding moths abundant at sugar during that period in one locality, friends in others have been experiencing the reverse,—their sugar being

* I have counted forty-seven moths on a single stone.

unproductive till the end of July and August, when mine had become unprofitable. It therefore depends, in some degree at least, on the locality, and each one's experience should teach him what the best time is in his own neighbourhood. One thing, however, must not be forgotten, and that is, that the most productive time is not always the same every year. I would recommend that sugaring should be begun in March, left off during the time the sallows are in bloom, resumed in May, and continued till the ivy comes into blossom in October. During that time sugar should be tried at least once a week, and when found productive, prosecuted with energy.

(4) We must now consider the great question of "the weather;" upon the state of which greatly depends whether our labours will be in vain or not. The most favourable combination of circumstances is a S., S.W., or W. wind, not too strong, nor veering from one point to another, but blowing a gentle steady breeze; a moist warm atmosphere, but clear near the ground, and not muggy; a cloudy sky, and no moon. Rain (if warm and not too heavy), though inconvenient to the collector, is often accompanied by "shoals" of moths, and even during a thunderstorm many specimens have been obtained at sugar. Thirty examples of *Diphthera Orion* were taken by an entomologist in the midst of a severe thunderstorm, and though he tried for more on several nights apparently more favourable, he did not see another specimen. Another moth, *Dasycampa rubiginea*, has on several occasions been taken at sugar on cold nights, when not another species was present. It follows, therefore, that sugaring on nights which do not present the above mentioned favourable combination sometimes "pays well." We must not expect always to have everything favourable, and should perhaps consider it an occasion suited for sugaring that does not present any symptoms decidedly bad. These we will treat of under—

(5) When *not* to sugar.

As a rule, then, the sugar will be of little or no use when there is—

(a) An easterly "touch" in the wind

(b) Frost, or unseasonably cold weather.

(c) Strong moonlight.

(d) No wind.

While the following are not quite so adverse, but still bad—

(e) An unclouded sky, (often, but not unvariably bad.)

(f) A sultry muggy atmosphere.

(g) After a thunderstorm, (according to Dr. Knaggs.)

(h) Too many attractive flowers. Sometimes, however, I have seen flowers swarming with one set of moths, and the sugar with another. When we find that the flowers are attracting all the moths, we should sugar the flowers; by this their attractions are increased, and we are able to reap a large harvest off them. Occasionally we find our sugar taken possession of by mice, toads, beetles, ants, &c., which deter the moths from coming. In such a case we must change our sugaring ground, or try some method of getting rid of the invaders. Mice are seldom so numerous as to do much damage; beetles and toads I generally transfer to some other locality; to the ants, if very numerous, it is perhaps better to yield the ground.

We must now return to the first division—"How to sugar;" and see how we are to reap the harvest of moths. First, then, we must provide ourselves with a lantern. This should be something like a policeman's, but with a piece of plate glass instead of a "bull's eye." It should be also furnished with a cord, by which it may hang from the neck, or with a hook to fasten it to a belt round the

waist. The wick should be flat, and made of "swan's-down, or "moleskin," while the best fuel is colza oil. We should always be sure to attend to the trimming and filling of the lamp before setting out, and not forget to take a good supply of lights. A great deal better than the colza oil lamp appears to be the sponge spirit lamp, which Mr. James Stewart has tried and found to work well. Its superior advantages are better light, greater cleanliness, and less trouble in trimming. I have not yet tried it myself, but have every intention of doing so.* As important as the lantern is the supply of chip-boxes, which should be placed in an accessible right-hand pocket—a pocket on the left being reserved for the boxes containing our captures. We should also be provided with a killing-bottle and with a corked box and pins. Then we must not forget to take a net,—an ordinary butterfly net will do; but as its shape admits of contact with the tree at one point only of its circumference, many moths in falling from the sugar—a trick to which many (and, of course, generally the rarer) species are unfortunately addicted—manage *not* to tumble into the net. To circumvent these species, Dr. Knaggs has invented a triangular-shaped net, the base of the triangle being made of cat gut, or other flexible material, which can adapt itself to the tree trunk. The bag of this net may be shallower than that of an ordinary net. Having, then, got everything in readiness, we proceed to look at our sugar. In approaching a sugared tree, be careful to conceal the light,—either by turning on the dark slide, or (as is my usual plan) by putting the glass against one's breast,—then, having placed the net in position below the sugar, turn on the light, and examine the tree. If there are any moths there that are needed, do not lose any time in boxing them. This is easily done by placing a box immediately below the moth, and then pushing the box gently upwards till the moth falls in; if, however, it is unreasonable enough to object to do so, it can be knocked in by the finger, or better still, the lid of the box. If the insect tries to come out of the box before the lid is put on, place a finger across the opening. In all cases, however, when the moth is at all lively, it is better to place the lid above, and the box below it, and shut it up without delay. Some species will not remain quiet in a box, and should therefore be taken off the sugar into the killing-bottle, and when dead, pinned into the corked box. Experience will show what species require this treatment: *Cymatophora duplaris*, *Mania maura*, and perhaps *Aplecta occulta*, *A. tincta*, and *Hadena rectilinea* are a few of them. As a rule, however, moths get so perfectly intoxicated that they remain quite quiet, both on the sugar (for a few minutes), and in the boxes; though at some seasons of the year they seem to be rather restless and apt to fly off when disturbed on the sugar. In taking the moths off the sugar, precedence should be given to the liveliest, if desirable, species; then to the rarest; and finally the commoner ones may be looked over, and those needed taken. If there is any doubt as to what a specimen is, it is better to take it (even if it is worn), for examination by day-light, when, if found worthless, it can be set at liberty. Having thus looked rapidly over the moths that are on the sugar, we should next examine the net, and then different parts of the tree, for moths after having had a feed often crawl off a little way and take a *siesta*—going, as my friend Mr. Norman pointed out to me, even *several feet* from the sugar, and hanging on to any little twigs that project from the tree. Bear in mind two things, in

*These lamps will require to have a lantern made to fit them, which any tinsmith can do. As more heat is produced than by the colza lamp, it may be advisable to provide more air holes than in an ordinary lantern.

looking at the sugar :—1st, To be "sharp" in doing so ; and 2d, not to mix empty and full boxes. Having done with one tree, go on to the next, always remembering not to throw light on the sugar before the net is in position. It is therefore advisable to know the path well, and to cultivate the habit of feeling one's way quickly with the toes. When we have boxed all the moths that have come to the sugar, or when we are satisfied with the quantity and quality of our captures, we may go home, and the first thing we should do, if it is not intended to set them at once, is to place our captures in a dark room or press, where neither artificial nor day light can reach them, as thereby they may be roused and spoil themselves by fluttering. The pinned moths may be either set at once, or placed in the relaxing jar till we have time to attend to them. If eggs are wanted, female specimens of rare moths should not be killed, but placed in a suitable box, (with a little "sugar" for food), and kept till they lay, an event which will usually take place in a few days.

The following are some details of my experience in sugaring during the last three years : –

The statistics are derived from a "Record of Sugaring," in which particulars of each night's sugaring is entered. The record is kept thus :–a series of parallel columns are ruled off, and each has a heading indicating the observation to be recorded. The following are the headings,—1st, Date ; 2nd, Wind ; 3rd, Weather and Sky ; 4th, Moon ; 5th, Hour of examining the Sugar ; 6th, Number of trees, &c., sugared ; 7th, The Results ; 8th, Number of species of *Noctuæ* ; 9th, Number of other species of *Lepidoptera* ; 10th, Greatest Number of Moths on one Tree ; 11th, Number of Hours (limited to 12) within which rain may fall after Sugaring ; 12th, Hour of concluding the examination ; 13th, The Locality ; 14th, Remarks,—such as the composition of the sugar ; the supposed reason of the success or non-success, &c. On another page is written the name of every species (common or rare) that is observed on the sugar each night.

From the above mentioned record I find that between June 4, 1868, and August 31, 1870, I sugared 119 times,* on, altogether, 7615 trees or stones. The following were the results :—

On 7 occasions, no moths ; on 57 occasions, few moths, *i.e.*, under 40 specimens ; on 39 occasions, many moths ; on 16 occasions, swarms of moths.

The greatest number of species of *Noctuæ* taken on one night was 35 ; the greatest number of species of *Noctuæ* taken on one night, on one tree, was 27 ; the greatest number of specimens of *Noctuæ* seen at one time on one night, on one tree, was 200. In the three years, 93 species of *Noctuæ* came to sugar.

An analysis of the results of each month shows the following—

	Number of times of Sugaring.	RESULTS.		
		Blank.	Few.	Many.
JUNE,	51	2	19	30
JULY,	35	1	18	16
AUGUST,	20	2	12	6
SEPTEMBER,	10	2	8	0
OCTOBER,	3	0	3	0

*All in Scotland.

The 7 "blanks" were caused by bright moonlight on 2 nights; prevalence of attractive flowers on 2 nights; cold east wind on 1 night; frost on 1 night; bad locality on 1 night.

The 57 "fews," by bright moonlight on 11 nights; prevalence of attractive flowers on 10 nights; cold east wind on 16 nights; want of wind on 5 nights; unseasonable cold or frost on 4 nights; bad locality on 2 nights; obscure causes on 9 nights.

In conclusion, I give some remarks made upon the first half of this paper:—

"In July (towards the end), and for the first ten or twelve days of August, before the autumnal change of temperature makes itself felt, (here, in the south), strong moonlight nights are particularly good ones for sugaring; and, if it were not for very weariness, collecting might be successfully pursued, I have no doubt, until dawn of day. On the few similar occasions I have been sugaring, one's whole stock of boxes have been filled by half-past one o'clock, and the arrivals still going on; but after the period I have named, moonlight only insures one a bad night. I have tried sugared rags many times, but never found a moth come to them; but ragwort and yarrow flowers, cut and kept in water, and taken out—tied on a stick, and sugared—to barren places attract wonderfully; and, with care, they will keep good for three nights at least. Another thing I must tell you is, that he who uses a drop of aniseed in his sugar mixture might as well stay at home, nor attempt (even with the proper sugar) again until he has thrown away his pot and brush, and taken to new ones without the least trace of the abominable oil. This suggestion of aniseed was originally made, I always thought, *to prevent* any captures, and was truly a very wicked one. Having proved it, I have always been content with sugar or treacle, or both, mixed with a little rum to perfume and stupify, without trying any other material, beyond beer or water for dissolving the sugar."—W. Buckler, Lumley House, Emsworth, Hants, *Jan.* 13.

"I find that on moonlight nights the moths come freely at dusk, but leave very soon, so that many (or most) are gone away again in three quarters of an hour; and any one waiting as you recommend would go home almost with empty boxes. Perhaps this is more especially the case with autumn sugaring." E. N. Bloomfield, Guestling Rectory, Hastings.

'We were scarcely prepared, even in a Scottish Journal, to find *whisky* mentioned as a probable substitute for *rum*, in concocting the bait; but, possibly, Scottish *Noctuæ* have Scottish peculiarities. We are careful not to say that the "Dew of Ben Nevis" is useless, because when we recently suggested to a German friend that "beet-sugar" was of little avail, we were met by the sarcastic remark (Stett. Ent. Zeit. 1871, p. 95) that, "Die englischen Noctuen bewiesen aber darin sehr feine Nasen, dass sie zwischen Runkelrüben und Rohr Zucher sehr genau unterschieden." [English *Noctuæ* showed very fine noses in this, that they discriminated very accurately between beet and cane sugar.]"—*Entomologist's Monthly Magazine, Feb.*, 1871.

ZOOLOGY.

THE COLEOPTERA OF THE SCOTCH FIR.

By D. Sharp, M.B.

SEEING that the Scotch fir is among the most striking and best known of the indigenous trees found in the Highlands of Scotland, it has struck me that a list of the Coleoptera dependent on it for their existence in this country may be acceptable to Scotch naturalists. I have appended a few remarks to the list, and shewing, as these do, how much has still to be done to work out the Natural History of the insects alluded to, I hope they may be the means of inducing the entomologists of Scotland to further elucidate this interesting subject.

The insects of an allied species of pine, the *Pinus maritimus* of the Landes, have been studied and described by M. Perris, with a care and completeness worthy of all praise, and I am sure that any Scotch naturalist who has the means of observing and studying the insects of the Scotch fir, and will give us the results of his observations, will at the same time find a most agreeable occupation for himself, and render a real service to science.

One of the most important of the remaining ancient forests of this tree in Scotland is to be found at Rannoch, in Perthshire, and this locality, (possessing so many charms for the lovers of the beautiful, as well as for the student of nature,) having been well worked by entomologists, has afforded a large proportion of the rarer of the species here enumerated. No doubt if other forests of this tree were well searched many of the species as yet supposed to be confined to Rannoch would be discovered elsewhere, and it may confidently be expected that others quite new would be added to the list.

The Scotch fir gives nourishment to insects of various orders, notably Lepidoptera, Hymenoptera, Hemiptera, and Diptera, but I must leave to naturalists more conversant with these orders than I am, the task of particularly enumerating their species.

PLACUSA PUMILIO, Grav.—Found under the bark of felled trees at Rannoch and elsewhere ; its larva is described by Perris.

QUEDIUS LÆVIGATUS, Gyll.—Found in numbers under the bark of felled trees, stumps, &c., at Rannoch, and near Loch Africk: the metamorphoses are not yet described, but the larva, as well as the perfect insect, is undoubtedly carnivorous.

Q. XANTHOPUS, Er.—A few individuals of this very rare species have occurred under fir bark at Rannoch ; nothing is known of its history.

XANTHOLINUS LENTUS, Grav.—Only a single individual of this species has yet been found in Britain; it was captured near Loch Africk by Mr. Crotch, in my presence, under the bark of a fir log. The larva has not been described; Thomson says, that in Sweden this insect "inhabits trees, particularly fir trees."

BAPTOLINUS ALTERNANS, Grav.—Is frequent under rotten bark of fir trees throughout the country ; I have not remarked it in other situations, though Thomson says of it "It frequents trees, particularly conifers"; metamorphoses not described.

HOMALIUM PINETI, Th.—Found under the bark of the fir stumps at Rannoch and Strath Africk; it is closely allied to *H. planum*, a species confined to sap trees ; earlier stages still unknown.

H. PUSILLUM, Grav.—Common throughout the country, under the bark of decaying fir trees. Thomson has recently pointed out that the specimens inhabiting sap or leaf trees are a distinct species. It is found also in connection with the *Pinus maritimus*, and its metamorphoses have been described by M. Perris.

H. INFLATUM, Gyll.—The few British specimens of this rare insect that have occurred have all been taken at Rannoch, where it is found under the bark of the logs and stumps ; its convex form renders it apparently little adapted for locomotion in such spots. The larva is unknown.

Liodes glaber, Kug.—Frequents a peculiar fungus growing on the old stumps at Rannoch and Strath Africk; the larva has been described by Schiödte.

L. castaneus, Herbst.—Found with the above at Rannoch, in similar circumstances; larva described by Perris.

Agathidium rotundatum, Gyll.—Sparingly under the bark of the fir at Rannoch and elsewhere; larva unknown.

A. rhinoceros, Sharp.—This was once found by me in abundance under the bark of a dead fir at Rannoch; besides these specimens only one other is known, which was captured by me with the sweeping net at night, in Strath Africk, in a locality where the Scotch fir grows; hence, I suppose it to be attached to this tree. The earlier stages are unknown.

A. nigrinum, Sturm.—Found with the species of *Liodes* at Rannoch. Thomson says it inhabits, in Sweden, leaf trees (in opposition to fir trees), but I am not quite sure that there may not be two species yet confounded under the name of *nigrinum*; observations of the history of the species would help to clear up this point; the earlier stages are unknown.

Pteryx suturalis, Heer.—This little creature is found under the bark of the fir stumps at Rannoch; its life history is unknown. It is the only bark Trichopterygian as yet found in Scotland.

Epuræa angustula, Er.—Found under the bark of fir at Rannoch; its larva and habits are quite unknown, but I suppose it to live at the expense of *Xyloterus lineatus*.

E. pusilla, Herbst.—Abundant through the country, under the bark of felled Scotch firs; the larva of this, and also of the following species, are quite unknown.

E. oblonga, Herbst.—Only a very few examples of this species have occurred in Britain, all found under bark of Scotch fir. First taken by myself and others near London, and subsequently by Mr. Crotch, on the Cheviots, near Yetholm.

Ips quadripustulatus, Fab.—This species is abundant under the bark of the fir stumps at Rannoch, and is found elsewhere. The larva is carnivorous, and has, I believe, been described by Frisch. Thomson says, that in Sweden this species inhabits leaf trees as well as fir, but my experience

of it in this country is, that it is quite limited to the Scotch fir.

I. FERRUGINEUS, Fab.—Found under the bark of the Scotch fir. This species likewise frequents the *Pinus maritimus*, where it lives at the expense of species of the genus *Hylastes*; its metamorphoses have been described by Perris.

RHIZOPHAGUS DEPRESSUS, Fab.—This common species also inhabits the *Pinus maritimus*, as well as the Scotch fir, and its larva, which lives at the expense of *Hylesinus*, has been described, as well as its transformations, by Perris. The generic name was given under a mistaken idea of its habits.

R. FERRUGINEUS, Payk.—Also a common *attaché* of the fir; its larva has not been described, but it is undoubtedly carnivorous.

DENDROPHAGUS CRENATUS, Payk.—Of this species hitherto only a few specimens have occurred in Britain; they have been found at Rannoch under fir bark. I believe the larva and its habits are unknown.

ELATER TRISTIS, Linn.—Has been found very rarely at Rannoch. In Sweden it is associated with the fir; its larva has not been described.

ATHOUS UNDULATUS, De Geer.—I am not sure whether this fine, (and in this country very rare,) species is attached to the fir or the birch; it has been found only at Rannoch. Out of the United Kingdom it has a very wide distribution, occurring in the Altai, Siberia, and Hudson's Bay; De Geer described the larva, as well as the perfect insect.

EROS AURORA, Fab.—This elegant insect has been found in Britain only at Rannoch, where it lives under the bark of the Scotch fir, and especially among the decaying chips, the the accumulation of years, at the saw-pit at Dall, there. The larva has not been described, but I have reared the perfect insect from a larva I took to London with me; it fed readily on lepidopterous larvæ.

THANASIMUS FORMICARIUS, Linn.—This insect is found in various parts, but, I believe, in Britain only in connection with the fir. Its larva is well known, and has been several times described; it is supposed to be very useful by attacking and destroying insects injurious to the tree.

PYTHO DEPRESSUS, Linn.—Found hitherto only at Rannoch, where it is common, (especially in the larva state), under the bark of felled trees and stumps. The larva is figured in Westwood's Introduction, and is no doubt carnivorous.

ERNOBIUS MOLLIS, Linn.—This insect is tolerably common on the Scotch fir, and is another of the species found also on the maritime pine. Its larva is described by Perris, who states that it lives at the expense of the tree, but attacks only sickly and ailing individuals.

E. NIGRINUS, Sturm.—Found by C. Turner, in Scotland, and by Mr. Hislop on the fir near Forres. Ratzeburg has described the larva.

BLASTOPHAGUS PINIPERDA, Linn.; HYLASTES ATER, Payk.; H. PALLIATUS, Gyll.—These three species are all very abundant, and most destructive to the tree. The larvæ are well known.

XYLOTERUS LINEATUS, Ol.—Till lately two species were confounded under this name, but it is now known that the insect inhabiting the oak is a distinct species from the one found on the pine. The latter appears to be the true *lineatus*, and has been found as yet only, I think, at Rannoch. It bores deep cylindric holes into the wood of the felled trees; but I am unacquainted with the larva.

RHYNCOLUS CHLOROPUS.—This also has yet only been found at Rannoch. Its larva, I think, has not been described. From my observations I am disposed to think that *Cerylon histeroides* lives at its expense.

ANTHONOMUS VARIANS, Payk.—A few specimens have been found on the fir, I believe, at Rannoch. Nothing is known of its history.

MAGDALINUS DUPLICATUS, Germ. (?)—This species has been found only by Mr. Hislop near Forres, and that very rarely. It is very doubtful whether it is the true *duplicatus*; and I may here call attention to the fact, that a species of this genus allied to *duplicatus*, Germ., has been recently described by M. Desbrochers des Loges under the name of *M. Heydeni*, and is stated by him to occur in Britain. The larva of *M. duplicatus* is not known, but will closely resemble that of *M. carbonarius*, described by Perris.

Rhinomacer attelaboides, Fab.—This curious insect, though not common, has occurred in several localities ; its larva has been described by Perris, it being one of the insects of the *Pinus maritimus.*

Brachonyx indigena, Herbst.—I know nothing of this species except that it has been taken at Rannoch by Turner, and at Forres by Mr. Hislop, and that it is stated to inhabit the fir in Sweden.

Pissodes pini, Linn.—Very common at Rannoch, and has occurred elsewhere ; its larva is well known, and considered very injurious to the tree.

P. notatus, Fab.—This species has suddenly become common in Britain. Up till five or six years ago but a single specimen was known ; about that time Turner discovered it somewhere in the neighbourhood of Inverness, and since then it has appeared commonly in various places in England and Scotland. Can it be that specimens have been introduced with trees from abroad? Its larva is well known, and is considered injurious.

Acanthocinus ædilis, Linn.—This is one of the most striking of British beetles ; it is common at Rannoch, where it is called the "timber man," but is rare elsewhere. Its larva is well known.

Asemum striatum, Linn.—Found on the fir stumps at Rannoch, and in Ross-shire. Its larva is known, but not, I believe, described.

This list only includes such species as I suppose in this country to be entirely confined to the Scotch fir. Numbers of other species of beetles are also found on this tree but are not exclusively confined thereto. If any entomologist would give us a like catalogue of the species found on this pine in other parts of Europe, we should have the material for a very interesting and instructive comparison. I may mention that the pinals of the valley of the Guadarrana, in the centre of Spain, are formed of this tree, and that when I collected there last summer, I found a vast number of species I had never seen alive before, and with them some of our well known Scotch ones, notably *Pissodes pini.* Amongst the most remarkable of the forms not found in Scotland was the

genus *Brachyderes*, represented by four species. As two species of this genus are also found on the fir in Sweden; there is reason to hope it may be yet discovered in Scotland.

ECCLES, THORNHILL, DUMFRIES-SHIRE.

Capture of Noctua sobrina.—My brother and I paid a visit last summer to Rannoch, and were fortunate enough to capture several specimens of the rare *Noctua sobrina*.—T. HUTCHINSON, Grantsfield, Leominster.

Dasypolia Templi.—I see in the first number of the "*Scottish Naturalist*" that *Dasypolia templi* has been recorded from only two Scottish counties,—Perth and Aberdeen. I can vouch for its occurrence in Fife. In October, 1868, a boy brought me a male of this moth, taken flying at night about one hundred yards from Balmuto House. In the month of July, 1869, I cut up all the diseased stems of *Heracleum* near the place where the insect was taken; most of these contained the larvæ or newly changed pupæ of *Depressaria heracleana*, but in one I found a flesh-coloured *Noctua* larva, about 1⅛ inches long, with black specks on the sides, and a few short hairs springing from these specks, which I suppose to have been the larva of *D. templi*. I dug up the plant and placed it in a flower-pot, with gauze tied over the cut end of the stem, but on examining it in September no trace of pupa or dead larva was visible. It was not till August, 1869, that I became aware that the pupa of *D. templi* is to be found in the stem of the food plant. In that month I grubbed up, at Seafield Tower, near Kirkcaldy, a large brown *Noctua* pupa, somewhat like that of *Phlogophora meticulosa*, from which a fine female *Dasypolia templi* emerged about the middle of September.—J. BOSWELL SYME, Balmuto, Kirkcaldy.

—Since Mr. Herd's notice of the capture of this moth, nine other specimens have been found near Perth, all, I believe, at rest on stones.—A. SIMPSON, High Street, Perth, Feb., 1871.

Anticlea sinuata taken in Scotland.—In looking over Mr. T. Anderson's collection of insects, recently, I noticed a specimen of the above which had been bred by him from a larva found near Forfar. Mr. Anderson did not know the name of the moth, but remembered that the caterpillar which produced it was a yellowish looper, and fed upon *Galium verum*. From Mr. Jenner Fust's "Distribution of Lepidoptera in Britain," it would appear that this species has never been previously recorded from any locality in Britain north of Cambridge. – F. BUCHANAN WHITE, Perth.

Additions to the Scottish Insect-Fauna.—The following species are noticed in the "Entomologist's Annual" for 1871 as occurring in Scotland. In COLEOPTERA,—*Amara Quenseli*, Schön., (Braemar, Hislop,); *Ocalea latipennis*, Sharp, (Sharp and Hislop); *Aleochara fungivora*, Sharp, (Dumfries-shire, Sharp); *Oxypoda longipes*, Mulsant, (Aberlady, Sharp); *Placusa denticulata*, Sharp, (Rannoch and Strathglass, Sharp); *Xantholinus distans*, Muls., (Rannoch, Rye); *Homalium brevicorne*, Fr., (Balmuto, Syme); *Anacæna variabilis*, Sharp, (Sharp); *Tomicus nigritus*, Gyll., (Strathglass, Sharp). In LEPIDOPTERA,—*Swammerdamia nanivora*, Stainton, (Strathglass, Buchanan White); *Gelechia confinis*, Stainton, (Perth, Buchanan White). Further particulars will be found in the "Annual."—*Id.*

Habit of Polyommatus Artaxerxes.—I have noted, and Mr. W. Herd tells me that he has done the same, that this butterfly has a particular affection for *blue* flowers. While collecting near Kinfauns one day, I was much struck by the attraction a tall plant with blue flowers seemed to possess for *P. Artaxerxes*. Over and over again I took specimens off this plant, and in a very short time fresh individuals would arrive and settle on the flowers. Not being a botanist, I regret that I am unable to give the name of the plant.—JAMES STEWART, High Street, Perth. [From Mr. Stewart's description to me, the plant is probably the Field Scabious (*Knautia orvensis*), and another *blue* flower, the Bugloss (*Lycopsis arvensis*), seems also to be attractive to the little *Artaxerxes*.—ED.]

Pyrochroa pectinicornis.—Though I cannot give an accurate answer to the query of Mr. Hislop as to the time of appearance of *Pyrochroa pectinicornis*, I think I can give some indication on the subject. Its two English congeners both appear in the Spring in the perfect state; one of them often in April, the other in May. Turner certainly captured his specimens of *pectinicornis* in the Spring; and I think it probable that the first spell of fine weather in May would see it about in the localities where it occurs. I may add that Turner told me it was a nocturnal species, and that he found it "coming to light" when he was sugaring for moths; but I should hesitate to accept this without confirmation.—D. SHARP, Eccles, Thornhill, Dumfries.

THE CAPERCAILLIE.*

Tetrao Urogallus, Cabar Coille.

By ROBERT GRAY.

PERTHSHIRE and Forfarshire are at present the stronghold in Britain of this fine game bird. In these counties it breeds extensively, and has become so firmly established that proprietors of the forests in which it is found do not now object to its falling to the sportsman's gun. In some places, indeed, it has been thought prudent to thin the Capercaillies where they have become numerous. Mr Geikie, factor to the Earl of Airlie, lately informed me that he has seen as many as fifteen brace killed in a day by one shooting party. These birds are also abundant on the estate of the Earl of Breadalbane, where of late years they have increased to a great extent Stray birds are often seen in the counties adjacent to the two just mentioned. Numbers are sent to the Glasgow poulterers, but from the rankness of their flesh they are not much esteemed for the table—a

* From Mr Gray's forthcoming work on the Birds of Scotland, noticed at p. 20.

quality which in these degenerate poaching days must materially lessen the chances of their destruction.

Mr Elwes, whose interesting notes are now before me, remarks that as they are not included in the game laws, and can be shot at any time of year, it is a favourite plan in some places to reserve them until January and February, when with a few roe-deer and woodcocks, they help to make up a very good day's sport. As they keep mostly in high Scotch-fir woods, and are very wary, it is necessary to drive them with beaters, and though from their great size very easy to hit, a hard blow and large shot are necessary to bring them down. They are said to drive the black game very much away from the woods they frequent, and in some places are not much liked on this account.*

On consulting some of the older records respecting the occurrence of this "chieftain of the grouse tribe," I find that as far back as the early part of the seventeenth century its head quarters had been almost where they now are, and that it had spread from this centre northwards.† In Inverness-shire it had

* On one estate in Perthshire when Capercaillies are abundant, they are not encouraged, I understand, because they frighten the Pheasants. Ed. Sc. Nat.

†As an exception to this rule it may be mentioned that the Rev. J. Headrick, in his "View of Arran," published in 1807, remarks that the Capercaillie "formerly abounded" in that island, but seemed then to be extirpated. I have the satisfaction, however, of stating that the bird has been again introduced into the island, and is now (1870) observed in considerable numbers. From this district eggs have been obtained by parties at a distance, and experiments tried in Dumfriesshire and Galloway with a view to the re-establishment of the bird in the firwoods of these counties. These experiments have been so far successful that several broods have been dispersed throughout the south of Scotland, but from the want of sufficient cover it is extremely doubtful if the species can increase in that direction. Indeed, judging from newspaper records, it would appear that in several instances the birds have wandered from their native woods, and been destroyed by grouse shooters. In December, 1868, a fine male, in beautiful plumage, was shot in Lanarkshire by Henry Lees. Esq., on his moors at Auchengray, near Airdrie; and in the last week of November, 1869, two specimens—both females—were killed in Galloway: one in the neighbourhood of Newton-Stewart, the other at Auchencairn, Kirkcudbrightshire.

Again, writing from Dunipace, in Stirlingshire, Mr Harvie Brown says, "You will, I think, be glad to hear that the Capercaillie may now be considered as fairly established in this part of the country. Last year several birds bred in Torwood, and are now seen not only by the keepers but also by the gentlemen who shoot over the covers. They are also not unfrequently seen in the adjoining cover of Dalcswood, both males and females. They are not of course

lingered until 1745. Writing in 1794, the Rev. John Grant says:—"The last seen in Scotland was in the woods of Strathglass about thirty-two years ago;" but the bird must then have been but a rare straggler, as is evident from a note by the minister of Kiltarlity, written about the same period, in which he says:—The Caperkaily, or king of the wood, said to be a species of wild turkey, was formerly a native of this parish, and bred in the woods of Strathglass; one of these birds was killed about fifty or sixty years ago in the church-yard of Kiltarlity," —an ominous haunt, indeed, for the last of his race. Besides these notices, mention is made of the species in the statistical account of Urquhart and Glenmoriston, and other parishes—all records agreeing in the fact of the bird being extremely rare between the years 1745 and 1760, when it apparently became extinct.

The following is a copy of a letter written in 1617 by the royal sportsman, mentioned in the account of the Pheasant to the Earl of Tullibardine, ancestor of the Duke of Athole :—

"James R.,

"Right trustie and right well beloved cosen and counseller. We greet you well. Albeit our knowledge of your dutiful affection to the good of our service and your countrie's credite, doeth sufficientlie persuade us that you will earnestlie endeavour yourself to express the same be all the meanes in your power; yet there being some things in that behalf requisite, which seem, notwithstanding of so meane moment, as in that regaird both you and others might neglect the same, if our love and care of that, our native kingdom, made Us not the more to trie their nature and necessity, and accordingly to give order for preparation of everything that may in any sort import the honour and credite thereof. Which consideration, *and the known commoditie yee have to provide, capercaillies and termigantis*, have moved Us very earnestly to request you to employ

as yet in any numbers, but three or four are often seen together. They have doubtless spread in this direction frum Tullieallan through Dunmore, where a nest of eggs was found some years ago, though not hatched on account of an accident." R. G.

both your oune paines and the travelles of your friendis, for provision of each kind of the saidis foules, to be now and then sent to Us be way of present, be means of our deputy thesaurer, and so as the first sent thereof, may meet us on the 19th of April at Durham, and the rest as we shall happen to meet and rancounter them in other places on our way from thence to Berwick. The raritie of these foules will both make their estimation the more pretious and confirm the good opinion conceaved of the good cheare to be had there. For which respectis, not doubting but that yee will so much the more earnestlie endeavour yourself to give us good satisfaction anent the premises, as yee will do Us acceptable service, we bid you farewell. At Whitehall, the 14th Marche, 1617."

From this letter it would appear that the capercaillie had been one of the delicacies of the royal table during the reign of James in Scotland; and it is amusing to observe the somewhat impatient directions given to have birds forwarded to Durham to meet him there on a certain day, and others as he should "happen to rancounter them" in his route northwards. Modern taste would hardly seem to confirm the good opinion "conceaved" by his Majesty of these birds, but their "raritie" was perhaps more esteemed than the flavour of their flesh. The species, as we have seen, probably continued scarce for another century, and finally disappeared about the year 1758.

It is not quite so certain that "termigantis" have ever been in danger of extinction.

The Nidification of the Tree-Sparrow.—In connection with the breeding habits of this bird as observed in Scotland, I cannot speak from personal experience, but in one of the eastern counties of England—Cambridgeshire—I have taken a considerable number of their eggs. In that country the favoured site for their nests is in the holes of pollard willows, and other trees by the banks of rivers, ditches, &c. On both sides of the River Cam above Cambridge-town, long rows of pollard willows extend, and nearly every one of these trees contains—or at the time I was in the county, five years ago, contained—one, two, or more nests of the Tree Sparrow (*Passer montanus*.) Mr J. Allen Harker's note, therefore, on the nidification of this species in Scotland is all the more interesting, as showing how these birds, like many other species, are influenced in their choice of a nesting site by the opportunities afforded to them in different

localities. Whereas Mr J. Allen Harker has in Scotland only heard of a "single instance of one nesting in a hole in a decayed trunk," we in England have never met with a Tree-Sparrow's nest in any other situation. May this difference in habit in the same species not be partially accounted for by the fact that whereas pollard—and, consequently, hollow—trees are exceedingly common in England,—in some districts at all events,—they are rare in Scotland. It is perhaps noteworthy, also, that in such districts of England where pollarding is most practised, *there* the Tree-Sparrow appears to be most abundant. Is it not also possible (I will not say probable) that were we in Scotland to practice pollarding, and thus allow the moisture to eat holes into our willow and other trees, that the Tree-Sparrow might not become a more abundant species than it at present is, upon thus finding places congenial to its habits prepared for it? The fact of the distribution of many species northward is well known, and can be traced in many, if not in most cases, to changes in the aspect of the country; conversely in the year 1690 the Green Woodpecker *(Gecinus canus)* "made place for its nest with its beak in the oak tree," in the far northwest of Sutherland, as we are informed by Sir Robert Gordon, in his "History of the Earldom of Sutherland." *Now* that *great* forests of wood have disappeared, the Green Woodpecker likewise has departed.—JOHN A. HARVIE BROWN, Dunipace House, Falkirk, Jan. 12, 1871.

The Glaucous Gull.—(*Larus glaucus,*)—This beautiful gull has appeared on the Eastern shores of Scotland in unusual numbers this winter. Though generally regarded as a somewhat rare British bird, I have of late years observed that it regularly frequents the coasts of Caithness, Sutherland, and Ross, making its first appearance in September or October, and departing early in the month of April. It is perhaps nowhere more numerously met with on the mainland of Scotland than in Aberdeenshire. Two very fine specimens were sent to me, in the flesh, in the last week of December, 1870, by Mr. Alex. Mitchell, who informs me that young birds especially are this year very plentiful. Another correspondent in that quarter writes, that he never goes along the shore with his gun in quest of birds without seeing several glaucous gulls. The two birds now before me present the following measurement,—*Adult male*, length, 32 inches; extent of wing, 66 inches. *Young of second year*, length, 27 inches; extent of wing, 61 inches. In other parts of Scotland this conspicuous sea-gull is occasionally observed. In the outer Hebrides it occurs sometimes in considerable numbers, and when two or three old birds are seen together, they form a splendid sight as they wheel round in their flight, and sweep their snow-white figures athwart the dark clouds during a Hebridean storm.—ROBERT GRAY, Glasgow. Jan. 16.

Birds of the Northwest of Aberdeenshire.—A complete list of Scottish breeding birds would be hailed with satisfaction by, I am sure, most of those taking an interest in Scottish Natural History. But such a list cannot be compiled by one individual, or even by a few, however observant, and however assiduous in their task they may be; it requires one to be intimately acquainted with, and to be resident for years in, a locality, to become thoroughly acquainted with its natural history—each parish, or at most one or two parishes, requires a natural historian for itself, and if those interested in this pursuit in different localities of Scotland would but keep their eyes and ears open, and keep a register of what passes under their notice, and send in, after a time sufficient to verify

their individual observations, these registers to be published in Journals such as the "*Scottish Naturalist*," the end desired would soon be accomplished. The following is a list of the breeding birds in two parishes—Drumblade and Huntly—in the N. W. of Aberdeenshire, the eggs or young of all of which I have found, with the exception of one or two, and the eggs of these I know from the highest authority have been found :—

Teal (*Anas crecca*) ; Wild Duck (*A. Boschas*) ; Moorhen (*Gallinula chloropus*) ; Landrail (*Crex pratensis*) ; Jack Snipe* (*Scolopax Gallinula*) ; Common Snipe (*S. Gallinago*) ; Woodcock (*S. rusticola*) ; Common Sandpiper (*Totanus hypoleucos*) ; Red Shank (*T. calidris*) ; Curlew (*Numenius arquata*) ; [Heron (*Ardea cinerea*), doubtful] ; Peewit (*Vanellus cristatus*) ; Golden Plover (*Charadrius pluvialis*) ; Partridge (*Perdix cinerea*) ; Red Grouse (*Lagopus Scoticus*) ; Pheasant (*Phasianus colchicus*) ; Rock Dove (*Columba livia*), in the common domestic pigeon ; Ring Dove (*Columba palumbus*) ; Swift (*Cypselus apus*) ; Sand Martin (*Hirundo riparia*) ; Martin (*H. urbica*) ; Swallow (*H. rustica*) : Cuckoo (*Cuculus canorus*)—I have never found its egg, but from its very frequent occurrence it is highly probable that it breeds here ; Wren (*Troglodytes europæus*) ; Creeper (*Certhia familiaris*) ; Magpie (*Pica caudata*) ; Jackdaw (*Corvus Monedula*) ; Rook (*C. frugilegus*) ; Hooded Crow (*C. Cornix*) ; Carrion Crow (*C. corone*) ; Starling (*Sturnus vulgaris*) ; Bullfinch (*Loxia Pyrrhula*) ; Mountain Linnet (*Linota montium*) ; Linnet (*L. cannabina*) ; Goldfinch (*Carduelis elegans*) ; Greenfinch (*Coccothraustes chloris*) ; House Sparrow (*Passer domesticus*) ; Mountain Finch (*Fringilla montifringilla*) ; Chaffinch (*F. Cælebs*) ; Yellow Bunting (*Emberiza citrinella*) ; Blackheaded Bunting (*E. schæniclus*) ; Bunting (*E. miliaria*) ; Wood Lark (*Alauda arborea*) ; Sky Lark (*A. arvensis*) ; Meadow Pipit (*Anthus pratensis*) ; Grey Wagtail (*Motacilla flava*) ; Yellow or Ray's Wagtail (*M. boarula*) ; Pied Wagtail (*M. alba*†) ; Longtailed Tit (*Parus caudatus*) ; Cole Tit (*P. ater*) ; Blue Tit (*P. cæruleus*) ; Golden-crested Regulus (*Regulus cristatus*) ; Willow Warbler (*Sylvia Trochilus*) ; White Throat (*Curruca cinerea*) ; Wheat Ear (*Saxicola Œnanthe*) ; Whin Chat (*S. rubetra*) ; Red Start (*Ruticilla phœnicurus*) ; Red Breast (*Erythaca rubecula*) ; Hedge Accentor (*Accentor modularis*) ; Ring Ouzel (*Turdus torquatus*) ; Blackbird (*T. Merula*) ; [Red Wing (*T. Iliacus*), and Field Fare (*T. pilaris*) ; winter visitants] ; Song Thrush (*T. musicus*) ; Missel Thrush (*T. viscivorus*) ; Dipper (*Cinclus aquaticus*) ; Tawny Owl (*Syrnium Aluco*) ; White Owl (*Strix flammea*) ; Shorteared Owl (*Otus brachyotus*) ; Sparrow Hawk (*Accipiter Nisus*) ; Kestrel (*Falco tinnunculus*) ; Merlin (*F. Æsalon.*)—H. O. FORBES, Aberdeen.

The Greenland Shark.—(*Scymnus borealis.*)—Three specimens of this fish, usually rather rare on the British coast, have been caught in the bay at Aberdeen, within the last year, two having been caught in March, 1870, the largest of which was 10 feet long. It is now in the University Museum. The third specimen was caught on 26th January, 1871, but was quite small, being only 5½ feet in length. It was much infested with parasites, having an *Æga* attached to its skin, a *Larneopoda elongata* on each eye, close to the pupil, and on the gills many specimens of an *Entozoon*, I think a species of

*A very doubtful breeder in Britain. What grounds has Mr Forbes for thinking that the Jack Snipe *breeds* in Aberdeenshire? *Ed. Sc. Nat.*

† Otherwise called *M. Yarellii.*

Tristoma. The chief remarks I have to make refer, however, to the continuance of the heart's action, even after it was removed from the body. The fish was to all appearance dead, on the evening it was caught (Thursday); next morning it was opened, when the auricle was found to be still beating strongly and regularly, four times per minute. It seemed to contain only air, and a very little fluid. The contraction seemed to begin behind, and to be continued forwards towards the ventricle, and it was followed by a recoil, seemingly due to the elasticity of the muscular fibres of the auricle bringing it into its former position. The regularity of the movement did not seem to be affected by pricking with any sharp instrument. The ventricle was not seen to move from the time the fish was opened. On cutting out the gill arteries from among the flesh, the heart began to beat faster, and at last reached seven beats per minute, but after the heart and vessels were cut completely out, the motion became slower again—four to six beats per minute. It continued to beat till Monday evening, but became more and more feeble, though still very regular, and the intervals between the beats shorter, but by nine a.m. on Tuesday it had stopped. It had thus continued to beat nearly four days after it was cut out of the body of the fish, viz.,—from Friday forenoon till Monday evening. The only precautions taken were to cover it with a glass shade to keep it moist and to keep off dust.—J. TRAILL, University, Old Aberdeen, Feb. 17.

Squirrels in the North of Scotland.—In connection with Dr. Gordon's note on Squirrels in Moray (p. 19), we give the following cutting from the *Elgin Courant*:—

"Squirrels, we believe, first appeared north of Spey some twenty years ago. Writers of natural histories, not so long ago as that, tell us that squirrels were unknown in the north, and they certainly were very few. Half a century has, however, elapsed since there were squirrels in Roxburghshire, into which a nobleman is said to have introduced them. In that country, as also in Perthshire, they are now a great pest, and hunted down without mercy. The squirrel is a creature known to have a propensity to migrate, persistently pursuing its course over river, mountain, and moor. They came here from Perthshire, by the way of Glentruim, getting to the top of that glen we know not how, through the wilderness on both sides of Dalwhinnie. At all events that was the route of the squirrel invasion, for they made their first appearance among the trees about Invereshie and Aviemore, and the woods of Rothiemurchus. From Badenoch, or rather Strathspey, they crossed into Nairn or Morayshire, and their multiplication has been so rapid, that now scarcely a wood in the two counties is free from their ravages. In the woods of Cawdor, Darnaway, and Altyre, they were numerous fifteen years ago, but it is not more than five years since they came to the woods on Heldon Hill, and the Oak Wood, near Elgin. From Elgin they have gone to the woods about Gordon Castle, and the extensive plantations about Cullen House will soon receive a visit from them."

Madness in Animals.—We have frequently been asked, *How and what to observe and record*, so that persons of ordinary capacity and opportunity—aspiring to become naturalists, or simply desirous of aiding in the development of local Natural History—may contribute their quota to the *real* progress of scientific knowledge. Let us indicate *one* of the directions in which all who have an opportunity of observing the habits of the domestic animals—[and indeed all who are in the practice of reading newspapers and serials, and have the taste and

leisure for making "cuttings"—as we editors are given to do—relating to a particular group of subjects]—may become of real service to science.

We hear constantly of *Madness* in Animals. Bulls, cattle, dogs, horses, and even pigs, are frequently said to become *mad*; and their madness is usually supposed, though erroneously so, to be dependent on, or part of, the specific contagious disease technically known as *Rabies* or *Hydrophobia*. Many—perhaps the majority of—cases of so-called Madness in Animals are, however, quite unconnected with Rabies; but such madness is nevertheless wrongly spoken of as Rabidity. Now, it is of importance to collect authentic records of cases of animal madness, in which *Rabies can be proved not to exist*. Such non-rabietic madness is comparable with what is called *Insanity* in man. That animal madness and human insanity are essentially mental affections—functional cerebral derangements—of the same kind, there is every ground for believing. But sufficient *proof* is yet required to carry conviction to minds that are prejudiced against the belief or admission that other animals besides man have minds; and that their minds are equally subject to disturbance or derangement by many of the *causes that produce insanity in man*. If this latter double proposition be capable of proof—as there is every reason to believe it is—the fact will necessarily tend to loosen and lessen the distinction that is presently supposed to exist between man and other animals.

Believing that there are few problems in Comparative Psychology, or Comparative Pathology, of greater interest than that which relates to the *Physiology and Pathology of Mind in the Lower Animals*, we gladly throw open our columns for the record of illustrations of non-rabietic madness,—of *insanity in animals* comparable with that which exists—alas! only too commonly—in man. And we invite the attention in particular of our *zoological* readers to the subject, convinced of the promising and important—as well as comparatively novel—field it offers for original observation and investigation.

The Peewit.—An outcry is very properly being made in the north of England against the wholesale destruction of the eggs of the plover, or "peewit," which occurs every March. The eggs are considered a delicacy, and command 3d. to 6d. each. The nests of all birds, sitting or not, are ruthlessly robbed, until the bird—the best of farmers' friends—is now almost extinct. The war against the plovers is held by some to be one great cause of the difficulty of raising a turnip crop, and of the great increase of insects and slugs. It is proposed to petition for a Plovers' Bill.—*Times*.

GENERAL INFORMATION.

PAISLEY FREE MUSEUM.—By the time the second number of the "*Scottish Naturalist*" is in the hands of its readers, it is anticipated that the labour incidental to the formation of a library and museum will be so far advanced, as to admit of the opening of this building to the public. It may interest naturalists in distant parts of the country to hear what has been done towards forming a natural history collection for it. The museum proper is a large and handsome room, rectangular in form, and admirably lighted from the roof; a gallery running round this room is the portion of the building devoted to natural history. The specimens are disposed in wall-cases on the west, south, and east walls, in six large table-cases, three at each end of the gallery, and in a series of narrow

table-cases, extending round the front of the gallery. These latter contain the insects, and there is ample space beneath them for fitting up tiers of drawers as the specimens increase. The walls on each side of entrance (by a flight of stone steps) are hung with photographs of local interest. The wall-cases contain the vertebrata. On the west wall are, a case, illustrative on a small scale, of the comparative anatomy of the vertebrates, including a fine series of human skeletons, from the infant to the adult; and two cases of British Mammals. The whole of the south wall, and part of the east, are taken up by a fine collection of British birds, mounted on plain wooden stands, and disposed on brackets fastened to the backs of the cases. The Falconidæ, presented by Mr. Bell, (a member of the Paisley Philosophical Society,) are a very fine group, and the case of Ducks is deserving of special notice. Indeed, with but very few exceptions, the whole of the birds are in good condition, and reflect credit on the taxidermist. The desiderata are still many, especially among the sea-birds, but doubtless they will gradually diminish after the opening of the museum. The remaining cases on the east wall are to be occupied by British reptiles and fishes. The large table-cases contain collections of Mollusca, Crustacea, Echinodermata, &c., specimens of Rocks, Ores, and Chrystals. There are also small collections of Fossils, (principally Mollusca) and Prehistoric remains of urns, ornaments, &c. Not the least interesting case, at least to the good people of Paisley, is one which contains among other things, portions of the manuscript, a few plates and original drawings, of Wilson's American Ornithology. Wilson, it need scarcely be mentioned, was a native of Paisley. The collection of insects (Mr. Morris Young's) is a very valuable and interesting one; and, considering the poverty of insect collections in almost all local museums, may be said to be the most attractive feature of the gallery. The orders Coleoptera, Hymenoptera, Lepidoptera, Diptera, Neuroptera, Orthoptera, and Hemiptera, are represented; and a large proportion of the specimens have been collected either in Renfrewshire or the surrounding counties; furnishing a pretty complete series of the insect fauna of the district. On this account the collection will prove very serviceable to youthful students of entomology in the town, in assisting them to name and classify their captures, always a trying and disheartening task to beginners. The cases which contain the insects are only temporary, and it is very desireable that they should, at the earliest convenient moment, be removed to the new and more suitable cases prepared for them. A great deal remains to be done in the way of filling in blanks, and completing nomenclature, &c, but as the managing committee have secured the services of Mr. Young as curator, there is no fear of this portion of the museum being neglected. The lowest forms of animal life, the Protozoa and Cœlenterata, are entirely without representatives, but it is the intention of the curator to supply this defect when time and space permit. The small botanical collection is displayed to the best advantage. A cabinet of 140 shallow glazed drawers, each containing a specimen mounted on tinted paper; a number of herbarium books, and a portion of one of the table-cases (for the fruits, seeds, and more unwieldy dried plants) have been provided for the reception of British plants. It must be remembered that a large proportion of the collections have been presented by the Philosophical Society, and that many of its members have given valuable assistance in the work of gathering together the many objects of interest The inhabitants of Paisley are to be congratulated on the possession of a collection representing so well the natural history of the country, and which may reasonably be expected to be productive of no small benefit to the community at large—J. ALLEN HARKER.

PHYTOLOGY.

SCOTTISH PLANT-NAMES.

"IT seems desirable," writes Dr Prior in the introduction to the second edition of his interesting work on the "Popular Names of British Plants," "that these old names [of plants] should be preserved, but there is already much greater difficulty in obtaining a correct list of those of any particular district, and the meaning of them, than there was a generation ago, from the dying out of the race of herb-doctors, and of the simplers, generally females, who used to collect for them. It is doubtful, indeed, whether any one of this class could now be found, who has learnt them from tradition, and independently of modern books." "In the northern counties and Scotland, the nomenclature is very different from that of the middle and south of England, and contains many words of Norse origin, and many of Frisian, but unfortunately these have been so vaguely applied that nobody knows to what plants they, any of them, properly belong." "Popular plant names, quite as much as popular tales, superstitions, ballads and remedies, arise with a higher and more educated class of society, and merely survive in a lower after they have elsewhere become obsolete. We can scarcely read without a smile of scorn the meaning of such names as Fumitory, Devil's Bit, Consound, and Celandine. But it is to men of great celebrity in their day, to Greek and Latin writers, such as Theophrastus, Aristotle, Dioscorides, and Pliny, to Arabian physicians, the most accomplished men of their time, and to the authors and translators of our early herbals, that we are indebted for nearly all such names as these. We are not to criticise them, or attempt to explain them away, but honestly to trace them back to their origin, and in doing so to bear in mind, for our own humiliation, that those who have betrayed

such astonishing ignorance and superstition passed in their day for philosophers and men of letters."

Most Scottish botanists will probably agree with us in thinking that something might be done to rescue from that oblivion to which an increasing knowledge of modern botanical nomenclature, and greater contact with the world at large on the part of dwellers in hitherto secluded districts, is fast hurrying the local names of Scottish plants, and we will with pleasure publish from time to time in the "*Scottish Naturalist*" any lists that are forwarded to us.

In such lists may be noted :—

1st. The local name (with its scientific equivalent.)
2nd. The district where it is, or was, in use.
3rd. Whether the use of the name is common, or becoming obsolete.
4th. The probable derivation or origin.
5th. Any economic uses (for medicine, dyes, &c.,) to which the plants are put by the inhabitants of the district.

In the meantime we give as examples a few local names that we have met with :—

The first few we give are, or were, Galloway Plant-Names, and are extracted from a "Gallovidian Encyclopedia," published in 1824 by John Mactaggart, who seems to have derived much of his plant information from the "Yirb-wives" or herb gatherers. The etymology of some of these names seems to be rather obscure, and we should be obliged to any one who will assist in explaining them. *Hech-how*, is Hemlock *(Conium maculatum.)* *Moonog* is the Cranberry *(Vaccinium oxycoccos).* It is perhaps worth mentioning that in Inverness-shire *V. Vitis-Idæa* is called the cranberry, and that the fruit is sent to market in large quantittes. Primroses *(Primula vulgaris)* are *plum-rocks* or *pimroses*,—the latter name evidently a corruption of *primrose. Bullister* is the Sloe, *(Prunus communis)*, or rather a large form of it common on sea-shores, and is a form of *bullace*, which is again from the Latin *bullas. Robin-run-in-the-hedge* is Cleavers, *(Galium aparine)*, though a similar name, *Robin-run-in-the-hedge* is applied to *Nepeta Glechoma*, (Prior., p. 196). *Gowlins* or *Hornecks* appear to be Earth-nuts, (*Conopodium denudatum*) though Dr. Prior states that the name *Gowlan* (from *gulden*) is applied to yellow flowers, such as the Trollius, Caltha, &c. *Pasper* is Samphire *(Crithmum maritimum); Fows* is House-leek, *(Sempervivum);* and *gall-busses* or *-bushes*, are Sweet-Gale *(Myrica)*,—in Turner's Herbal the name is *Gall*, which Dr Prior suggests is a corruption of *galangale*, a name that may have been acquired from its fragrance while burning, and which through its intense bitterness has become confounded with *gall. Dishalago* is Coltsfoot *(Tussilago)*, and is apparently a cor-

ruption of *Tussilago*; while *Carsons* are Water-cresses *(Nasturtium)*, from *Carse*, the old spelling of *Cress*, A.S. *Caers*. *Dodjell reepan* "a beautiful plan common in marshy places," flower (or head of flowers) of a conical shape 'of a lovely red – but sometimes white, its smell very fine, and its root of a bulbous nature." "There are few districts in Scotland which have not their own name to this plant; in Annandale, and on the border, it is *Meadow rocket*; in the west and greater part of Ireland, *Mount Caper*." What is the plant? *Gymnadenia* or *Habenaria?*

In Ayrshire we find the Crab-apple *(Pyrus Malus)* called the *Scribe-tree*, and the Bird-cherry *(Prunus Padus)*, *Hagberry*, a name also found in the north of England, and of which Dr Prior gives the derivation. In the same county, *Lonicera Periclymenum* is called *Woodbine* but in Perthshire the other name, *Honeysuckle*, predominates. In Perthshire, *Oxalis acetosella*, the Wood Sorrel, is called *Lady's Clover*, and *French Sourock*,—the first from its delicate trifoliate leaf; the second from its acid taste, resembling that of the *Sourock*, *(Rumex acetosus.)* Then, we have Ragwort, *(Senecio Jacobæa,)* known by the name of *Weeby;* and Monkshood, *(Aconitum)*, by the appropriate term, "*Old Wives' Mutches.*" In Inverness-shire, the Aspen, *(Populus tremula)*, is known as the *Mountain*, or *Quaking, Ash*; and in Kirkcudbrightshire, the Quaking Grass, *(Briza)* is called *Mountain Flax*, and is used medicinally. Another plant of high medicinal repute for cattle, in the same county, is *Potentilla Tormentilla*, which is called *Tormèntil*, the accent being laid with great stress on the penultimate. In conclusion, we must say one word with regard to what species has most right to the term "Scotch Thistle." Dr. Prior says the Musk Thistle *(Carduus nutans,)* or the Cotton Thistle *(Onopordum acanthium);* a writer in the *Scottish Farmer*, discusses the claims of several species, but decides upon none; and the late Sir W. J. Hooker states that *Onopordum acanthium* is *cultivated* as the Scotch Thistle. Our own opinion agrees with that of the writer in the *Scottish Farmer*, and is that, as in the English Rose and the Irish Shamrock, the *identical* species is uncertain. If, however, we were asked to select any one species, as the Scotch Thistle, our choice would be the Spear Thistle *(Carduus lanceolatus.)*

LIST OF MOSSES FOUND IN THE VICINITY OF FORRES.

BY THE REV. JAMES KEITH, M.A.

THE following list has been made up mainly from a collection of Mosses gathered upwards of twenty years ago by Dr. J. G. Innes, of Forres, during the scanty intervals of leisure available for such pursuits in a busy professional life. This collection contains a few species from Grantown, Cawdor, and Glenfernes, discovered during a hasty visit to each of these localities, and these species have been mentioned in the list. All the rest are from the vicinity of Forres. The few discoveries

which have since been made in this district are also noticed.

The district in question possesses a rich and varied Flora, which renders it as interesting in a botanical point of view as it is noted for the beauty of its scenery and the amoenity of its climate. A nearly complete list of its flowering plants is recorded in the "Collectanea for a Flora of Moray," printed in 1839, under the auspices of Dr. Gordon of Birnie; but the Bryology of the district beyond the limits to which this list refers is still almost a virgin field, and the list is now published in the hope that it may serve as a nucleus for further discoveries, and an incentive to further study and research among so interesting a class of plants.

1.—ANDREÆA, Ehrhart.

1. *A. rupestris*, Linn., Hedw.—Above Sluie, common on higher grounds.

2.—SPHAGNUM, Dill.

2. *S. cymbifolium*, Dill, Ehrh.
3. *S acutifolium*, Ehrh.
4. *S. cuspidatum*, Dill, Ehrh.
5. *S. squarrosum*, Pers.

These Sphagna are all common.

3.- PHASCUM, Linn.

6. *P. cuspidatum*, Schreb.—Dyke, Invererne, &c.
7. *P. subulatum*, Linn.—Abbotshill, Dyke.

4.—GYMNOSTOMUM, Wils.

8. *G. rupestre*, Schwaegr.—Banks of the Findhorn, above Sluie.—J. K.

5.—WEISSIA, Hedwig.

9. *W. controversa*, Hedw.—Common.
10. *W. cirrhata*, Hedw.—Banks of Findhorn, &c.
11. *W. crispula*, Hedw.—Banks of Findhorn, &c.
12. *W. verticillata*, Brid.—Cothall.

6.—SELIGERIA, Br. and Sch.

13. *S. calcarea*, Br. and Sch.—Cawdor.

7.—CYNODONTIUM, Br. and Sch.

14. *C. Bruntoni*, Br. and Sch.—Banks of Findhorn and Divie, &c.

8.—DICRANUM, Hedw.

15. *D. pellucidum*, Hedw.—Above Sluie. Var. *serratum*.—Above Sluie.
16. *D. squarrosum*, Schrad.—Common. In fruit beside Altyre Burn.
17. *D. crispum*, Hedw.—About Forres, not common.
18. *D. varium*, Hedw.—Cothall.
19. *D. cerviculatum* Hedw.—Birdsyards wood.
20. *D. subulatum*, Hedw.—Birdsyards wood.
21. *D. heteromallum*, Hedw.—Very common.
22. *D. fuscescens*, Turner.—Glenfernes, J. K.
23. *D. scoparium*, Hedw.—Very common.
24. *D. palustre*, Bridel.—Birdsyards wood, &c.
25. *D. majus*, Turner.—Birdsyards wood.

9.—LEUCOBRYUM, Hampe.

26. *L. glaucum*, Hampe.—Manachie, &c. Not found in fruit.

10.—CERATODON, Bridel.

27. *C. purpureus*, Bridel.—Very common.

11.—CAMPYLOPUS, Bridel.

28. *C. flexuosus*, Dill., Lin.—Above Sluie.

12.—POTTIA, Ehrh.

29. *P. cavifolia*, Ehrh.—Wall top near Forres.
30. *P. truncata*, Br. & Sch.—Common.
31. *P. Heimii*, Br. & Sch.—Around Findhorn Bay.

13.—ANACALYPTA, Bohling.

32. *A. lanceolata*, Röhl.

14.—DISTICHIUM Br. & Sch.

33. *D. capillaceum*, Br. and Sch.—Banks of Findhorn. Common.

15.—TRICHOSTOMUM, Br. & Sch.

34. *T. tophaceum*, Brid. Cothall.
35. *T. flexicaule* Br. & Sch.—Cothall, &c.
36. *T. homomallum*, Br. & Sch.—Clunyhill, &c.

16.—TORTULA, Schreb.

37. *T. unguiculata*, Hedw.—Thornhill, Cothall, &c.
38. *T. fallax*, Hedw.—Cothall.
39. *T. muralis*, Timm.—Common.

40. *T. subulata*, Bridel.—Extremely common.
41. *T. ruralis*, Hedw.—Common.

17.—ENCALYPTA Schreb.

42. *E. vulgaris*, Hedw.—Greeshop, Moy, &c. Not common.

18.—HEDWIGIA, Ehrh.

43. *H. ciliata*, Hedw.—Lethen, Braemoray. Common on higher ground.

19.—SCHISTIDIUM, Br. & Sch.

44. *S. apocarpum*, Br. & Sch.—Common. Var. *strictum*.—Waterford.
45. *S. maritimum*, Br & Sch.—Burghead.

20.—GRIMMIA Ehrh.

46. *G. pulvinata*, Smith.—Very common.
47. *G. trichophylla*, Grev.—Above Sluie.

21.—RACOMITRIUM, Br. & Sch.

48. *R. aciculare*, Brid—Grantown, Glenfernes, &c.
49. *R. sudeticum*, Br. & Sch.—Grantown.
50. *R. fasciculare*, Brid.—Above Findhorn Bridge, Edinkillie, &c.
51. *R. heterostichum*, Brid.—Sluie, Manaole, &c.
52. *R. lanuginosum*, Brid.—Common, but rare in fruit.
53. *R. canescens*, Brid.—Broom of Moy, Waterford, Grantown, &c.

22.—PTYCHOMITRIUM, Br. & Sch.

54 *P. polyphyllum*, Br & Sch.—On a stone in the Findhorn, Glenfernes.

(To be continued.)

Lepigonum rupestre, *Lebel.*—This plant, which was found for the first time in Britain by Professor Boswell Syme, some ten years ago, in the Isle of Wight, can now be added to the list of Scottish plants. I found it growing last summer very abundantly on maritime rocks in the parish of Colvend, Kirkcudbrightshire. It differs from *L. marinum*, of which Dr. Hooker makes it a sub-species, by its glandular pubescence, its pedicels longer than the bracts, and its unwinged seeds, &c., and from *neglecta*, Syme, by its being perennial, by its more numerous stamens, and its shorter capsule. I shall be happy to distribute my stock of this plant among those botanists who would like to have Scottish specimens. F. BUCHANAN WHITE, Perth.

SCOTTISH SOCIETIES.

Aberdeen Natural History Society, 15th November.—Annual Meetting.—The following extract from the Secretary's Report will give an idea of the business brought before the Society during the previous year.

The principal papers read were :—"On the Structure of Fishes," by Professor Nicol; illustrated by a model, and by numerous preparations. "On Mushrooms," by Rev. Alexander Beverly; illustrated by diagrams and preserved specimens. "A List of Fungi found in the Neighbourhood of Forres," by Rev. James Keith. "On the Mollusca of Aberdeen, Banff, Moray, and the neighbouring Seas," by Mr. Robert Dawson; illustrated by maps and specimens of all the rarer and more interesting species. "On the Sandstones at Lossiemouth, and some of the Fossils recently found there," by Mr. James Grant. "Zoological Notes for 1869-70," by Mr. George Sim; a complete List of the Stalk-eyed Crustaceans hitherto found in this neighbourhood was appended, and specimens were exhibited. "On Plants, chiefly Mosses, found in Braemar, in July, 1869," by Mr. J. Roy; specimens of the rarer species, including *Grimmia montana*, new to Britain, were shown. "Notes on the occurrence of *Andreæa obovata*, and *A. alpestris*, in Braemar," by Rev. J. Fergusson; specimens of these mosses, which are new to Britain, were shown. Besides these papers, other subjects were brought under the notice of the Society by Dr. Ogilvie; one in particular, in which he showed specimens of curious forms of growth, including spiral twisting in different species of trees, under certain circumstances.

The following gentlemen were elected office-bearers for 1870-71 :—Mr. W. WILLIAMSON, *President*; Professor NICOL, and Dr. OGILVIE, *Vice-Presidents*; Mr. J. ROY, *Secretary.*—(Re-elected.) Mr. GEORGE SIM, *Treasurer.*—(Re-elected); Dr. STRUTHERS, Rev. Dr. SPENCE, Rev. ALEX. BEVERLY, Mr. ALEX. ADAMS, *Committee of Management.*

20th December.—Professor Nicol read a paper on the occurrence of the Maigre *(Sciæna aquila, L.)* at Aberdeen. In the course of his paper he stated that "this is a well-known fish of the Mediterranean. Formerly it seems to have been common on the western coast of France, but about the middle of last century became more rare. In 1803 ten were caught at Dieppe, but were not known to the fishermen. In Britain the first, mentioned by Dr. Fleming, was got in Zetland in 1819, and described by Dr. Neill. Several have been caught since on the coast of Cornwall, one, more than six feet long, in Cork Harbour, and a small one in the Firth of Forth. The specimen shown was got on the coast here on 1st December. The fish measured 5 feet 1 inch in length, and weighed 78 pounds. It has two fins with strong spines on the back. When first caught it was of a bright silvery-grey colour, with a deep red tint on the fins. Some of

its internal organs were also shown, as the heart, the stomach with the intestines, and the swimming bladder. The œsophagus is wide, short, and very rugged. The stomach large and with strange ridges. The swimming bladder is fixed above, to the back-bone, and has curious branched productions, along the sides, some of them running between the ribs into the flesh. The Maigre is still sold in the markets of Italy, and formerly was considered a great delicacy, the head being the part most in request. The ear-bones are very large, and were at one time worn as a cure for the colic. The specimen is now being preserved, and will be placed in the University Museum." Mr. Jas Taylor read a paper on some of the rarer Birds occasionally found in this district, and gave an account of their habits from his own observations, both here and in the Arctic regions.

Botanical Society of Edinburgh, 8th December, 1870.—A. BUCHAN, M.A., *President*, in the Chair.—The following business was transacted: (1) Prof. Balfour recorded the results of several botanical excursions in July and August, 1870. The first excursion mentioned was to Loch Lubnaig and Ben Ledi, on 18th July, when *Œnanthe pimpinelloides* was found for the first time in Scotland (see p. 24). The other excursions were to Loch Lomond, on 22d July, and to the Breadalbane Mts., (for seven days), on 4th August. (2) A paper, by Dr. Stirton, upon the Mosses of Ben Lawers. (3) "On the Varieties of *Hieracium stoloniflorum* of Waldst. and Kit. at different seasons," by Professor Balfour. Specimens of the different forms were exhibited. Mr. Sadler exhibited specimens of a form of *Centaurea Jacea*, from Forgandenny. Mr. John Sim recorded the discovery of *Butomus umbellatus* in abundance, by Col. Drummond Hay of Seggieden, on the banks of the Tay.* Mr. W. Evans presented specimens of *Calamagrostis lanceolata*, from Penicuik.

12th January, 1871.—A. BUCHAN, M.A., *President*, in the Chair.—The following papers were read,—(1) "On the Practical Application of Meteorology to the Improvement of Climate," by the President. (2) "The Structure and Measurements of Cells in *Hepaticæ*," by Dr. J. E. Edmond. (3) "On the Distribution of *Algæ*," by Professor Dickie, Aberdeen. (4) "On the Flora of the South of France," by Mr. J. F. Robinson. (5) "Memoranda on Fir-cones in the Museum at the Royal Botanic Garden," by Professor Dickson, Glasgow. Various exhibitions were made.

9th March.—A. BUCHAN, M.A., *President*, in the Chair.—Professor Balfour noticed the death of Dr. Franz Lagger, of Freiburg, a Foreign member of the Society; and also read a letter from Prof. Andersson, Stockholm, thanking the Society for his election as a Foreign member. The following communications were read:—(1) Report on the effects of the cutting down of Forests on the Climate and Health of the Mauritius. By Dr. ROGERS, Port Louis, Mauritius. Communicated by ALEXANDER BUCHAN, M.A., President. (2) On the Cultivation of New Zealand Flax (*Phormium tenax*.) By Dr. JAMES HECTOR, Wellington, N.Z. Communicated by Mr. SADLER. (3) Notes on the British Batrachian Ranunculi. By JAMES F. ROBINSON.—Illustrated by specimens from the University Herbarium. (4) Report on the Open Air Vegetation at the Royal Botanic Garden. By Mr M'NAB. (5) Statistics of the Botanical Class in the University of Edinburgh, from 1860 to 1870 inclusive. By Professor

*Possibly a colony from Loch Cluny, where the *Butomus* occurs as an introduced plant.—Ed. *Sc. Nat.*

BALFOUR. Recent additions to the Museum, Library, and Herbarium, at the Royal Garden, were exhibited.

Perthshire Society of Natural Science, 2d December—Dr. BUCHANAN WHITE, *President*, in the Chair.—Mr. John Sadler, Edinburgh, read a paper upon the Geographical distribution of Plants in Perthshire, and illustrated it by numerous specimens and diagrams. The President read a paper upon "Winter work for Naturalists."

5th January.—The *President* in the Chair.—A paper by Mr. W. Cameron was read, upon the "Ferns of Balquhidder," and was illustrated by specimens. Mr. Camer on enumerated the various species and their localities in the district, and alluded to the valuable economic uses of the common bracken for thatching houses; a cottage roof of bracken thatch would cost about £4, and last for ten years. A roof of this material was far better than one of slate for preserving an equable temperature in the house, and, in an artistic point of view, harmonized better with the surrounding scenery. Dr. Buchanan White read a paper upon the eggs of insects, and illustrated it with diagrams.

2d February.—Dr. BUCHANAN WHITE, *President*, in the Chair.—Mr. W. Herd read a paper upon the "Lepidoptera of Moncrieff Hill," and illustrated it with specimens of the various species. (We shall probably give extracts from this paper in a future number of the *Naturalist*.) Mr. C. Fleckstein gave an interesting account of the "Zoology and Botany of the Ancients," and traced the various degrees of knowledge attained from the time of Aristotle to that of Pliny.

Perthshire Literary and Antiquarian Society.—Under the auspices of this Society, Dr. M'Intosh of Murthly has been giving a course of Lectures on Zoology. These Lectures, which have been well attended and appreciated, were illustrated by numerous diagrams and specimens from Dr. M'Intosh's extensive collection.

NATURAL SCIENCE CHAIRS IN OUR UNIVERSITIES.

BY W. LAUDER LINDSAY, M.D., F.R S.E., F.L.S.

SECOND PAPER.

THE main purport of the present Paper is to discuss—necessarily very briefly—the following questions:—

I. *What is, or ought to be, the object and status of our University Chairs* of Natural Science?*

* What *English* University Chairs *are*, as compared with what they *ought to be*, is so well set forth in the chapter on "Liberal Education in Universities," in a volume recently published (1870), of "Lectures and Essays" by Prof. Seeley of Cambridge, that I venture strongly to commend the whole of the said chapter to the careful perusal of all who are interested in the *Reform of Science teaching in British Universities*.

II. *What are the qualifications desirable, or necessary, in their occupants?*

III. *Whether, or how far, do their occupants possess the requisite qualifications?*

It appears to me desirable to regard our University Chairs of Natural Science, from at least three different points of view, viz.,

a. In connection with their primary and most ostensible object, the Education of youth.

b. In relation to the Advancement of knowledge; and

c. As rewards for Distinction already achieved.

Unquestionably the Education, instruction, or training, of youth is the first and most important object of Natural Science Chairs. But what *is* the *proper* education of a University Student in Natural Science? We must bear in mind that a University is not a mere School, nor are its Students mere boys; and that the sort of teaching which is suited to the latter is not adapted to the former. A mere schoolmaster need not be deeply learned, and seldom is so; though he must, if he is to be efficient, have tact and firmness. Moderate learning will command the respect of boys, and satisfy *their* requirements. But the qualifications most important in a Professor are altogether different. "In order," says Professor Seeley (speaking of our two grandest Universities, Oxford and Cambridge, and especially of the latter) "to be a useful guide to the cleverest young men at their most impressionable age, he must be before all things a man of *power and learning*. . . . . A *man*, as compared with a *boy*, requires above all things *learned and profound* instruction. . . . Even if University teachers devote themselves absolutely to the work of *Education*, they will find the way to influence the Students most powerfully is by becoming as *learned* as possible," (p. 191.) The primary ambition of a Professor of Natural Science is, or ought to be, to make each of his students, or as many of them as possible, and to as great an extent as possible, themselves *Naturalists*. With such an object, it is not enough to acquaint them, by a series of dreary, meaningless *Readings*, with the contents of some text-book, or its equivalent a volume of MSS. Notes. It is infinitely more important that the Student should

be led to cultivate his powers of *observation* and of *generalisation*; that he should be taught the imperative value of *accuracy* in the one, and of *cautiousness* in the other; that he should be trained *in a practical way*, by laboratory and field work, to *collect, preserve, experiment, describe, and classify.* Every endeavour should be made to impart *enthusiasm* in the study of Nature, its objects and phenomena; to infuse a love of Science and of study for their own sakes, as means of culture, and as valuable mental acquisitions, as well as for their ultimate technical or economical applications. Now all this cannot be achieved by the current "Professorial system," by class-room harangues however eloquent, by mere rhetorical display. It can only be the fruit of object-teaching—of the demonstrational, experimental, or practical system—in which the *example*† of the Professor is of infinitely greater importance than his mere precept. Unless, therefore, the Professor's own acquirements are genuine, it is simply impossible he can train up race after race of enthusiastic young *Naturalists.* We have only to compare ourselves with *Germany*, as regards the character of the Natural Science Students sent forth from the Universities of the respective countries, to see what are the fruits of *real* teaching qualifications on the one hand, and of *spurious* ones on the other. We cannot for a moment, compare ourselves favourably either as to the number, or the character, of her naturalists, with Germany. In our own country the number of Naturalists manufactured by our Universities is very small compared on the one hand, with the number of Medical or other Students who attend Natural Science Classes, and on the other, with the number of Non-academical Naturalists, men of strong Natural History tastes, and of substantial acquirements among the general population, who have had no School or University teaching in Science at all.‡

Next to the training of youth, our University Chairs of Natural Science ought to be what they certainly are not—centres for the general *Cultivation of Science*—for the extension of the bounds of Scientific Knowledge—the diffusion of Scien-

† *Exemplo* plusquam ratione vivimus.

‡ Of this class of self-trained Naturalists, the late Hugh Miller may be fitly taken as a type.

tific Learning. It is not enough that every effort should be made towards such an end by the training up of ardent and accomplished young Naturalists, who are necessarily destined to scatter themselves throughout the world, and who will thus disseminate the results—whatever these may be—of their own accomplishments. It is highly desirable that the Professor himself should *add directly to scientific progress by the results of original research.* If he is not—he ought to be—in a position most favourable for the production of original work—the conditions for which are, according to Prof. Seeley—"Leisure: special ability: a limited field: and rewards in reputation and money, proportionate to exertion," (p. 188.) Unfortunately there is no Public opinion in this country demanding original research in our Professors: while in every other country in Europe it is deemed necessary "to encourage *thought and study* by special arrangements," (p. 190.) Again comparing ourselves with Germany, it has to be confessed that the kind and amount of *original work* produced by our Professors of Natural History are insignificant. The "insignificance of our Universities in the world of science is explained"—says Prof. Seeley, (p. 189)—"very naturally by the system pursued in them.... It has quite a different object from the *advance of knowledge*: and therefore naturally enough does not favour the advance of knowledge"—a conclusion or affirmation as startling as it is nevertheless true! It is perhaps natural to suppose that there is antagonism between aptitude *for original research and for teaching:* that the two classes of qualification are of entirely different kinds: that the man who devotes himself to the one will necessarily neglect the other. And to a certain extent this is true. But, that it is not altogether true appears from the evidence again of Prof. Seeley, who assures us that "Where the *spirit of original inquiry* is most active among the teachers, there the *teaching* is best: and on the other hand, that where it is languid or dormant, the teacher, however assiduous or conscientious, is degraded in character, and that such a University tends to become *a mere school.*" (p. 190.) §

§ Regarding the subject from a very different stand-point, a reviewer in "*Nature*," [for February 2, 1871, p. 263,] expresses his opinion, that in every Science "the widest *Culture* brings about the most telling and effective *Teaching.*"

In this country, Professorships are almost the only *Rewards* to which our young Naturalists can aspire. There are exceptions in the shape of Directorships of Geological Surveys or Botanical Gardens; but they are very few and far between. University Professorships, moreover, are themselves few: while their attractions—as will appear in a subsequent Paper of the present series—are utterly insufficient to induce any number of our ablest youths to devote themselves to Science; whose energies are consequently diverted into what are called more "practical" channels,—into the medical or legal professions—the church—the public services—or commerce,—all of which "pay," and provide the means of comfortable livelihood, while Science too frequently offers comparative starvation! In this view alone—to provide *prizes for distinction* in the different walks of Science—to attract a greater number of our youth, and a higher class of intellect, to the cultivation of Natural History—it is, as will afterwards appear, desirable, or necessary, that *Natural Science Chairs should be multiplied—more adequately endowed—and gifted with a higher status.*

There can be little doubt that the fundamental qualification in a Professor of Natural Science is a *thorough knowledge of the subject to be taught.* Now, there are different kinds, as well as degrees, of scientific knowledge. There is, on the one hand, that sort and amount which the student "gets up" from his class or text-book for his "Pass Examination": or which the schoolmaster acquires from a similar source, when he is called upon to teach the elements of Science in our schools. This is pre-eminently a *superficial* knowledge: which, while it may suffice for the purposes of elementary schools,—and for the instruction of mere children,—is of a kind that can command no respect from University students.* Knowledge is likely to

* There is much truth in the poet's distinction between *knowledge* and *wisdom*:—

> "*Knowledge* dwells
> In heads replete with thoughts of other men:
> *Wisdom* in minds attentive to their own.
> *Knowledge, a rude unprofitable mass—*
> *The mere materials with which Wisdom builds—*
> Till smooth'd, and squar'd, and fitted to its place,
> Does but *encumber whom it seems t'enrich.*"

be superficial in proportion as it professes to comprehend an extensive range of sciences or subjects. *Concentration* is a condition of profound learning. The true *savant*—the man who is *learned* in the proper sense of the term—concentrates his attention on a specific, or special, *limited department of Science.* Professor Tait of Edinburgh, in his opening address for 1870, said very truly,—and his opinion will be echoed by all our highest scientific authorities, in proportion to their own acquirements—"Scientific knowledge has reached such an immense development,* that *no one man* can now possibly master thoroughly more than one or two of its many branches. There can be no 'Admirable Crichtons' in *our* days!"† As regards Natural History, the further assertion would be strictly true, that no one man of ordinary capabilities can master more than *a section* of one of its constituent sciences. There is, for instance, no living Botanist, who is equally distinguished in Cryptogamic and Phænogamic Botany; while Botanists are distinguished—if distinguished at all—for their knowledge of particular groups of Phænogams—such as Rosæ, Salices, Hieracia, Rubi; or of those of this or that country or county; or of Ferns, Mosses, Lichens, Fungi, Algæ, Diatoms, or Desmids; or of only particular groups of Algæ, or Fungi, such as those which are microscopic, or fresh water, or parasitic in or on living bodies.‡ And yet there are men, who profess their perfect acquaintance with the whole range of Natural Science—expressing their readiness, and asserting their ability, to teach all its departments: men who are equally ready to accept Chairs of Chemistry, *or* Natural History; or Chemistry *and* Natural History; or of Natural and Physical Science; or of Applied Science; or of the specific Sciences of Botany, Zoology, Geology, and probably all the other "ologies" pertaining

*"The Horizon of the Sciences," says the late distinguished Master of Trinity, Dr. Whewell, "spreads wider and wider before us as we advance in our task of taking a survey of the *vast domain*." And long before his day, the Poet wrote—

> "*One Science only* will one genius fit,
> So vast is art, so narrow human wit."

†As reported in "Nature," December 1st, 1870, p. 90.

‡Thus, on the continent there are Journals, as well as endless Books and Papers, devoted exclusively to *Cryptogamic* Botany; or to Entomology, Ornithology, and other departments of Zoology.

to Natural History! To give an example of both a recent and a public kind. Only the other day, the University of Otago, New Zealand, advertised for candidates to fill its proposed "Chair of Natural Science." The knowledge required was "an extensive acquaintance with *all* the departments of Natural Science—as well as with *Chemistry*, *Mining*, and *Agriculture*—theoretical and practical!† Moreover, the Professor elect was, and is, to be *Curator of a General Museum*; and the University Council intimated, "it is expected the Professor will throw a large amount of *enthusiasm* into *this* department of his duty!' For this chair there were, I am told, twenty-three competitors. The unfortunate individual, who secures the favour of the Otago University Council, will find himself, I am disposed to think, in a very false position in more ways than one!‡

In strong contrast to *this* kind of "extensive acquaintance" with science is the knowledge of the man who makes himself master of a *limited subject*—whatever it may be—by resolutely studying, in the first place, all that has been written upon it in the chief European languages. Such knowledge is *critical* and *profound:* it alone is entitled to the designation of "learning;" and it is of a kind calculated to command the respect alike of the student and of the public. A profound knowledge of any department of science now-a-days requires, at least, a reading acquaintance with the chief continental languages,—especially German and French, Italian and Danish. It implies also a familiarity with Latin, and a certain knowledge of Greek. On the other hand, a profound knowledge of a department of science must be based partly, at least, on personal observation and experiment. It almost implies a certain amount or kind of *original research.*

Few of our Professors of Natural Science, however, possess the necessary linguistic qualifications for acquainting

† The advertisement in the newspapers of Edinburgh and London, of date September, 1870, bore that, "While an *extensive* acquaintance with *Natural Science* is indispensable, the University Council have resolved to give a preference *cæteris paribus* to the gentleman who shall produce the most satisfactory evidence of *ability to teach Chemistry and Mineralogy*, and the practical applications of these sciences to *Agriculture and Mining* respectively."

‡ In the *German* Universities there is a comparatively elaborate division of labour among a large staff of lecturers—numbering (*e.g.*,) at Heidelberg no less than sixty.

themselves with all the literature of any given department of Natural History. The kind and amount of knowledge they do possess is too frequently that which is simply superficial and elementary: "extensive" it may be, but it is usually not "profound." Moreover, it sometimes happens that, such as it is, it has to be acquired subsequent to appointment. In other words, before attempting to teach others, our Professors have first to educate themselves: and they do so to the same degree, and in the same sense, as the mere *schoolmaster*. Again, only a very few of our Professors have made real contributions to scientific knowledge—contributions that give them a decided place in the general world of science, and attach to their opinions the weight of *authority*. Some of them, indeed, however much they may have written of a so-called "popular" kind, have not added a single fact to science, or assisted in the interpretation or explanation of a single natural phenomenon!

A man may, however, have a very profound knowledge of a subject, and yet be altogether wanting in *Teaching capacity*. Ability to teach is indeed frequently a special and valuable endowment—combining or involving a number of important qualities. It implies, in the first place, readiness or *fluency* in speech: self-confidence and facility in the expression of ideas: command of abundant and appropriate language: clearness and attractiveness of style:

> "*Concise* his *diction*, let his *sense* be *clear;*
> Nor with the weight of *words* fatigue the ear":

earnestness, zeal and *enthusiasm*: *patience* with the stupid or dull of comprehension, leading to infinite painstaking: and *thoroughness* of work. He must be capable of maintaining *discipline* among an eminently troublesome race—university students: and he can only do so by possessing the qualities that command the *respect* of intelligent youth—such as learning, dignity, and manliness. A Professor of Natural Science should, moreover, be *youngish* or middle aged; fresh, active, in vigorous health, both of body and mind. Much of his work—such as that conducted in the *Laboratory* or the *Field*—is physically exhausting, and requires the best of bodily constitutions. Inability to teach properly not unfrequently arises from a Professor

having long survived his youthful or mature vigour and accomplishments, and from his being nevertheless compelled, by lack of adequate superannuation arrangements, to stick to office long after his services could be of any real use. Under such circumstances, a septuagenarian or octogenarian Professor is apt to become a mere driveller: unable to see to read his old MSS, written perhaps twenty or even fifty years ago: scarcely able to articulate or enunciate distinctly: disturbed, in his efforts at public speaking, by cough or faintness, or other forms of bodily debility—the fruits of age. In such cases, a lecture becomes a mere farce—painful in the extreme, equally to student and Professor. So far from *commanding respect, or maintaining necessary discipline*, the old man and his peculiarities serve only as a butt for the amusement or ridicule of his waggish students. There is an utter and mischievous waste of the student's time, and a pitiable sacrifice of the Professor's dignity and reputation.

So far from possessing the requisite qualifications for *Teaching*, our Professors are sometimes scarcely able to speak *extempore* at all: even their *Readings* from notes are repulsive on account of the tone of voice, or other peculiarities: occasionally there is some organic or functional defect in the organs of speech. There may be utter want of clearness in exposition—inability to place abstruse or abstract facts or laws in an attractive and intelligible style before a student: there may be much talk and few facts—great verbosity,* but little impression left on the student's mind, less by far than would be the result of his studying a good text-book at his own fire-side.† Frequently there is none of the *enthusiasm*—the *ingenium perfervidum*—of the true

*What Shakespeare says in "Love's Labour Lost" is too apt to be true of a so-called "eloquent" Professor:—

> "He draweth out the thread of his *verbosity*
> Finer than the staple of his *argument*."

To a Dr. Elder we owe the following Recipe for "a Popular Lecture":—"Take one drop of *thought*, beat it up to a bushel of *bubble*, and throw *rainbows* on it for one hour!"

† The teaching of a frothy, imaginative, superficial Professor has been said to produce in the student's mind some such result as that—

> "In describing our earth, he is apt to conjecture her,
> As *one* part pure earth, *ninety-nine* parts pure Lecturer!"

Naturalist: and without this very important quality, it is impossible to convert students into zealous naturalists; the Professor lectures on Botany, Zoology, or other "ology," in a perfunctory way, while his heart is perhaps far away with some *other* science, or with some occupation or recreation that is not science at all, and has no connection therewith. So far from being *patient* with the backward or slow, devoting himself to *catechetical*, or *tutorial*, teaching, he contents himself with reading his manuscript notes, and with thereby conducting his class through what he complacently calls a "Systematic Course of Lectures" on his speciality. So far from his work being *thorough* in teaching observation, manipulation, generalisation, description, classification, and the other accomplishments which go to make up the true Naturalist, he succeeds in developing none of these aptitudes: but communicates only a series of facts and theories in Natural History, the importance of which the student fails to perceive, and the knowledge of which is dearly purchased by the sacrifice of much valuable time and money.

There are yet certain other qualifications, which it is *desirable*, though not so essential, that a Professor of Natural Science should possess. For instance, the *power of pictorial representation* is, at least, a very great advantage—a most important accomplishment. He who cannot extemporise chalk figures on the black-board, or execute with his own fingers coloured drawings, both on the large and small scale, must depend entirely on the aid of professional artists, who are not generally Naturalists,* and who never *can* represent natural objects so accurately as the observer skilled in, from being accustomed to, their examination. Moreover, in such a case, where liberal money grants are not available for class "properties," the Professor's gallery of illustrations is likely to be lamentably meagre and old-fashioned. I have seen some of our University diagrams that looked as if they had been ante-diluvian, so utterly were they behind the age—unworthy of exhibition even in an infant

* There are exceptions. Thus Mr. Walter Fitch, of Kew, and Mr. Tuffen West, of London, have become—from their great experience in drawing, from the life, objects of Natural History – themselves excellent Naturalists,—men whose accuracy of observation, and fidelity of delineation may be thoroughly trusted; and both of them have well deserved their position as Fellows of the Linnean Society of London.

school! The great advantage of ability to execute one's own drawings is constantly being illustrated in the publications of our most eminent Naturalists—some of whose plates, if not works, would never have seen the light had it not been for the possession of such an accomplishment by their authors.*

In these days of "Popular" lecturing and "Popular" writing—when a Professor is incessantly called upon to appear before Mechanics' Institutes, and all kinds of Public Assemblies,† as well as more private Societies, and to contribute to a superabundant Periodical Literature, including the weekly and even the daily Press—it is at all events desirable that he should possess the not very common power of interesting the general Public by a popular style of writing and address. Unquestionably our Professors only consult their own interests in developing *this* class of accomplishments, to the sacrifice, perhaps, of all that is original or profound: for Popular lecturing and writing—catering for the Public gratification in Winter lectures, and Serial contributions—"pays" infinitely better than original research, which, in nine cases out of ten, not only does not "pay" at all, in the commercial sense, but involves the investigator in heavy—sometimes ruinous—personal expense.‡ "Popular" qualifications for lecturing and writing *de omnibus rebus* are greatly more common than special qualifications for the advancement of different departments of science. *Popularisers* abound—men having simply the "gift of the gab," as we call it expressively in Scot-

"Most ignorant of what they're most assured."

* For instance, the magnificent works of Harvey (of Dublin), on Marine Algæ; or of Greville (of Edinburgh), on Diatomaceæ.

† Including *Ladies'* classes, which are sometimes so well attended [*e.g.*, in Edinburgh and Glasgow,] that they "pay" better than the university male students' classes, and offer the strongest temptation to mere *Popularisation*, rather than to original research.

‡ This may be illustrated by the following incident. Recently a popular article I had written with little trouble for a Provincial newspaper had its destination changed, and appeared as a Review in a Metropolitan Quarterly. It was paid for at the rate of £6 10s. per sheet. But an elaborate paper, the fruit, perhaps, of several years' original research, in the same Quarterly is not paid for at all: and if the subject is very abstruse, or not considered scientifically orthodox, it may not even be accepted for publication!

land—who are fluent and self-confident with their merely superficial knowledge *—perhaps

But *originators* are extremely rare,—men of profound learning—original thinkers—successful discoverers experienced in recondite research. While the former class of expositors finds an appropriate platform in Mechanics' Institutes, and similar popular assemblies, it is from the other class—the *men of original genius*—that our Professors of Science *should be* drafted. The combination, in the same man, of aptitude for original research, with facility in popular exposition, is so rare, that it must frequently become a question with the Patrons of a University Chair, whether to prefer to a vacancy the mere Teacher: or the man possessed of great learning on the one hand, and of tried aptitude for original investigation on the other—who is an "authority" in the department of science, which he specially cultivates. Holding the views I do regarding the position that *ought to be* occupied by our University Chairs of Natural Science, I am very strongly of opinion that every sacrifice should be made—if it becomes necessary—in favour of the *man of original genius*. If the rhetorical, harangue, lecturing, or "professorial," system is to be perpetuated, any deficiency of power, on the part of the Professor, in the mere "grinding" of students for examination, could easily be remedied by the appointment of Tutors or Class Assistants possessed of the necessary readiness of speech, facility of popularising dry scientific details, and aptitude for the drudgery of inculcating and catechising. But the so-called "Professorial" system appears to me to be the worst that could be devised for making men Naturalists: and in what is

* There is an aphorism which says that "Much *Tongue* and much *Judgment* seldom go together: for *talking* and *thinking* are two quite different faculties: and commonly there is most *depth* where there is least *noise*"! And long ago Bacon said—"There is nothing makes a man *speak much* more than to *know little*." In another form Butler puts it:—

> "All *Smatt'rers* are more brisk and pert
> Than those who *understand* an art:
> As little sparkles shine more bright
> Than glowing coals that give them light."

And Roscommon says:—

> "The men who *labour* and digest things most
> Will be much apter to despair than boast."

contra-distinguished as *Practical*, Laboratory, or Field, teaching, the man of original mind—who has acquired his own knowledge by personal investigation—would be quite at home—*facile princeps.*

If we attempt to

"See ourselves as *others* see us:" *

if we contemplate our University Chairs of Natural Science and their results *(e.g.,)* through *German* spectacles, we cannot fail to be humiliated. In Philosophy, Professor Seely asks, "Has not *The German School* sprung entirely from the Universities? Were not Kant, Fichte, Schelling, and Hegel, without exception, University Professors." (p. 215). And it has to be added that the position of German Universities in relation to Natural Science has been similar. The ablest Naturalists of *Germany*—using the latter word in its widest geographical sense—are, or have been, University Professors. Governments, which are the patrons of the chairs, and which, in some cases at least, have endowed them munificently—compared with the emoluments attached to similar Professoriates in this country—look out for the most disguished men—*inviting* them from inferior to superior positions—thus directly rewarding conspicuous merit, and rendering unnecessary the humiliating candidatures to which our own most eminent Naturalists have so frequently to subject themselves. In our own country the most eminent of our Naturalists are not, and never were, *University Professors*; and in the training of many of them, University Lecturing never had a share.† Thus Darwin, Owen, Huxley, Hooker, Bentham, Berkeley, Murchison, Lyell, Lubbock, Sclater, Wallace, Gwyn-Jeffreys, among the living; Greville, Hugh Miller, and many others, among the dead—do not, or never did—hold *University*

* "O wad some power the giftie gie us
To see ourselves as others see us:
It wad *frae mony a blunder* free us,
And foolish notion."—BURNS.

†Such a man as Hugh Miller was "*abnormis sapiens*" as Horace calls it; in other words,

"Of plain good sense, untutored in the schools."

appointments.† On the other hand, some of our Professors of Natural History hold *no* position whatever in the ranks of real science; the mention of their names merely creates a smile in the genuine Naturalist: their opinions carry no "authority": and they pass quietly away without leaving a single scientific fact to be identified hereafter with their personality! They may have done their work decently as schoolmasters: may have expended a vast amount of toil in, and made a goodly sum of money by, Literary hack-work—such as compilations in the form of Text-Books, Encyclopædia, and Review Articles: may have done, in various ways, much real service of other kinds in their day and generation: but they have not—according to my views—properly discharged the duties of University Professoriates: have added nothing to the éclat of their colleges: have made no direct or noteworthy contributions to progress in any department of the very wide domain of Natural Science!

> . . . . "They never say
> A single thing that's *new*, but all they do
> Is to clothe old ideas in language new,
> Turning the same things o'er and o'er again,
> And upside down." . . . .

†I have here mentioned only a few of the names, which at present bulk most conspicuously in the forefront of Natural Science in our own country. But there are many other younger men, less known as yet to fame, of whom it is feeble praise to say that, in all that constitutes *genuine* qualification or accomplishment, they are the superiors of most of their more fortunate rivals, who now occupy—though they cannot be said to adorn—our Professional chairs!

The Mistletoe in Scotland.—We understand that for some years attempts have been made by Mr. Gowanlock, Gardener to the Murray Royal Institution, Perth, to inoculate various fruit trees in the grounds of that Institution with the juice of the berries—including the seeds—of the common Mistletoe *(Viscum album L.)* of Shropshire and Herefordshire. He has had various foreshadowings of success, which has culminated in the growth of a handsome vigorous plant, about a foot high, from the upper part of the stem of an apple tree, in an exposed part of the said grounds. There is, however, nothing really remarkable in the growth of the mistletoe in *Scotland*. The incident in question only shews (as does also the record of the fact in Hooker & Arnott's "British Flora," that mistletoe grows extensively—having originally been introduced in some similar way—at Meikleour, in the neighbourhood of Perth,) that it is a mistake to suppose that this plant does not flourish in Britain north of the midland counties of *England*.

ZOOLOGY.

THE LEPIDOPTERA OF AYRSHIRE.

By J. P. DUNCAN.

AYRSHIRE, as a field for entomological research, is very extensive and diversified—the coast for miles rocky and precipitous—wild and romantic dells—extensive tracts of heathy moors, with clumps of stunted birches (the favourite food of many of the larvæ of our rarer native insects)—extensive ranges of gently sloping hills, stretching onwards for miles, covered over with heath and marshes—fresh-water lochs, and gently flowing streams, with banks adorned with flowers of every hue—large tracts of natural meadows, swarming with insect life—deep and woody glens, admired for their picturesque and romantic beauty—forests of pine, beech, elm, and sturdy oaks of a hundred years—belts and clumps of other trees of less magnitude, planted both to shelter and to beautify the landscape—hedges of white thorn, intermingled with osiers and willows—old baronial castles and ecclesiastical edifices, of the thirteenth and fourteenth centuries, whose mouldering piles are mantled over with the evergreen ivy (whose blossoms are so attractive to many of our rarer *Noctuæ*). It is quite obvious, then, that such a county as this, with such a variety of localities, and so diversified in its features, must offer to the zealous and persevering student of entomology, a rich and interesting field for investigation.

For the last twenty-four years I have been engaged less or more, during my leisure hours, in visiting almost every suitable locality, that appeared to me calculated to produce at the pro-

per seasons, certain species of insects; and in ascertaining what particular species were to be found in our inland and rural districts, as well as on the maritime coasts of the county.

The list, when completed, will shew with what success my labours have been crowned. With very few exceptions, the captures have been all my own, and the greater majority of them have been either reared from the ova, or bred from the larvæ; the remainder have been taken by the net, and a few by sugaring.

RHOPALOCERA.

COLIAS EDUSA.—This butterfly was taken in the month of June, 1854, in a garden at Newfield; another, the same year, near Fullarton House, and some others in different localities. No account of its appearance in the county since.

PIERIS BRASSICÆ swarms in every garden; the larvæ commit great havoc among the cabbages and green kale.

P. RAPÆ.—Abundant in all our gardens. Occasionally varieties of this insect are taken.

P. NAPI is abundant in all our turnip fields, and roadsides. We have frequently captured some pretty varieties of this insect, especially in localities where the *Nasturtium officinale* was growing abundantly.

ANTHOCHARIS CARDAMINES.—This pretty butterfly is generally distributed throughout the district, and is in some localities rather common, especially by damp roadsides and marshy places, where the *Cardamine pratensis* is found.

LASIOMMATA EGERIA.—This species is rather local, and nowhere abundant in the county. The only locality known to me is one near Ballochmyle Bridge, in an open wood.

L. MEGÆRA may be found in almost every parish, by the roadsides, and edges of dry cultivated fields, in June, August, and September.

SATYRUS SEMELE is very abundant here, from Ayr to Irvine, all along the sea shore, on the sand hills. The larvæ feed on the *Triticum repens* by night, and have been picked off that plant in dozens, by the writer of this list.

S. JANIRA.—This species is by far the most abundant of our

Diurni. In every natural meadow throughout the county, this sombre-looking butterfly is to be found. Not unfrequently, varieties of this insect are taken; and, at times, we have taken both the males and females, and have scarcely been able to distinguish the one sex from the other.

S. TITHONUS.—This butterfly must be regarded as a rare insect in the west of Scotland. There is only one authenticated locality, where a few specimens were taken twenty years ago, on a grassy embankment in the parish of Dundonald, and district of Kyle.

S. HYPERANTHUS has been taken in different localities here, and is by no means scarce, though somewhat local in its *habitats*. The larvæ will be found, if looked for, feeding on *Aira cæspitosa* by night.

EREBIA BLANDINA.—Common in the month of July, on a marshy piece of ground skirting Loch Doon. This is the only locality known to me in the county where it is found.

CŒNONYMPHA DAVUS is far from being uncommon here. It appears on Shewalton Moss, and also on the sand hills, near Monkton, in July. It appears also occasionally on Paisley Moss, in June.

C. PAMPHILUS.—This very common insect is found in every parish of the county. All along the sea shore from Ayr to Ardrossan it is abundant, and found from May to September.

VANESSA CARDUI is generally distributed throughout the district of Kyle. It occurs in considerable numbers in some seasons, and then completely disappears in others. The larvæ are often found on the *Carduus arvensis*.

V. ATALANTA is abundant with us every season, frequenting all the chief gardens in the neighbourhood of Ayr, and other places in the north and south of the county. The larvæ are common on the stinging nettle, especially when sheltered by some hedge or fence; it is easily reared in confinement.

V. IO.—This beautiful butterfly—styled by one of our naturalists *omnium regina*—is not common in the county. In the parish of Monkton it is more frequently observed than in any other place in the west. About fourteen years ago we took a batch of the larvæ—I think about forty—from a clump of nettles growing in the corner of a field and the same year (1857) a

considerable number of the imago were taken, near the village of Symington. I have neither seen *Io*, nor heard of any captures, since the above date.

V. URTICÆ is abundant everywhere throughout the county; every season we frequently pass clumps of the Stinging Nettle with batches of from forty to sixty of the larvæ feeding on that plant. This insect frequently furnishes beautiful and striking varieties, when reared from the larvæ in confinement.

ARGYNNIS AGLAIA.—This insect is abundantly distributed along the sea-coast, on the sand hills, where not unfrequently the pupæ are found attached to the stalks of the bent-grass (*Elymus arenarius*).*

A. SELENE is found in some plenty in a marshy piece of ground near Dundonald Loch, also near Tarbolton Loch, and a few other localities in the county.

A. EUPHROSYNE.—This butterfly occurs in the same locality as the former, but is not so common, and appears rather earlier than *Selene*.

MELITÆA ARTEMIS has hitherto been considered rare in Ayrshire, and even yet cannot be said to be found in many localities; it, however, frequents a damp meadow near the farm of Langholm, where we first caught it, in the month of May, sitting on the *Scabiosa succisa*, (Devil's-bit Scabious). The only other place of its resort is a marsh at the foot of a wood near Hill House.

THECLA RUBI.—This insect has appeared in several localities here. One season, not many years ago, a few specimens were taken flying among broom; and on another occasion, in a different locality, several worn-out individuals were captured while flying over bramble bushes, in the month of June.

T. QUERCUS cannot be said to be a common insect here. One locality only is known to me, where it has been captured; this was in a wood near the village of Monkton, in 1856.

POLYOMMATUS PHLÆAS.—This pretty little butterfly is abundantly distributed throughout the county, and is nowhere so abundant as on the sand hills skirting the sea-shore. There

* The larvæ do not feed on this plant, (though it makes use of it in this way), but on species of violet.—ED.

must be several broods of it throughout the year, for it is found in fine condition from April to September.

Lycæna Alsus.—This delicate little butterfly, the smallest of our native species, is rather local, though generally distributed throughout the district. It is in some plenty on the sand hills, and along the banks of the line of railway from Monkton to Troon.

L. Alexis is a very abundant insect, and is generally distributed over all the county. Its *habitats* are grassy meadows and pasture-lands, and it may be found from June to September.

L. Artaxerxes is by no means common in Ayrshire, and is local in its distribution. The locality where it used to be captured has undergone considerable alterations, and I fear it has been completely extirpated from the place where we were wont to find it in some plenty. It is also found on the rising ground near Loch Doon.

Thanaos Tages.—This species is generally distributed throughout the county and not unfrequently found on dry heaths and commons, in the neighbourhood of Troon, in the month of May ; especially where the *Lotus corniculatus* (Bird's-foot trefoil), the food of the *larvæ*, grows in abundance.

NOTES ON SOME OF THE RARE BIRDS THAT HAVE BEEN OBTAINED IN THE EAST OF FIFE DURING RECENT YEARS.

By ROBERT WALKER, F.G.S.E.

ALL the birds given in the following list have come under my own observation, with the exception of two which I give on the authority of Mr. R. Gray ; the names are after Yarrell.

White-tailed Eagle *(Haliætus albicilla).*—A young specimen of this eagle was shot at Kinkell rocks, close to the edge of the sea, on the 29th December, 1866.

Peregrine Falcon *(Falco peregrinus).*—Occasionally seen. There was a male shot at Eden, in February, 1864, while making off with a Golden Plover which he had just caught,

—the plover escaped. A pair of these birds had a nest on the Isle of May, in 1869.

Honey Buzzard *(Pernis apivorus).*—One shot near Balcaskie, in September, 1863.

Great Grey Shrike *(Lanius excubitor).*—A specimen shot at Kenley, in February or March, 1845.

Red-backed Shrike *(Lanius collurio).*—Mr. R. Gray states, in Turnbull's "Birds of East Lothian," that an example of this shrike was killed near Cupar Fife, 1861.

Shore Lark *(Alauda alpestris).*—Two specimens of this bird were caught at a farm in the neighbourhood of St. Andrews, in the winter of 1865. Another was shot at the "Out-head," St. Andrews, on the 31st December, 1869: it appeared to be associating with Meadow Pipits, one of which was killed along with it.

Rose-coloured Pastor *(Pastor roseus).*—A fine male was shot near Cupar Fife, in August, 1863. (Mr. R. Gray, in "Birds of East Lothian.")

Jay *(Garrulus glandarius).*—This bird, which was not uncommon at one time, has now become rare in the east of Fife. There was one shot at Waterless Wood, in September, 1868.

Great Spotted Woodpecker *(Picus major).*—One shot in Dura Den, in October, 1863. In the autumn of 1868, a considerable number of specimens of this bird were obtained in the east of Fife: indeed, that year they seem to have occurred here and there along all the east coast. I examined a number of those from the east of Fife: they were all birds of the year.

Little Bustard *(Otis tetrax).*—A female shot at Burnside, on the 6th March, 1840.

Great Plover *(Œdicnemus crepitans).*—A specimen of this bird was shot in a turnip field, at Stravithie, near St. Andrews, on the 27th January, 1858.

Dotterel *(Charadrius morinellus).*—One obtained at Largoward, in the spring of 1866; another at Kenley, in the spring of 1868.

Common Bittern (*Botaurus stellaris*).—I have only seen the Bittern once in Fife. This was in the winter of 1858, when one was started, after a good deal of trouble, out of a

marshy place, amongst reeds, on Tents Moor. A fine specimen was shot on the estate of Ochterlony, Forfarshire, in the winter of 1866.

Green Shank (*Totanus glottis*).—Occasionally seen. One shot at Eden, in the winter of 1864.

Ruff (*Machetes pugnax*).—I have seen this bird two or three times on Tents Moor; and there was a Reeve shot there in May, 1865.

Purple Sandpiper (*Tringa maritima*).—Three birds of this species were shot amongst the rocks at St. Andrews, in the winter of 1858; and, during the last winter, some two or three were got about the same place.

Pink-footed Goose (*Anser brachyrhynchus*).—This goose has been frequently obtained in the neighbourhood of St. Andrews in late years. It is either now more abundant than it was formerly, or, what is perhaps not unlikely, it may not have been heretofore distinguished from the other species.

Bernicle Goose (*Anser leucopsis*).—This is a rather rare species in the east of Fife. One was shot near Boarhills, in the winter of 1855; another near Eden, October, 1870.

Mute Swan (*Cygnus Olor*).—An individual of this species was shot at the "East Neuk of Fife," in the winter of 1867. I was told that three of these birds frequented the "East Neuk" for some time that winter; of course, it is quite possible that these birds may have escaped from some preserve, but, if so, nothing whatever could be learned as to the place from whence they had strayed.

Shoveler (*Anas clypeata*).—A female specimen of this duck was shot near Dairsie, in the winter of 1839.

Pin-tail Duck (*Anas acuta*).—A female shot at Eden, in December, 1869; and there was a male, in fine plumage, shot at the same place, in February, 1870.

Smew (*Mergus albellus*).—A female shot at Eden, in the winter of 1837; and a fine male shot in the Kenley, 16th February, 1871,—this bird had ten minnows in its stomach, most of them of full size.

Goosander (*Mergus merganser*).—Has been occasionally obtained. A male, in fine adult plumage, was shot on Loch Leven, in January, 1871.

Red-necked Grebe (*Podiceps rubricollis*).—One killed near the sea, to the east of Kingsbarns, February, 1856; another shot at Eden, March, 1870.

Great Northern Diver (*Colymbus glacialis*).—Rarely procured in adult plumage. Two fine males, in splendid condition, were caught in the salmon nets at Tents Moor, in the beginning of June, 1870.

Fulmar Petrel (*Procellaria glacialis*).—I found an adult specimen of this bird on the beach, to the east of St. Andrews, on the 6th July, 1867; a wounded bird was caught on the West Sands, in October, 1868; and another was shot at Eden, December, 1870.

Manx Shearwater (*Puffinus Anglorum*).—One shot in St. Andrews Bay, in June, 1870.

Forked-tailed Petrel (*Thalassidroma Leachii*).—A fine specimen of this bird was shot, on the 29th April, 1868, amongst the rocks, nearly opposite the Club House, St. Andrews.

Storm Petrel (*Thalassidroma pelagica*).—Occasionally found dead, or in a dying state, on the beach after storms.

University, St. Andrews.

Extinction of Rare Birds.—Permit me to say a few words upon the proposition made by your correspondent—Mr. H. O. Forbes—in the 2d number of "*The Scottish Naturalist*," p. 47, viz.,—*That* of arriving at a complete List of Scottish Breeding Birds, by giving, from time to time, separate lists of birds found breeding in limited areas, such as parishes.

In making the following remarks, I hope you will not consider that I in any way wish to be the means of limiting the information given by your various correspondents, *further than is necessary* for the preservation of our rarer species. Such a plan as your correspondent proposes (and I speak from painful experience) is one which has had, and will again have, the most baneful effects upon the increase of our rarer birds. In thus stating a limited area, or areas, wherein species are known to breed, instead of being satisfied with a more extensive district, your correspondent must surely have overlooked the fact that unprincipled persons, dealers, and others, will be assisted thereby in obtaining, (in some cases *wholesale*), eggs of many of our rarer birds, and this too in spite of all attempts to frustrate them, by the proprietors or other persons really interested in the welfare and increase of our rarer species. The consequences of such minute information are easy to conjecture. In course of time, (and in many cases *no great length of time is required to effect it*), species, comparatively rare, or local in their distribution, will cease to exist as breeding species at all.

Thus will the interests of all *true* naturalists, and lovers of British birds, who "take an interest in Scottish Natural History," be seriously damaged instead of forwarded. The knowledge which naturalists possess concerning the distribution of our rarer British birds in Scotland, is already all-sufficient for scientific purposes. Why then expose localities, and directly or indirectly lead to their extermination? Why add even one link to the chain of destruction?—J. A. HARVIE BROWN, Dunipace House, Falkirk, 2d April.

Arrival of the Squirrel in Sutherland.—I may state that the Squirrel has within the last two years made its appearance in the east of Sutherland, as I am informed by Mr. MacKenzie of Dornoch.—*Id.*

Note on the Capercaillie.—The following extract from the first volume of Grave's "British Ornithology" would put the extinction of the Capercaillie at a much later date than 1758. I cannot give the exact date of the publication of Grave's work, but his plate bears date 1813.

"This species is nearly extinct in Great Britain; two instances of its being killed in Scotland within these few years are the only satisfactory accounts we have received of its being recently killed in the kingdoms. One was killed by a gentleman (of the name of Henderson) near Fort-William, about six years ago, and sent to Dundee; but the vessel that conveyed it to London was detained so long on the passage that the bird became so putrid that only the head and legs could be preserved. The other specimen was shot by Captain Stanton, near Burrowstone-Ness, two winters ago; they were both males. Some few are said to be yet remaining in the pine forests of Scotland, and also in the mountainous parts of Ireland."—J. H. GURNEY junr., 2 Beta Place, Alpha Road, London, April 5th 1871.

Birds of Aberdeenshire.—I observe in the "*Scottish Naturalist*" of April, 1871, a list of the breeding birds of the N. W. of Aberdeenshire, by Mr. Forbes. To prevent repetition I shall here only name what I have got in this locality (Inverurie) in addition to his.

Long-eared Owl (*Otus vulgaris*); Spotted Flycatcher (*Muscicapa grisola*); Sedge Warbler (*Salicaria Phragmitis*); Great Titmouse (*Parus major*); Tree Pipit (*Anthus arboreus*); Siskin (*Carduelis spinus*); Lesser Redpole (*Linota linaria*); Common Crossbill (*Loxia curvirostra*); Night Jar (*Caprimulgus Europaeus*); Black Grouse (*Tetrao tetrix*); Oyster Catcher (*Haematopus ostralegus*); Coot (*Fulica atra*); Little Grebe (*Podiceps minor*); Black-headed Gull (*Larus ridibundus*). The eggs of the Common Heron (*Ardea cinerea*) I got at Hatton Castle near Turriff. The egg of the Cuckoo (*Cuculus canorus*) has been found here, in the nests of the Sky Lark, Meadow Pipit, and Hedge Sparrow. I shall likewise mention a few visitors that I have observed in this locality, but I am not aware of any of them breeding here. Hooper (*Cygnus ferus*); Cormorant (*Phalacrocorax Carbo*); Little Bittern (*Botaurus minutus*); Scaup Duck (*Fuligula marila*); Tree Sparrow (*Passer montanus*); Green Shank (*Totanus glottis*); Osprey (*Pandion Haliætus*); Wigeon (*Anas Penelope*); Pochard (*Fuligula ferina*); Tufted Duck (*Fuligula cristata*); Golden Eye (*Fuligula clangula*); Goosander (*Mergus merganser*); King Fisher (*Alcedo ispida*); Kittiwake (*Larus tridactylus*); Herring Gull (*Larus argentatus*); Dunlin (*Tringa variabilis*); Snow Bunting (*Plectrophanes nivalis*). The

Green Shank was observed at Kinnord, near Ballater, and one of each of the five prior to it has been shot here, but I am not aware of more. I also observe that Mr. Forbes has got in Drumblade and Huntly the eggs of four birds that I have not met with here, viz ,—Wood Lark (*Alauda arborea*) ; Mountain Finch (*Fringilla montifringilla*) ; Short-eared Owl (*Otus brachyotus*) ; Jack Snipe (*Scolopax gallinula*). I am doubtful of the two first named breeding in Scotland. The Short-eared Owl I have got, but never its eggs ; I have observed the Jack Snipe here during the summer months, but I have never got its eggs.—JAMES GARROW, 40 Market Place, Inverurie.

NOTES ON CERTAIN ABERDEENSHIRE BIRDS.

BY STUART M. BURNETT.

Jacksnipe—*(Scolopax Gallinula).*—Some of these breed with us every year. Solitary, and never anywhere numerous, they seem least scarce in the end of autumn and during the winter, when sportsmen most observe them, and they then occur chiefly in low spots, ditches, &c. A wet patch in a pasture field, or even in a tolerably open wood, is often a haunt to which one will pertinaciously adhere for a considerable time. The common Snipe *(Scolopax gallinago)*, as is well known, is not confined in the spring and summer to low-lying lands, but often breeds in wet grassy places, by the sides of hills, and there, too I have flushed the Jacksnipe at the end of May. We have some bogs in which a good many Snipe are bred, and in most of them during the spring you will find a Jack or two I flushed one last year in Borradale Moss in the Parish of Keith hall, on 30th April, as also this year in the same locality on the 1st of May. I have to record a nest and eggs, the only one ever found by me, as long ago as May 11th, 1848, and described from notes made at that time. The locality, a marshy hollow now mostly drained, near the junction of the parishes of Kintore, Skene, and Kemnay. The bird sat closer than is even the wont of that close-sitting species. Nest like that of the common Snipe, of dried marsh grass, in the midst of a tussock of the same. Four eggs, proportionally smaller and shorter than the common Snipe's ; somewhat less smooth on the surface of their shells ; of a somewhat different shape, the taper towards the small end beginning lower down, and much more sudden, so that the extremity was proportionally less. A little above it, each egg had a sort of contraction, like what is seen towards the small end of some pears. General ground colours of each egg, a beautiful light olive, tinged with blue, like what is seen in some eggs of the Carrion Crow and Blackbird. The markings varied a little in the different eggs as to density and distribution, but were in all most numerous and distinctly made out *towards the small end,* and were arranged in masses, spots, and smaller patches of deep dusky brown, intermixed with shades of darker, approaching to black,—the latter colour often disposed in veined streaks and curious serpentine lines, like those on the egg of the Black-headed Bunting *(Emberiza Schoeniclus)*, and making with the dark brown a most beautiful sort of marbling. The eggs, indeed, were singularly beautiful; in that

respect as superior to those of the common Snipe as the Jack's plumage exceeds in brightness of markings its congener's.

Several persons in my neighbourhood, who are interested in its ornithology, have met with the Jacksnipe every spring, during May, June, and even later, though they have not yet found its eggs. This is nowise wonderful in connection with a species not generally numerous, and whose habits render it the very reverse of conspicuous. But I heard a report of young, nearly full-fledged, found in a bog not far from Aberdeen. One cannot fix the time of breeding on the authority of one nest. I have found the new-hatched young of the common Snipe as early as the 30th of April, and as the eggs of that species take fifteen days to incubate (as I have ascertained by observation), the full number must have been laid on April 15th at latest. Most common Snipes, however, breed rather later—May being the month when most nests are found. They are got during that month and June, and I once found one at the end of the latter month, which would seem to indicate that the birds breed twice.

I am not aware that the male Jacksnipe *buzzes* or *hums* in spring and summer, like the male of the common Snipe ; at least all the birds I ever saw doing this were males of *S. Gullinago*. Indeed, the Jacksnipe's muteness is characteristic. It almost always rises without any call, though I once or twice heard it utter a slight note, weaker than what is uttered by the common Snipe when flushed, almost on every occasion, even when it quits its eggs. I may add that I can be under no mistake as to the eggs described, which were not those of the common Snipe, with which I am well acquainted, and which I find every year. The different eggs could never be confounded by those who had seen both. The difference in size alone would be distinction, and there is much in the shape, though it be difficult to define it clearly in words. The eggs of the common Snipe have more the elongate form, with uniform gradual taper from a little below the large end to the smaller extremity, that distinguishes in a more exaggerated degree than of the Curlew. The tapering in the Jacksnipe's eggs, as already described, is more sudden, and there is a contraction, or sort of neck, before the extremity is reached. Common Snipe's eggs vary much, but I never saw any that had their ground colour of that blue olive approaching to sea green that the Jacksnipe's had. In the common Snipe's egg the ground colour is rather more of a dun, tinged with greenish yellow, or a sort of yellowish clay colour, in the palest varieties. The dark markings, too, in the eggs of *S. gallinago* are less defined, more in large coalescing masses, always densest *toward the large end*.

Grasshopper Warbler (*Sibilatrix locustella*).—I never but once met with this species. It occurred in a cover of small stunted Scots-firs, rank heath, and whins mixed, in Thorn's Forest, near Kintore. I got the most transient glimpse of the bird while it was alive, but my attention was directed to it by its strange call—like that of a Shrew Mouse, but much louder. As it was killed with No. 6 shot, it was too much battered to be of any use as a specimen, but it exactly answered to the description in Mr. M'Gillivray's Manual as also to a drawing I had of *Sibilatrix locustella*.

Pied Fly-catcher (*Muscicapa atricapilla*).—An individual was seen on the 8th of May, 1869, and two or three days after, in the grounds of Manar, near Inverurie.

GREATER WILLOW-WREN (*Sylvia sibilatrix*).—Very rare. In some years I have seen several, but none for long. I once got a nest, differing from that of the common Willow-Wren (*S. Trochilus*), in being lined with grass. Eggs in both very similar.

TURTLE DOVE *(Columba Turtur).*—In 1869, I heard a peculiar sound from the spruces in Keithhall grounds, like the words *chung chung*, mournfully prolonged, altogether unlike any note known to me of the Woodpigeon. On April 30th, 1870, a bird flew slowly past me and then turned on the wing so as to come very near me. It seemed little bigger than a Missel Thrush, but had a Pigeon's flight and appearance, and I could see a black patch on the neck. A few months after I was informed of the curious call of a bird in the woods of Fyvie, which was described to me by the word *Chung*, the same as that to which I had in my journal compared the Keithhall sound.

BLACK CAP *(Sylvia atricapilla).*—A fine male was shot by Mr. Sym, Gourdas, Fyvie, about the end of last month. I saw the specimen stuffed in Aberdeen. It has once or twice been procured in Banffshire.

QUAIL *(Coturnix communis).*—An irregular and unusual visitant. I have eggs said to have been found near Banchory Ternan, in Kincardinshire. A party or brood for some time haunted a corn-field not far from Kintore, in September, 1869. My attention was drawn to the spot by their curious twittering call.

SPOTTED CRAKE *(Crex porzana).*—I am not aware that this bird has ever been seen or identified; but some eggs were got in a grass field in Manar, near Inverurie, much smaller than those of the Common Landrail, and the markings of a brighter red. One was given me.

WATER RAIL *(Rallus Aquaticus).*—Supposed to be very rare, and not known to breed here; but I have seen a specimen shot on the farm of Balhaggardy, near Inverurie, in the autumn, and one was seen on a milldam at the home farm of Manar, in December 1869.

GOLDEN EAGLE *(Aquila Chrysaëtos).*—One frequented the Don, not far from Inverurie, for some days, from February 27th, 1869, when I first saw it. The severity of the weather had probably driven it from the inland mountainous parts. One was seen on the Hill of Bennochie, in the Garioch district, in June, 1870.

PIED WOODPECKER *(Picus Pipra).*—An occasional winter visitant at irregular intervals. I never observed it until 1868, when I saw one in October, and during the winter months 1868-9 they were by no means scarce in this neighbourhood, and, by accounts I got, were more plentiful on Speyside. A pair lingered in Manar Woods, till far on in May, 1869, but it was not ascertained that they bred.

GREAT SHRIKE *(Lanius excubitor).*—Not ascertaincd to visit this district every winter, but I have met with it for several different years, and usually in severe or snowy weather. I have seen it as early as October, and once in March, but most commonly in the depth of winter.

Balbithan House, Keith-hall, by Inverurie.

THE LEPIDOPTERA OF THE SCOTCH FIR.

By F. Buchanan White, M.D.

THERE does not appear to be so many species of Lepidoptera attached to *Pinus sylvestris* in Scotland as might have been expected from the wide distribution of this tree.

With the exception of *Trachea piniperda*, (the caterpillars of which are said to occur occasionally in such numbers as to injure the tree, by devouring all the leaves), and the species of *Retinia*, (whose larva feeds in the young shoots), none of the Lepidoptera mentioned in this list probably do much harm to the Scotch Fir.

It is worthy of note that the colours of many of the species in one or more stages resemble very closely those of some part of the tree. Some of these cases I have mentioned.

Trachea piniperda Panz.—This species is common in all Scotch Fir woods, and its larva is said to do considerable damage sometimes to the tree by stripping it of its leaves. The colour of the perfect insect resembles that of the bark of the fir, while the larva is of the same shade of green as the leaves, and is striped with white.

Ellopia prosapiaria L. *(fasciaria S. V.)*—Common in many places. The moth resembles the bark in colour, and the larva is somewhat like a twig divested of its leaves.

Boarmia abietaria Hb.—Said to have been taken near Dumbarton, and in Perthshire. The caterpillar resembles a leafless twig.

Macaria liturata Cl.—Common in many places. The larva is green with white stripes.

Fidonia piniaria L.—Abundant everywhere. The underside of the wings, (which is the part exposed when the insect is at rest,) resembles a piece of variegated bark. The larva is green with white and yellowish-white lines.

Eupithecia indigata Hb.—Occurs at Edinburgh, Rannoch, Braemar, and elsewhere. The moth rests on the trunks of the firs, and resembles them in colour.

E. TOGATA Hb.—This pretty species has been taken near Perth. The larva is said to feed on the seeds of the Scotch Fir. The following North European *Eupitheciæ* feed on *Pinus sylvestris* and may perhaps yet be found in Scotland, —*abietaria* Göze, (on the unripe seeds); *lanceata* Hb., (on conifers ?).

THERA VARIATA S.V.—Very common everywhere. The moth resembles the bark in colour, and the larva is green with white lines.

T. FIRMATA Hb.—Not so common as the preceding (which it resembles in colour), but occurs in various places, Edinburgh, Paisley, Perthshire, &c.

PHYCIS ABIETELLA Zk.—Rare. Rannoch and Ross-shire. The larva feeds in the cones and decaying wood.

STEGANOPTYCHA RATZEBURGIANA Rtz.—Not uncommon. Occurs at Rannoch, &c.

S. BOUCHARDANA Dbd.—Morayshire: scarce.

GRAPHOLITHA CONIFERANA, Rtz.—In Perthshire and Braemar.

G. COSMOPHORANA Tr.—Rannoch and Braemar: rare.

G. TEDELLA Cl.—Common in various localities—Perthshire, &c.

RETINIA RESINELLA L.—Perthshire (Rannoch) and Fochabers. The larva feeds in the smaller twigs.

R. DUPLANA Hb.—Rare. Has been taken in Perthshire and Banffshire.

ŒCOPHORA SIMILELLA Hb.—Common at Rannoch, and also occurs in Ross-shire. The larva feeds under the bark of dead pines.

CEDESTIS FARINATELLA Dup.—Braemar, &c. The larva feeds in the leaves.

C. GYSSELINELLA Dup.—Rannoch. The larva lives in a web between the leaves.

OCNEROSTOMA PINIARIELLA Z.—The larva feeds in the leaves.

Occurrence of Sesia Philanthiformis in Aberdeenshire.—I have recently met with the larvæ of this species, feeding in the sea-thrift, on the coast, near Aberdeen.—J. W. TRAILL, Old Aberdeen, May, 1871.

PHYTOLOGY.

LIST OF MOSSES FOUND IN THE VICINITY OF FORRES.

By the Rev. James Keith, M.A.

(Concluded from p. 57.)

23.—ORTHOTRICHUM, Wils.

55. *O. anomalum*, Hedw.—Near Heronry. Not common.
56. *O. affine*, Schrad.—Very common.
57. *O. diaphanum*, Schrad.—Greeshop Wood.
58. *O. leiocarpum*, Br. and Sch.—Birdsyards.
59. *O. pulchellum*, Sm.—Greeshop Wood.
60. *O. crispum*, Hedw.—Very common.
61. *O. Hutchinsiæ*, Sm.—Above Sluie, J. K.

24.—ZYGODON, Hook. and Tay.

62. *Z. Mougeotii*, Br. and Sch.—Banks of Findhorn and Divie, barren, J. K.

25.—TETRAPHIS, Hedw.

63. *T. pellucida*, Hedw.—Glenferness. Plentiful in fruit in 1868 and 1869.

26.—BUXBAUMIA, Haller.

64. *B. aphylla*, Haller.—Cluny Hill, Miss Davidson.

27.—ATRICHUM, P. Beauv.

65. *A. undulatum*, P. Beaur.—Common.

28.—POGONATUM, P. Beauv.

66. *P. nanum*, Brid.—Cluny Hill, &c. Common.
67. *P. aloides*, Brid.—Sanquhar, Dunphail, &c.
68. *P. urnigerum*, Brid.—Altyre Burn, &c.

29.—POLYTRICHUM, Brid.

69. *P. commune*, Linn.—Common.

70. *P. juniperinum*, Hedw.—Above Findhorn Bridge, &c.
71. *P. piliferum*, Schreb.—Common.

30.—AULACOMNION, Schwaegr.

72. *A. palustre*, Schwaegr.—Manachie, &c. Common.
73. *A. androgynum*, Schwaegr.—Sanquhar, Relugas. In fruit at Glenferness, 1868 and 1869.

31.—LEPTOBRYUM, Wils.

74. *L. pyriforme*, Wils.—Flower-pots at Dalvey.

32.—BRYUM, Wils.

75. *B. crudum*, Schreb.—Grantown, Glenferness, Dunphail, &c. Common.
76. *B. nutans*, Schreb.—Common.
77. *B. carneum*, Linn.—Opposite Cothall.
78. *B. Wahlenbergii*, Schwaegr.—Altyre Woods.
79. *B. pseudotriquetrum* Schwaegr.—Califer, &c.
80. *B. pallens*, Swartz.—Around the base of the Knock of Braemoray, J. K.
81. *B. intermedium*, Bridel.—Above Sluie.
82. *B. capillare*, Hedw.—Common.
83. *B. cæspiticium*, Linn.—Common.
84. *B. julaceum*, Sm.—Greeshop Wood.
85. *B. argenteum*, Linn.—Common.
86. *B. roseum*, Schreb.—Sanquhar, Altyre, Darnaway. Always barren.

33.—MNIUM, Br. and Sch.

87. *M. affine*, Bland.—Darnaway Woods. In fruit below Sluie.
88. *M. cuspidatum*, Hedw.—Loch of Blairs, &c.
89. *M. rostratum*, Schwaegr.—Above Sluie.
90. *M. serratum*, Brid.—Above Sluie.
91. *M. hornum*, Hedw.—Common.
92. *M. undulatum*, Hedw.—Common; not uncommon in fruit.
93. *M. punctatum*, Hedw.—Banks of Findhorn, &c.
94. *M. subglobosum*, Br. and Sch.—Slatesheugh, Rafford.

34.—FUNARIA, Schreber.

95. *F. hygrometrica*, Hedw.—Common.

35.—PHYSCOMITRIUM, Bridel.

96. *P. ericetorum*, De Notaris.—Lethen.
97. *P. pyriforme*, Br. and Sch.—Forres Nurseries.

36.—BARTRAMIA, Hedw.

98. *B. fontana*, Bridel.—Common.
99. *B. calcarea*, Br. and Sch.—Above Sluie.
100. *B. pomiformis*, Hedw.—Common.
101. *B. Halleriana*, Hedw.—Above Sluie, and near Pluscarden.
102. *B. ithyphylla*, Brid.—Darnaway, &c.
103. *B. arcuata*, Brid.—Earnside, Alves.

37.—SPLACHNUM, Br. and Sch.

104. *S. ampullaceum*, Linn.—Blackhills, Rafford.
105. *S. sphæricum*, Hedwig.—Dava, &c.

38.—TETRAPLODON, Br. and Sch.

106. *T. mnioides*, Br. and Sch.—Downduff, etc.

39.—FISSIDENS, Hedw.

107. *F. bryoides*, Hedwig.—Common.
108. *F. adiantoides*, Hedwig.—Above Sluie, &c.
109. *F. taxifolius*, Hedwig.—Above Cothall, &c.

40.—ANTITRICHIA, Bridel.

110. *A. curtipendula*, Bridel.—Grantown.

41.—ISOTHECIUM, Bridel.

111. *I. myurum*, Dill., Brid.—Sanquhar Woods, &c. Common.
112. *I. myosuroides*, Dill., Linn.—Dunphail, &c. Common.
113. *I. alopecurum*, Dill., Linn.—Cawdor, Sluie.

42.—CLIMACIUM, Web. and Mohr.

114. *C. dendroides*, Web. and Mohr.—Greeshop Wood, and Banks of Findhorn.

43.—LESKEA, Bridel.

115. *L. sericea*, Dill. Lin.—Common.

44.—HYPNUM Dill., Hedwig.

116. *H. albicans*, Dill. Neck.—Cothall.

117. *H. velutinum*, Dill., Lin.—Common.
118. *H. rutabulum*, Dill., Lin.--Common.
119. *H. rivulare*, Bruch.—Sanquhar, J. K.
120. *H. piliferum*, Vail., Schreb., Brodie, Dr. I.—Common in barren state ; in fruit, Sanquhar, J. K.
121. *H. prælongum*, Dill., Lin.—Common.
122. *H. striatum*, Hedwig,—Sanquhar, &c.
123. *H. ruscifolium*, Dill.—Forres Burn, Sluie, &c.
124. *H. serpens*, Dill., Lin.—Sanquhar, rare.
125. *H. stellatum*, Dill., Schreb.—Relugas, &c.
126. *H. palustre*, Dill., Lin.—Forres Burn, J. K.
127. *H. cordifolium*, Swartz.—Greeshop Wood.
128. *H. cuspidatum*, Dill., Lin.—Common.
129. *H. Schreberi*, Dill., Wild.—Common, but rare in fruit.
130. *H. purum*, Dill., Lin.—Common.
131. *H. tamariscinum*, Hedw.—Sanquhar, Dunphail, &c.
132. *H. splendens*, Dill., Sibth.—Woods, common.
133. *H. triquetrum*, Dill., Lin.—Common.
134. *H. loreum*, Dill., Lin.—Common.
135. *H. squarrosum*, Dill., Lin.—Common.
136. *H. fluitans*, Dill., Lin.—Mundole, Bogs of Birdsyards, Dava, &c.
137. *H. revolvens*, Swartz.—Moycarse, Grantown, &c.
138. *H. aduncum*, Dill., Lin.—Moycarse, &c.
139. *H. filicinum*, Dill., Lin.—Grantown, Glenferness.
140. *H. commutatum*, Dill., Hedw.—Above Cothall.
141. *H. uncinatum*, Hall., Hedw.—Common.
142. *H. Crista-castrensis*, Linn.—One station in Altyre Woods, barren.
143. *H. molluscum*, Dill., Hedw.—Sluie.
144. *H. cupressiforme*, Dill., Lin.—Common.
145. *H. ochraceum*, Turn.—River Findhorn.
146. *H. scorpioides*, Dill., Lin.—Califer, Brockloch.
147. *H. pulchellum*, Dicks.—Banks of Findhorn.
148. *H. undulatum*, Dill., Lin.,—Clunyhill, etc., common.
149. *H. denticulatum*, Dill., Lin.—Clunyhill, etc.

45.—NECKERA, Hedw.

150. *N. complanata*, Bryol., Eu.—Sanquhar, Banks of Findhorn.

46.—HOOKERIA, Sm.

151. *H. lucens*, Dill., Lin.—Banks of Divie and Findhorn, Slatesheugh, Cawdor.

47.—FONTINALIS, Dill.

152. *F. antipyretica*, Lin.—Common. Plentiful in fruit in Burn above Glenernie.

153. *F. squamosa*, Lin.—Findhorn, below Waterford.

Manse of Forres.

Notes on certain Scottish Plants.—The following are notes from the Curator (Dr. Boswell Syme) of the Botanical Exchange Club's Report for 1871. "Mr. Duthie has settled the point of there being two forms of *Pyrus scandica*, Bab., (varr. *fennica* and *pinnatifida*) in Arran ; one of which has the leaves with none of the segments separated ; the other with some of the leaves at least pinnate towards the base. The fruit of each form is sweet. The Arran plant appears to be a sub-species, different from that of the south-west of England." "*Hieracium pedunculatum* Wallroth.—Inverleith, Edinburgh. Mr. Sadler sends a few specimens of this plant under the name of *H. stoloniflorum*. I have not access to Waldstein & Kitaibel's work, but it is certainly not the *H. stoloniflorum* of Fries' "Epicrisis." Whether it be a variety or sub-species (of *H. pilosella*) remains to be proved by raising the plant from seed." In a foot-note, Dr. Trimen remarks that the plant collected at Granton, in 1869, by Mr. Sadler, certainly agrees with the figure of *H. stoloniflorum* in Waldst. & Kit. "*Hieracium dubium*, L.—Dr. Roy sends a specimen of a *Hieracium* which was noticed several years ago by the Rev. James Keith, of Forres, on a piece of waste ground near that town. I believe it to be the plant formerly called by Fries, *H. collinum*, but which he now considers to be the true *H. dubium* of Linnæus. The periclines of the only Forres specimen I have seen are smaller, the peduncles longer, and the leaves on the stolons less developed, than in the ordinary form of the Scandinavian *H. dubium* ; but Fries states that it is even more protean and polymorphous than the very variable *H. præaltum*, which it replaces in colder countries. I cannot, therefore. speak with certainty as to the name of the Forres plant until I have seen a series of specimens." "*Cuscuta Trifolii*, Bab.—Seggieden, Perth. Col. Drummond Hay states that this is the first season in which he has noticed the Dodder 'in this immediate neighbourhood.'* Last year I observed it in a clover field between Kirkcaldy and Kinghorn." "*Chenopodium rubrum*, L., var. *pseudo-botryoides*.—Kinghorn Loch, Fife. In the utmost profusion on the banks of the loch, below the winter level of the water. I have not met with the normal form of *C. rubrum* in Fife, except as a weed in my own garden, into which it was no doubt introduced." "*Rumex Hydrolapathum*, Huds,—Banks of the Tay at Elcho. H. M. Drummond Hay."

* We saw it in abundance several years ago in a field two miles north of Perth.—Ed. *Sc. Nat.*

R. conspersus, Hartm.—Banks of the Devon, above and below the Crook, Kinross, and Perth." "*Rumex* ———?—Crook of Devon, Kinross, and Perth. The stems are from 18 inches to 3 feet high ; the root-leaves narrowly oblong, scarcely cordate at the base, and subacute ; the panicle is very similar to that of *R. obtusifolius*, but the enlarged petals, which are of a brilliant red, are smaller, more deltoid, and with shorter teeth. It seems intermediate between *R. obtusifolius* and the supposed hybrid, sent by me last year." "*Allium carinatum*, L.—Banks of the Tay. The plant is certainly well naturalized, if it be not native." "*Maianthemum bifolium*, D.C.—Wood, Linlithgowshire. Probably introduced, but if so, it must have been a long time ago, as it is well established, and in great quantity.—A. Craig Christie." "*Potamogeton nitens*,—River Don, Aberdeenshire. Dr. Roy." *Juncus biglumis*, L.—Skye. Prof. Lawson. Not found before in the west of Scotland." "*Carex aquatilis*, Wahl. ? var. *Watsoni*.—River Don, Aberdeen. J. Roy."

Nuphar pumila.—Since I first made the acquaintance of this interesting lily, in a small loch near here, I have been much surprised to see how rapidly it spreads when fairly established in a favourable localty. On my first visit the plants could easily be counted in twenties ; the second year there were hundreds ; the third year they covered a large bay of the loch, 30 or 40 yards across its widest part. On a fourth visit, I find they have extended along one side of the loch, and their name is "legion." They threaten to spoil fishing from the shore, and render bathing very unpleasant ; on the other hand their leaves give a delicate tinge of green to the surface of the loch, which is as charming as it is rare.—J. ALLEN HARKER, Glasgow.

VARIOUS NOTES.

The seventh volume of *The Entomologists' Monthly Magazine*, which was completed by the issue of the number for May, maintains the character which has from the first made this periodical indispensable to all British entomologists. The additions to the British Insect Fauna brought forward in this volume include, 33 species of *Coleoptera*, 13 *Diptera*, 5 *Heteroptera*, 30 *Homoptera*, 4 *Hymenoptera*, 8 *Lepidoptera*, 1 *Neuropteron*, and 1 *Orthopteron*. There are besides 7 new genera, and 77 new species, of insects described for the first time. We regret to learn that there still remains a deficiency in the collective balance-sheet. We heartily recommend this serial to all our entomological readers.

The report of the Botanical Exchange Club for 1871 has just been published, and contains, as usual, many interesting notes upon British plants. Elsewhere will be found some extracts relative to Scottish plants.

The first three parts of a work on the Birds of Europe, by Messrs. Sharpe & Dresser, of the Zoological Society, are now before us. The authors intend giving a complete life-history as far as is known,—and one, two, or more coloured figures of each species, —of every bird inhabiting the western Palæarctic regions. Both the plates and letterpress are good, and this work will supply a great desideratum in ornithological science.

The Perthshire Society of Natural Science has commenced the publication of a catalogue of the animals inhabiting Perthshire. The part just published contains a list of the Lepidoptera, and is illustrated by a coloured map of the county.

Bridge of Allan Museun of Natural History.—We take the following from the "*Edinburgh Daily Review*," and venture to hope that the suggestion of a proper arrangement of the Geological and Zoological specimens will not be overlooked by the trustees of the museum :—

"The collection was made by the late John Macfarlane, Esq, of Coneyhill, and occupies a suite of apartments situated upon an elevated terrace bearing the name of the founder. The shells are set down at 20,000 specimens, the birds at 500, and quadrupeds at 300. The collection is deficient in classification, and therefore in educational value. It includes a number of select fossils tossed together in confusion, but which might be rendered serviceable as geological illustrations. A portion of the museum is devoted to works of art, embracing some excellent casts of classic statuary, and no end of wretched pictures, which the trustees are judiciously weeding out. There is, in addition, a miscellaneous series of objects coming under the category of curiosities. With all its deficiencies, the collection must have involved no little expenditure of money and attention, and it affords striking evidence of what a man can do in this way single-handed, even in the obscurity of a rural village. The trustees would greatly enhance its value by getting the arrangement thoroughly overhauled by a competent hand. The museum merits more of public support than it seems to receive. It is to be hoped that the trustees may see their way to its efficient maintenance, both in honour of the founder's memory and as a boon and a credit to the neighbourhood."

A Suggestion for the Improvement of Loch Trout.—Scattered over the extensive parish of North-maven, in the extreme north of the mainland of Shetland, there are several fresh-water lochs that afford excellent sport in rod-fishing. The denizens of one of them, "Pundswater" by name, far exceed in size the trout in any of the other sheets of water. The probable cause of this superiority may be the peculiar nature of the food in Pundswater. The examination of the contents of the stomachs of the trout taken from it shewed that they fed largely on *Gammarus pulex*, (See S. Bates' Brit. Crustacea, vol. 1, p. 388.) This small crustacean seemed to form the chief *pabulum*, while not a single instance of it was met with in some trout taken from two of the adjoining lochs. Mr. Spence Bate, to whom specimens of this crustacean were sent, "can see no reason to doubt their being the ordinary species—*G. pulex*"; and in the volume referred to, p. 390, he says, "We have found this animal—*G. pulex*—in almost every stream that we have looked for them. They are sometimes common in shallow overgrown ditches. Sometimes, as in a field in Carmarthenshire, they are so abundant that a single dip of the sieve will bring up perhaps a hundred specimens." It is to be hoped some of your correspondents will be able to state their occurrence, frequency, &c., in other parts of Scotland. Might it not then be worth while to introduce them into our smaller lochs and fish ponds? an experiment not difficult, but likely to increase the size of trout. No difference was observable in the water, bottom soil, or plants, of Pundswater, so as to indicate that it, among the Shetland fresh-water lochs, was exclusively adapted for the support and increase of *Gammarus pulex*.—G. GORDON, Manse of Birnie, Elgin.

SCOTTISH SOCIETIES.

Edinburgh Botanical Society, Thursday, 13th April.—A. BUCHAN, M.A., *President*, in the chair. Professor BALFOUR noticed the death of Mr. Wm. Wilson, author of the *Bryologia Britannica*, which took place at Paddington, near Warrington, on 3rd April. He was a Corresponding Fellow of the Society, and contributed to its transactions and herbarium. The following communications were read :— (1) *Notes on the recent Progress of Botany in Denmark*, by Dr. Robt. Brown. Dr. Brown gave a review of some of the more important researches made by Danish botanists during the last few years, and published chiefly in the Danish language, in the Transactions of the Natural History Society, the Botanical Society, the Academy of Science, or as separate works. (2) *On the Phyllotaxis of Lepidodendron*, by Professor Alex. Dickson. Dr. Dickson exhibited, and made some remarks on, specimens of Lepidodendron from the coal measures, which, in the arrangements of their scales, or leaf scars, illustrated the same spirals as found in plants at the present day. (3) *Note on Lilium canadense, L. var. puberulum Torr*, by Dr. Robert Brown. (4) *Report on the Open Air Vegetation at the Royal Botanic Garden*, by Mr. M'Nab. Since the last meeting of the Botanical Society (March 9), the weather has been excessively dry, accompanied with north-easterly winds. On fifteen mornings the thermometer has been at and below the freezing point, the lowest markings being on the 15th, 17th, and 29th of March, and on the 7th, 8th, and 11th of April, falling respectively to 22, 28, 26, 28, 25, and 24 deg. It is remarkable that those plants fixed on for the purpose of recording the dates of their flowering, have this year come within a range of rather less than two months—viz., between February 13 and April 9. The plants enumerated generally extend over a part of four months. The short period this year has been caused by the unusually long winter, which prevented the snowdrop and winter aconite (two of the earliest spring flowers) opening their blossoms before February 13. Some of the latest recorded this month are fully eighteen days earlier than last year. During 1870, the same plants ranged between February 3 and April 30, and during 1869 between January 9 and April 3, shewing a considerable range in the periods of flowering of the same plants during different years.

	1871.	1870.	1869.
Orobus vernus, . .	March 18	April 3	Jan. 26
Scilla bifolia, . .	,, 18	March 25	Feb. 3
Hyoscyamus Scopolia,	,, 18	April 9	Jan. 19
Omphalodes verna, .	,, 20	,, 9	,, 10
Scilla bifolia rubra, .	,, 20	March 28	March 8
Puschkenia scilloides,	,, 20	April 1	Feb. 29
Scilla bifolia major, .	,, 20	March 24	,, 21
Draba aizoides, .	,, 21	April 4	March 11

Symphytum Caucasicum,	,, 21	,, 10	Jan. 10
Ribes sanguineum, .	,, 21	,, 6	March 1
Gagea lutea, .	,, 21	,, 2	,, 5
Adonis vernalis .	,, 22	,, 8	,, 18
Hyoscyamus orientalis,	,, 22	,, 11	,, 10
Aubretia grandiflora,	,, 22	,, 2	Feb. 10
Muscari botryoides .	,, 22	March 30	,, 28
Hyoscyamus Physaloides,	,, 23	,, 31	,, 28
Muscari botryoides alba,	,, 24	April 8	March 5
Mandragora vernalis,	,, 24	,, 3	,, 2
Erythronium Dens-canis,	,, 24	,, 2	,, 6
Carex montana, .	,, 25	,, 14	April 1
Narcissus moschatus,	,, 26	,, 13	March 16
,, Pseudo-Narcissus,	,, 27	—	—
Anemone nemorosa,	,, 28	,, 12	April 3
Fritillaria imperialis	,, 29	,, 15	March 24
Pulsatilla vernalis,	,, 30	,, 11	,, 10
Narcissus bicolor,	,, 31	,, 16	,, 29
Saxifraga virginica,	April, 1	,, 19	April 2
Menziesia empetriformis,	,, 2	,, 20	,, 1
Primula ciliata purpurata,	,, 3	,, 20	,, 3
Tritelia uniflora,	,, 5	,, 5	March 28
Epimedium rubrum,	,, 6	,, 21	April 2
Ornithogalum montanum,	,, 8	,, 28	,, 2
,, excapum,	,, 9	,, 30	March 30

Miss Carnegy, Laverock Bank House, Trinity, exhibited a specimen of the young cones of Araucaria imbricata, from Craigo, in Forfarshire. The tree is now 29 feet high, 66 feet circumferencc of branches; girth of stem at the surface of the ground, 5 feet 8 inches; and at 4 feet above the ground, 3 feet 2 inches in circumference. It is supposed that the Craigo Araucaria is the first to produce cones in Scotland.

Perthshire Society of Natural Science, 2nd March.—Dr. BUCHANAN WHITE, *President*, in the Chair.—This being the annual meeting of the Society, the Secretary read the report of the Council for the session, 1870-71. During the past session, thirty-two members had been added to the Society, ten meetings had been held. eighteen papers had been read, and a number of excursions made. The Treasurer gave a statement of the funds of the Society, from which it appears that there was a balance of £7 6s 5d in the bank. The reports were unanimously approved of by the meeting. Office-bearers having been elected, 21 gentlemen were balloted for, and admitted members of the Society.

6th April.—Dr. BUCHANAN WHITE, *President*, in the Chair.—The President read a paper upon the Species of Hemiptera found in Perthshire. The paper was illustrated by specimens and coloured figures. Mr. Robert Paton read Notes upon the Tetraonidæ occuring in the county, viz.—the Capercaillie, Ptarmigan, Red Grouse, Black Grouse. The skins of two fine Capercaillies were presented by Mr. Paton to the Society's Museum.

4th May.—The *President* in the Chair.—Mr. Lamb presented a stuffed specimen of a beautiful hybrid between the Capercaillie and Black Grouse: it was shot in the neighbourhood of Perth. Dr. Buchanan White gave a lecture on the Structure of Plants.

THE ORIGIN OF SPECIES.*

THROUGHOUT this volume we have felt considerable inconvenience from the adopted dogmatical classification of plants, and have all along been floundering between species and variety, which certainly under culture soften into each other.

A particular conformity, each after its own kind, when in a state of nature termed species, no doubt exists to a considerable degree. This conformity has existed during the last forty centuries.

Geologists discover a like particular conformity—fossil species—through the deep deposition of each great epoch; but they also discover an almost complete difference to exist between the species, or stamp of life, of one epoch, from that of every other. We are therefore led to admit either of a repeated miraculous creation, or of a power of change, under a change of circumstances, to belong to living organized matter, or rather to the congeries of inferior life, which appears to form superior. The derangements and changes in organized existence induced by a change of circumstances from the interference of man, affording us proof of the plastic quality of superior life, and the likelihood that circumstances have been very different in the different epochs, though steady in each, tend strongly to heighten the probability of the latter theory.

When we view the immense calcareous and bituminous formations, principally from the waters and atmosphere, and consider the oxidations and depositions which have taken place, either gradually or during some of the great convulsions, it appears at least probable that the liquid elements containing life

*To all who have read (and who has not?) Mr. Darwin's work on the "Origin of Species" this essay (which is mentioned in the "Origin of Species"), extracted from the appendix to Patrick Matthew's work on "Naval Timber" (1831—London: Longman, Rees, and Co.; Edinburgh: Adam Black,) and communicated to our columns by Mr. N. A. Dalzell, will, we think, possess considerable interest.

have varied considerably at different times in composition and in weight; that our atmosphere has contained a much greater proportion of carbonic acid or oxygen; and our waters, aided by excess of carbonic acid, and greater heat, resulting from greater density of atmosphere, have contained a greater quantity of lime, and other mineral solutions.

Is the inference then unphilosophic, that living things which are proved to have a circumstance-suiting power (a very slight change of circumstances, by culture, inducing a corresponding change of character) may have gradually accommodated themselves to the variations of the elements containing them, and without new creation have presented the diverging changeable phenomena of past and present organized existence?

The destructive liquid currents, before which the hardest mountains have been swept and comminuted into gravel, sand, and mud, which intervened between, and divided these epochs, probably extending over the whole surface of the globe, and destroying nearly all living things, must have reduced existence so much that an unoccupied field would be formed for new diverging ramifications of life, which, from the connected sexual system of vegetables, and the natural instincts of animals to herd and combine with their own kind, would fall into specific groups; these remnants in the course of time moulding and accommodating their being anew to the change of circumstances, and to every possible means of subsistence, and the millions of ages of regularity which appear to have followed, between the epochs probably after this accommodation was completed, affording fossil deposit of regular specific character.

There are only two probable ways of change; the above and the still wider deviation from present occurrence of indestructible or molecular life (which seems to resolve itself into powers of attraction and repulsion, under mathematical figure and regulation, bearing a slight systematic similitude to the great aggregations of matter,) gradually uniting and developing itself into new circumstance-suited living aggregates, without the presence of any mould or germ of former aggregates, but this scarcely differs from new creation, only it forms a portion of a continued scheme or system.

In endeavouring to trace, in the former way, the principle of these changes of fashion which have taken place in the domi-

ciles of life, the following questions occur. Do they arise from admixture of species nearly allied, producing intermediate species?. Are they the diverging ramifications of the living principle under modifications of circumstance? Or have they resulted from the combined agency of both? Is there only one living principle? Does organized existence, and perhaps all material existence, consist of one Proteus principle of life, capable of gradual circumstance-suited modifications and aggregations, without bound under the solvent or motion-giving principles, heat or light? There is more beauty and unity of design in this continual balancing of life to circumstance, and greater conformity to those dispositions of nature which are manifest to us, than in total destruction and new creation. It is improbable that much of this diversification is owing to commixture of species nearly allied: all change by this appears very limited, and confined within the bounds of what is called species. The progeny of the same parents, under great difference of circumstance, might in several generations even become distinct species, incapable of co-reproduction. The self-regulating adaptive disposition of organized life may in part be traced to the extreme fecundity of nature, who, as before stated, has, in all the varieties of her offspring, a prolific power much beyond (in many cases a thousandfold) what is necessary to fill up the vacancies caused by senile decay. As the field of existence is limited and pre-occupied, it is only the hardier, more robust, better-suited-to-circumstance individuals, who are able to struggle forward to maturity; these inhabiting only the situations to which they have superior adaptation, and greater power of occupancy than any other kind: the weaker, less-circumstance-suited, being prematurely destroyed. This principle is in constant action. It regulates the colour, the figure, the capacities and instincts: those individuals of each species whose colour and covering are best suited to concealment or protection from enemies, or defence from vicissitude and inclemencies of climate—whose figure is best accommodated to health, strength, defence, and support—whose capacities and instincts can best regulate the physical energies to self-advantage according to circumstances, in such immense waste of primary and youthful life—those only come forward to maturity, from the strict ordeal by which nature tests their

adaptation to her standard of perfection, and fitness to continue their kind by reproduction. From the unremitting operation of this law, acting in concert with the tendency which the progeny have to take the more particular qualities of their parents, together with the connected sexual system in vegetables, and instinctive limitation to its own kind in animals, a considerable uniformity of figure, colour, and character is induced, constituting species; the breed gradually acquiring the very best possible adaptation of these to its condition which it is susceptible of, and when alteration of circumstance occurs, thus changing in character to suit these, as far as its nature is susceptible of change.

This circumstance-adaptive law, operating upon the slight, but continued, natural dispositions to sport in the progeny (seedling variety) does not preclude the supposed influence which volition or sensation may have over the configuration of the body.

To examine into the disposition to sport in the progeny even when there is only one parent, as in many vegetables, and to investigate how much variation is modified by the mind or nervous sensation of the parents, or of the living thing itself during its progress to maturity, how far it depends upon external circumstances, and how far on the will, irritability and muscular exertion, is open to examination and experiment. In the first place, we ought to investigate its dependency upon the preceeding links of the particular chain of life, variety being often merely types or approximations of former parentage, thence the variation of the family, as well as of the individual, must be embraced by our experiments.

This continuation of family type, not broken by casual particular aberration, is mental as well as corporeal, and is exemplified in many of the dispositions or instincts of particular races of men. These innate or continuous ideas or habits seem proportionally greater in the insect tribes, those especially of shorter revolution, and forming and abiding memory may resolve much of the enigma of instinct, and the foreknowledge which these tribes have of what is necessary to completing their round of life, reducing this to knowledge, or impressions, or habits, acquired by a long experience.

This greater continuity of existence, or rather continuity of

perceptions, and impressions, in insects, is highly probable; it is even difficult in some to ascertain the particular stops when each individuality commences, under the different phases of egg, larva, pupa, or if much consciousness of individuality exists. The continuation of reproduction for several generations by the females alone in some of these tribes tends to the probability of the greater continuity of existence, and the sub-divisions of life by cuttings, at any rate must stagger the advocate of individuality.

Among the millions of specific varieties of living things which occupy the humid portion of the surface of our planet, as far back as can be traced, there does not appear, with the exception of man, to have been any particular engrossing race, but a pretty fair balance of powers of occupancy. or rather most wonderful variations of circumstance parallel to the nature of every species; *as if circumstance and species had grown up together.* There are indeed several races which have threatened ascendency in some particular regions, but it is man alone from whom any general imminent danger to the existence of his brethren is to be dreaded. As far back as history reaches, man had already had considerable influence, and had made encroachments upon his fellow denizens, probably occasioning the destruction of many species, and the production and continuation of a number of varieties, or even species, which he found more suited to supply his wants, but which, from the infirmity of their condition, *not having undergone selection by the law of nature*, of which we have spoken, cannot maintain their ground without his culture and protection. It is, however, only in the present age that man has begun to reap the fruits of his tedious education, and has proven how much "knowledge is power." He has now acquired a dominion over the material world, and a consequent power of increase, so as to render it probable that the whole surface of the earth may soon be over-run by this engrossing anomaly, to the annihilation of every wonderful and beautiful variety of animated existence which does not administer to his wants, principally as laboratories of preparation to befit cruder elemental matter for assimilation by his organs.

ZOOLOGY.

THE BALEEN OR WHALE-BONE WHALES (BALÆNOIDEA) OF THE NORTH-EAST OF SCOTLAND.

By ROBERT WALKER.

BALÆNA MYSTICETUS.—The Right Whale, or Greenland Whale.

As this whale has been included heretofore in all our books on British animals, it may be necessary to state briefly some of the grounds, at least, upon which its claim to a place in the British Fauna is now questioned by many naturalists of eminence. From a commercial point of view, this is the most valuable of all the whales that frequent the Greenland seas; its carcass yielding a greater quantity of oil, and a longer and better quality of baleen, or whalebone of commerce, than that of any other species. In order to supply the demand for these valuable products, the "Whalers" of this and other countries proceed to the Arctic regions every spring: the experience of nearly three centuries of whale fishing having proved this to be the natural habitat of this animal, and that it is to be met with only amongst the ice-bergs of that rigorous climate. That this whale has its regular periods of migration, as well as probably every other Arctic animal—proceeding southward in winter, and returning north again in summer—will be evident enough if we bear in mind the fact, that a great portion of the Polar Sea, in which it roams in summer, is frozen every winter, and the impossibility of the animal breathing under the ice. The question, however, remains—granting this migration—how far south was the whale ever known with certainty to go? The investigations of Eschricht and Reinhardt, given in their excellent essay on the Greenland Whale,* throw considerable

* Ray Society, 1866.

light on this subject. These authors shew pretty conclusively, from the journals kept at the Danish establishments on the western shore of Greenland, that the whale was never known to leave the neighbourhood of the ice-bergs. These establishments extend from the 60th to the 73d degree, in a direction almost due north. The journal kept at Holsteinsborg, extending from 1780 to 1839, and that at Disco Bay, farther northward, from 1780 to 1837, give the dates every year when the whales arrived at these stations, which was generally in the end of November or beginning of December, some years as late as January; the dates of their departure to the north again being March, April, and occasionally as late as June: both events depending apparently on the temperature of the season. The conclusion arrived at by the Danish authors, apparently after carefully considering all the facts in their possession bearing on this subject, amounts to this, "that the Greenland whale penetrates farthest to the south in winter, although it does not, even at that season, leave that part of the sea which is filled with drift ice, and more or less closed by great masses of ice." The long persecution these animals have undergone has sadly diminished their number. At the same time, they do not appear to have changed in the least their former habits and places of migration, "the original range of the whale remaining perfectly unaltered." Prof. Van Beneden* also states that *B. mysticetus* is strictly confined in its geographical range to the Polar Sea, extending along the Siberian and Kamtschatkan coasts, but does not reach as far south as the north of Iceland. Scoresby,† who, from personal experience, knew the haunts of the Greenland whale better perhaps than the most of men who have had something to say about it, states that it has never been seen in the European seas, and rarely within 200 leagues of the British coast, and that it was only to be met with in or very near the regions of ice. If we now glance at the evidence as to the occurrence of this whale in the British seas, we will perhaps find that it is not of the strongest, or to say the least, of the most satisfactory kind. Of course, if the opinions of these distinguished naturalists as to the geographical range of this animal could be implicitly relied upon, we could scarcely expect the

* Bull. de l'Acad. Roy. de Belg., xxv., 1868. † Arctic Regions.

evidence to be otherwise, as it could hardly, in historical times at any rate, have frequented our seas in company with ice or ice-bergs.

Sibbald states in his "Phalainologia" that a specimen of this whale was thrown ashore at Peterhead, in 1682, 70 feet in length. It may be observed that this is a rather unusual size for a Greenland Whale, and one would imagine, judging from the size, that it was more likely to have been an example of *Physalus antiquorum*, or other large finner. Of the former Scoresby says that of 322 individuals he had seen killed, not one, he believed, exceeded 60 feet in length, and the longest to appearance he ever saw measured 58 feet. Sibbald's statement appears to be the main ground on which the whale in question has been admitted into all the works on British animals published since his time. No doubt Bell* states, on the authority of Mr. Barclay, "that it is occasionally seen on the coast of Zeatland, and several of this species have run aground, or have been found dead at sea." Unfortunately, none of the bones of these whales seem to have been preserved, to decide the question as to what species they really belong. Besides it may perhaps be fairly questioned whether any of these specimens were examined with a sufficient degree of care to establish their identity, and to determine acurately whether, for instance, they were Greenland or Biscay whales (*Balæna biscayensis* Esch.,) which is another finless species. We may, I think, on the whole, dismiss this as an instance of mistaken identity, which in the case of whales, as well as in other things, is apt to happen with the best of people. Although, of course, it is not impossible that the Greenland whale may have accidentally reached the British seas in recent times, comparatively speaking, still it must be confessed that the evidence as to its doing so is of the most meagre kind. In fact, of the two species above-mentioned, *biscayensis*, from its habits, was by far the most likely of the two to strand on our coast.

MEGAPTERA LONGIMANA Gray.—JOHNSTON'S HUMP-BACKED WHALE.

THIS whale appears to be somewhat rare on the coast of Europe.

* British Quadrupeds.

So far as I can make out, it has been recognized six times only; twice on the Scandinavian coast; one stranded at the mouth of the Elbe, in 1824; another found floating dead in the sea off Revel, in 1851; and another stranded in the estuary of the Dee, in 1863. The skeleton of this individual is preserved in the Derby Museum in Liverpool. Another example of this species was thrown ashore about two miles north of Berwick on the 19th September, 1829. This specimen was described by Dr. George Johnston, * who states that it was between 35 and 36 feet in length, the circumference at the thickest part 24 feet, and the pectoral fins 9 feet in length. Lilljeborg, † who also describes this species, states that, according to Holböll and Eschricht, it attains to a length of 55 to 60 feet, and that the latter author considers it the most common of all the whale-bone whales in Davis Strait during the summer. It is said to go south in winter, and that "when near the coasts it generally feeds upon *Osmerus arcticus*, *Gadus agilis*, *Ammodytes tobianus*, and *Limacina arctica*, and the smaller crustaceans." The contents of the stomach of the Berwick specimen were of a somewhat different nature from this. It contained, according to Johnston, "six cormorants, and another in the throat, so that it was presumed the whale had been choked in the attempt to swallow the bird."

BALÆNOPTERA MUSCULUS (Physalus antiquorum Gray).—THE RAZORBACK.

THIS appears to be the commonest of all fin-whales. It has been stranded and found dead at sea on the European coast oftener than any other species of baleen whale. It has likewise occurred pretty frequently on the North-East of Scotland. As a species, it ranks amongst the largest of the whale family, and of course is one of the largest animals in existence. Dr. Gray ‡ states that the British Museum specimen is said to have been 102 feet long. This is very likely considerably exaggerated; at any rate, the majority of examples of which we have any description do not attain to near that length, but range

* Trans. of the Nat. Hist. Soc. of Northumberland, Durham, &c., vol. I., 1831.

† Cetaceous Mammalia of Scandinavia, Ray Society, 1868.

‡ Cat. of Seals and Whales, 1866.

from 43 to about 70 feet in length. The latter Prof. Flower † considers to be about the utmost extent to which this species has any claim. Notwithstanding its great size, it is of the least commercial value in proportion to its bulk of all the whale tribe. Sibbald described and figured in his "*Phalainologia Nova*," two fin whales which he regarded as specifically distinct. Dr. Gray and some others seem to be of a different opinion, or at least doubtful as to the correctness of this arrangement, consequently they have placed both animals in the present species. The first of these is Sibbald's *De Balæna tripinni quæ rostrum acutum habet et plicas in ventre*, &c. This individual was stranded near Burntisland, on the 17th November, 1690. It was 46 feet long, and 20 feet in circumference ; the pectoral fins 5 feet long; the tail 9 feet broad. The second is Sibbald's *De Balæna tripinni quæ maxillam inferiorem rotundam*, &c. This specimen was thrown ashore near Abercorn, in the Firth of Forth, in September, 1692, and measured 78 feet in length, with a circumference of about 35 feet. The pectoral fins were 10 feet long, and the tail was 18½ feet broad. That the first-mentioned of these whales belongs to *B. musculus* may be readily, I think, taken for granted. The second, however, presents greater difficulties in the way of arriving at a similar conclusion. Irrespective of the large size of the animal, there is the wide under jaw, embracing the upper, the length of the baleen (3 feet), the breadth of the tail, and the long pectoral fins. All are characters that appear to me to be more appropriate to *B. Sibbaldii* than to the species under consideration.

Dr. Neill ‡ describes a male of this whale which ran ashore near Alloa on 23d October, 1808. The total length was 43 feet, the circumference where thickest, about 20 feet, the pectoral fins nearly 5 feet long, and tail about 10 feet broad. Dr. Neill states that he had seen a M.SS. account by the the late Dr. Walker, dated 1782, of a whale which was forced ashore near Burntisland on the 10th June, 1761, precisely of the same size as Sibbald's Burntisland whale, and that Walker, who was at the same time clearly of opinion that his specimen was of the same species as that described by Sibbald from the same place, named it *Balæna sulcata.*

† Proceedings of Zoological Society, 1864.

‡ Memoirs Wernerian Society, vol. i. 1811.

Another example of this whale was cast ashore near Kinkell, about three miles east of St. Andrews, on the 8th January, 1848. As no description of this specimen has been published, I will endeavour, as far as I can, to supply the deficiency, chiefly from my own examination of the animal, aided on one or two points by the sizes of some of the parts as taken by the late Dr. Reid, who exhibited specimens illustrative of some of the structures of this animal, and made some remarks upon the Cetacea, to the Literary and Philosophical Society of St. Andrews. It is much to be regretted that Dr. Reid's notes on this whale, if he made any, appear to be lost. The animal, when I saw it first, was lying amongst the rocks, with its head seaward, and partly on the right side. It was a female, and was observed floating about dead some time before stranding. All the back, and pretty well down each side, was of a greyish-black colour, and the lower hide of a white or dirtyish-white colour. There was a considerable number of longitudinal folds or ridges of the skin on the under anterior part of the body; those in the middle commenced almost at the symphysis of the lower jaw, and terminated half-way to the tail; those on the sides did not extend quite so far. The extreme length of the animal was 54 feet; the greatest circumference, in front of pectoral fin, 29 feet 10 inches, or thereby; length of the mouth, 10 feet 3 inches; height of dorsal fin, 14 inches; the tail, 10 feet 8 inches broad; from point of snout to pectoral fin, 6 feet 2 inches; pectoral fins, 6 feet 2 inches long; the lower jaw projected about 15 inches beyond the upper. The baleen was of a lightish slate-colour; the longest plates were situated behind the middle of the mouth, and measured 1 foot 10 inches in length. From this point they gradually diminished in length to both extremities; those near the snout appeared to me to be the shortest. I could count 14 ribs only on each side, and 59 vertebræ in all; but as the carcass was a good deal broken up, and not very approachable otherwise before this was possible, the numbers may not be quite correct. Indeed, authors differ somewhat in opinion as to the number of vertebræ in this species; sometimes they are given as high as 63. Professor Reinhardt, however, states that there are regularly only 61 in this whale. I do not know exactly in which of Professor Flower's stages, as to age, this animal should be placed; it was not, at any rate, past

the "adolescent," as the disunited epiphyses of the anterior caudal vertebræ, now before me, clearly show.

The late Dr. Cook read a communication to the Literary and Philosophical Society of St. Andrews, on an individual of this species, which went ashore in a dying state, near Aberdeen, on the 18th December, 1847. It was from 46 to 48 feet long; the greatest circumference about 30 feet; and the longest baleen did not exceed 14 inches in length.

BALÆNOPTERA SIBBALDII (Physalus Sibbaldii Gray).

This is a somewhat critical species to meddle with, more especially as scarcely any two zoologists appear to entertain the same opinion relative to which whales should, and which should not, be assigned to it. According to the investigation of Prof. Van Beneden,* four species only of *Balænoptera* inhabit the North Atlantic. Whatever amount of probability there may be in this, it will be sufficient for our present purpose to state that, in the arrangement proposed by him, he considers *B. rostrata* as one species, and unites *B. borealis* Cuv., and *B. laticeps* Gray, into another. His next species embraces *B. musculus* (*Physalus antiquorum* Gray), and *B. gigas* Eschr., and the last includes *P. Sibbaldii* Gray, *B. latirostris* Flower, and *B. carolina* Malm. Dr. Gray,† on the other hand, adds *B. gigas* Eschr., to his *Sibbaldus borealis*, and in this species, amongst others, he includes the celebrated Ostend whale. This whale, however, Prof. Turner‡ seems to think—and in this I consider he is in all likelihood right—will likely prove to be the same species as his Longniddry whale, which he names *Balænoptera Sibbaldii* (*Physalus Sibbaldii* Gray). The Ostend whale has had various names, as well as sizes, ascribed to it. Indeed, both are nearly as numerous as its describers. Dubar states 105 feet long; Dr. Gray, 102 feet; Van Breda gives 84 feet; Van Benden, 80 feet; Dewhurst,§ who describes both the whale and its skeleton (the latter he had examined personally), states that the total length of the animal was 95 feet. He called it *B. rorqual*, or Broad-nosed Whale, and states that "in Iceland it is called the *Steipe*

* Bull. de l'Acad. Roy. de Belgique, t. xxvii., 1869.

† Cat. Seals and Whales. ‡ Trans. of the Roy. Soc. Edin., vol. xxvi. pt. 1.

§ Nat. Hist. of the Cetacea.

Rey-das, the Broad-nosed Whale of the whalers." This Icelandic name of the whale is no doubt synonymous with Eschricht's "*Steypireythr*."* Dewhurst gives a lithographic drawing of the whale under consideration, which is said to be the only correct one extant. It is a copy from a larger one presented to him by Mons. Kessel of Ostend, by whose orders the original drawing was made, previous to the dissection of the animal, in 1827. This figure —which seems to me to have been overlooked—represents a rather pretty mottled whale, agreeing, as it appears to me, very closely with Professor Turner's description of the colours of the Longniddry animal. It likewise makes a near approach to Eschricht's "*Steypireythr*," as given by him. Dewhurst mentions a number of whales captured or stranded on the coasts, which he supposed to be of the same species as the Ostend example. In some of these cases, it is more than likely, he was mistaken. Amongst those thus claimed, however, was Sibbald's Abercorn whale, of 1692. In Professor Turner's excellent description of the Longniddry animal, when comparing it with other finners, he notices the small number of vertebræ (54) which is said to have been all that existed in the Ostend whale. I have in my possession a somewhat large plate, containing figures, by Scharf, of that animal and its skeleton. On this plate the vertebræ are distinctly stated to be 62 in number, and, whatever this may be worth, the figure at all events does not belie the statement. The Longniddry whale was stranded on the 3d November, 1869. The total length of the animal was 78 feet 9 inches. The circumference was estimated at 45 feet (some say 33 feet). The pectoral fins about 12 feet long; the tail probably 18 feet broad; and the longest baleen, 2 feet 9½ inches long, and of a deep black colour.† The next whale deserving attention in connection with this species is Knox's *Balena maximus borealis*.‡ It is expected that Turner will definitely settle the place of that specimen, in his forthcoming paper on the anatomy of the Longniddry animal. Meantime,

* Vidensk. Meddelelser fra den Naturhistoriske, &c., 1867; trans. in Annals of Nat. Hist. 1868.

† Since the above was written, I see from the report of the British Association that Prof. Turner has identified the whale stranded at Aberdour, in July, 1858, with his Longniddry animal.

‡ *Rorqualis borealis* of Naturalists' Library, vol. xxvi.

we may observe that it was found floating dead in the sea, at the mouth of the Firth of Forth, and towed ashore near North Berwick, in October, 1831. It was 80 feet in length; the circumference, 34 feet; pectoral fins, 11 feet long; breadth of the tail, 20 feet. The only other whale to be noticed, that has occurred on the north-east of Scotland, so far as I know, is Sibbald's Abercorn example, of 1692, which has been already remarked on. It is probable that the whale, 82 feet long, mentioned by Scoresby as killed in Balta Sound, Shetland, in the winter of 1817-18, may also belong to this species, as he states that the longest lamina of baleen was about 3 feet long.

BALÆNOPTERA ROSTRATA.—THE PIKE WHALE.

THIS little species was long confounded with the larger individuals of the family, chiefly with *Physalus antiquorum* of which it was supposed by many zoologists to be the young and undeveloped condition, and that the differences between them, although apparent—to some at least—would ultimately disappear with age. This opinion was retained by some long after Fabricius, Traill, Scoresby, and others, had pointed out the fact that it was the smallest of the whale-bone whales, and that it differed otherwise from the larger specimens. Scoresby* figured and described one that was killed in Orkney, in 1808. The circumference of this example, however, was 10 feet, not 20 feet, as stated in his description. Dr. Knox † was the first to point out clearly the difference, anatomically, between this whale and the larger species, mainly from his examination of the skeleton of the Queensferry specimen, in 1834, which, as he showed, contained in all 48 vertebræ; while his *Balena maximus borealis*, the bones of which he had amongst hands at the time, contained 63 vertebræ. Since Knox's time it has been recognized by all cetologists. As stated above, it is the smallest of the baleen whales, and seldom exceeds 25, rarely 30, feet in length. It seems to be pretty generally distributed throughout the seas of central Europe. Van Beneden's map,‡ however, shows its occurrence six times only in British waters. Although not very common,

* Arctic Regions. † Edin. Phil. Jour.

‡ Bull. de l'Acad. Roy. de Belgique, t. xxvii., 1869.

it has undoubtedly been met with oftener than that. It extends as far north as Greenland; according to Scoresby, one of this species was killed near Spitzbergen, in 1813. An example of this whale was entangled in the salmon stake nets, and killed, near Largo,* 15th May, 1832. Dr. Knox's "*Rorqualus minor*"† was taken near Queensferry, Firth of Forth, in February 1834. It was 9 feet 11 inches long; the baleen about 2½ inches in length. Another individual was found, apparently dead, in the sea near the Bell Rock,‡ 7th September, 1857. Its length was about 16 feet; the longest baleen, about 5 inches in length. Another, about 18 feet long, was stranded near Burntisland, on the 8th September, 1870. Another specimen of this little whale—the skull and baleen of which are in my possession—was stranded near Arbroath, 29 July, 1869. It measured 13 feet in length. The circumference in front of pectoral fins, 7 feet 3 inches. From point of snout to dorsal fin, 8 feet 1½ inches; dorsal fin, about 20 inches high. From snout to pectoral, 4 feet. Length of fin, 16 inches. The two blow-holes were situated in a slight depression on the front part of the head, their anterior ends 17⅜ inches behind the point of the nose, each aperture 3⅞ inches long, and somewhat crescent shaped; near each other in front, but diverging outward and backward, with the concave side outward. From point of snout to interior edge of eye, 25¼ inches. There were two rows of baleen, one on each side of the upper jaw. The longest plates of these measured 3¾ inches in length, and were placed about the middle of the posterior half of the length, from which they gradually became shorter toward each extremity; posteriorly each row was gradually curved inward, approaching the posterior of the palate, until within two inches of each other at the entrance of the œsophagus. The baleen was of a brownish white, or pale horn colour; the apex and inner edges of each plate were closely fringed with hair-looking fibres of a similar colour. The baleen of each side, measured round the curve, was 26½ inches in length. The animal was jet black on the back, and about half-way down the sides; the lower side of a dusky white, and so was about two inches of the upper surface of the pectoral fins.

* Mag. of Nat. Hist., vol. v., 1832. † Naturalists' Library, vol. xxvi.
‡ Proceedings Roy. Phy. Soc., Edinburgh, 1858.

University, St. Andrews.

NOTES ON THE TETRAONIDÆ OF PERTHSHIRE.

BY ROBERT PATON.

THE PTARMIGAN *(Tetrao albus)*

IS only met with on the higher mountain ranges, where it dwells amongst the grey rocks and all but perpetual snow of our highest hills. It is no child's play to reach its favourite ground, and quite as hard work to find it after one is there. It pairs very early in the spring, nesting on the bare ground.*

During summer ptarmigan are of a uniform grey, but during severe winters they become almost pure white, excepting the tail feathers proper, which remain black. Generally speaking, they cast their feathers, receiving a new coat for the season, either white or grey, as the case may be; still I do not think they cast all their feathers, as I find them sometimes partly white and partly grey, causing me to think that, to a certain extent, they change their colour without entirely changing their feathers. The ptarmigan is somewhat smaller than the red or common grouse, its length being about 14 or 15 inches, stretch of wings 20 to 22 inches, and weight 1 lb. 2 oz. to 1 lb. 4 oz.

* That it is not the invariable habit of the ptarmigan to nest on the bare ground I have reason to believe, having found a nest on Ben Muick Dhu, during the past summer. This nest was at an altitude of about 4200 feet, and was placed among some coarse grass and sedge, close to a patch of snow. It was rudely constructed, the materials being the leaves of some sedge (probably *Carex rigida*), mixed with pieces of that common mountain lichen, *Cetraria islandica*. The nest contained four fresh eggs, and the bird sat very close. Possibly this may have been a second nesting, as a few days previously (the time was towards the end of June), I saw a ptarmigan with a brood of young birds on a hill near Lochnagar. This bird displayed far more solicitude for the safety of her young than any other bird I have seen, running along in an apparently disabled state not more than a yard from us, in fact, so near at times, that I believe I might easily have put my entomological net over her, if I had been so disposed. After accompanying us for about fifty yards, she flew off, doubtless congratulating herself on her cleverness. I have never seen ptarmigan at a less altitude, I think, then about 3000 feet. When flushed, they rise with a low hoarse croak, very different from the loud cry of the red grouse. Often, however, they give no cry at all, and hence have been termed the mute grouse. Though generally associated in very small flocks or coveys, I saw a large flock of at least fifty individuals one day early last August.—EDITOR.

THE RED GROUSE *(Tetrao lagopus)*

Is the most common and best known of all our species, and seems to be confined to the British Islands. It is found most abundantly on our high lying moors, still it occurs occasionally quite close to Perth, on such places as Caller Fountain Hill, and westwards about Dupplin, and the Moss of Methven. The male bird is of a rich dark chestnut brown and has the usual red patch over the eye, which adds so much to the appearance of all our Grouse; the female is somewhat lighter in the colour. It does not change the colour of its plumage as the Ptarmigan does. The Red Grouse feeds upon the shoots of heather, &c., and has no objections to breakfast on the corn stooks of the highland farmer, where it sometimes falls into a rat-trap. The hen lays from 7 to 14 eggs, in a very meagre nest, amongst the heather, grass, or whins.

THE BLACK GROUSE *(Tetrao tetrix).*

This is a very handsome species, and is still plentiful in Perthshire. It may be met with on the east, about Murray's Hall Hill, but with one exception it has never occurred on Kinfauns, that I am aware of. The male is of a glossy black, with the wing and tail coverts white, and has the peculiar curl on the tail, which most of us, I dare say, have noticed. The female, or gray hen, as she is called in Scotland, wants this peculiarity in the tail feathers, and her name gives a pretty correct idea of her colour. The Black Grouse is quite at home either in forest or moor, being met with frequently in the Black Woods of Dupplin. In this it differs from our Red and White Grouse, which never enter a wood except passing through a strip or outskirt when flying from one part of a moor to another. The male measures about 22 inches, while the female is some 4 or 5 inches shorter.

The black-cock is very hard on any intrusion of his feathered neighbours during spring, when he will attack and drive off even a cock pheasant, and should the enemy take refuge in a bush, the black-cock will beat the cover until he shows front, when he is speedily driven off the ground.

THE CAPERCAILZIE *(Tetrao urogallus)*

Is the largest and most beautiful species of all our grouse, and is very abundant throughout Perthshire, occurring quite plentifully within two miles of Perth, as on Kinnoull Hill, where it is very common. It is about ten years since first I met with them there. They were introduced at Taymouth in the year 1835, a number of eggs having been presented to Lord Breadalbane, by Mr. Buxton. The eggs were hatched in the nest of the Black Grouse, and the young were carried about the moors in boxes to feed. The Capercailzie feeds almost entirely on the leaves of the Scotch fir *(Pinus sylvestris)*, and also in summer on the common fern and other wild plants; but I have seen them feeding greedily during winter on the corn stooks during a late harvest. This, however, seems to be more a local than a general habit, as I have never heard of it happening anywhere else. The male is a very large bird, measuring 3 feet and upwards, and weighing 10 lbs. to 12 lbs. It resembles an eagle a good deal when seen flying between one hill and another, which may account for the name it has earned for being so bad to pheasants. I think, however, the greatest harm it does them is caused by their own stupidity in mistaking it for a bird of prey, and getting frightened. I have seen a good deal of them, but I never even once saw the capercailzie and pheasant fighting; and it is even difficult for me to believe that they do not agree (excepting in that one point), as it is quite common for the females of both to deposit their eggs in the same nest.* This bird must be very destructive to the plants upon which it feeds, the crop, when full, being very large. During the spring time the cock struts about the woods with the hens about him, much as a Turkey cock does in a farm-yard, his wings trailing on the ground, and his tail spread over his back. At this time he gives a peculiar cry, calling on the females. When sprung, he makes pretty long flights, always choosing the highest branches of the Scotch fir to perch upon, and keeping a very strict look-out. A favourite perch

* The male bird may also cause some damage by treading the hen pheasants, which he is rather guilty of. The capercailzie is sometimes reared in a pheasantry along with the other birds, and seems to thrive well.—R. P.

of the hen is the very top of the larch, which swings to and fro by the weight of the bird. When sprung, she emits a cry like the syllable *whut*, repeated rapidly over and over again. The capercailzie flies swiftly, so much so, that I have seen the head of one cut clean off by a wire before it could draw up. The great size of the bird, however, makes the speed of its flight very deceptive, when seen moving through an open space. The hen is only about half the size of the cock. I know of one instance in which the capercailzie and black-cock crossed, a pair of the hybrid* having been shot near Perth a few years ago.

* One of the above hybrids is now in the collection of the Perthshire Society of Natural Science, presented to it by Mr. J. Lamb.—R. P.

PERTH, April, 1871.

Notes on Lepidoptera.—*Thecla rubi.*—This species is, I think, certainly only single brooded here; I have found it in May, but never in August.

T. quercus.—I have found this butterfly in every little clump of oak trees round here. One day last summer I watched a group of eight or ten sporting round an oak tree on the front of Moncrieffe Hill. They flew round and round the tree, sometimes going high up in the air, at another away from the tree, but always coming back to it again, and always keeping out of reach of the net.

Tephrosia crepuscularia.—I find this moth on the north side of Moncrieffe Hill. It appears about the 20th of April, and sits during the daytime on the trunks of the larches, at a height of from one to four feet from the ground, where it strongly resembles a piece of lichen. The female conceals the eggs in chinks of the bark, or in the heart of the buds which are then about half open. The larva feeds on the larch.

Dasydia obfuscata.—This species is found among the rocks on Moncrieffe Hill, but is very local. It rests on the rocks with its wings spread wide, and pressed very close to the rock. On the approach of anything the moth starts up and flies high in the air. It is difficult to get specimens in good condition, on account of the force with which they fling themselves by their wings off the rock, which is covered with small, sharp, and hard pieces of lichen, which scratch and cut the wings in a few hours. This insect is greatly overrun with small pink parasites, which stick close to the body, wings, and legs. I have taken from twelve to fifteen of these parasites upon one moth. The caterpillar may be found feeding on heather, from September till June, but when reared in confinement, the moth is generally smaller, and without the beautiful gloss and green brindle. Ants are very destructive to the eggs and young larvæ; I have seen them cut the eggs from the stalk of heather on which they were laid, and catch and carry off the young larvæ to their nests.

Gnophos obscuraria—This moth resembles the last-mentioned very much in its habits, but is not so readily disturbed, and does not fly so very far. When

going to settle, it drops down all at once. Sometimes there is a slight brindle of green on the wings, but not commonly. The caterpillar feeds on heather.

Anisopteryx æscularia.—I find this species commonly on a privet hedge, near my house. The eggs are laid round the twigs like a necklace or bracelet, and covered with the fine down which forms the anal tuft of the female. I once caught a male flying *in cop.* with the female: this shows how species with apterous females spread from one place to another.

Chesias obliquaria occurs all round here. It is a very late-flying insect, and there is no use going to look for it before the dark twilight, *i.e.*, about half-past ten o'clock.

Geometra papilionaria.—The larvæ of this species pass the winter in rather a curious manner. They are generally hatched in the month of August, and feed till about the middle of September, when they are about half or five-eighths of an inch in length. About the middle of September the caterpillar selects a small twig (which it resembles very much in colour), and placing itself close to the point, it puts a few threads of silk round its body, and fastens itself securely to the twig. When the bud begins to swell in spring, the caterpillar eats it up; then it throws off its fastenings, and after roaming about for a few days, casts its skin, and assumes a different appearance. It has five humps of a rose-pink colour; but the rest of the body varies very much in different individuals: sometimes being dull straw-colour, sometimes dull pink, sometimes half-brown half-green, and so on. The larva feeds on the birch or alder.—W. HERD, Scoonie Burn, near Perth, May, 1871.

Cucullia chamomillæ in Fife.—On the 26th May, I took a specimen of *C. chamomillæ* at rest on a paling here. *Chærocampa porcellus* has been abundant here this season. In the last fortnight I have taken eighteen specimens at the flowers of Rhododendron, while in the three preceding years I have seen but two.—J. BOSWELL SYME, Balmuto, Kirkcaldy, 20th June, 1871.

Chœrocampa celerio.—Spending lately a few days in Peterhead, I called on the Rev. James Yuill, the Free Church minister there, when he kindly allowed me to examine his very extensive collection of Lepidoptera, in which he pointed out to me an excellent and finely-conditioned specimen of the very rare moth, *Chærocampa celerio*, caught in September, 1868, in Broad Street of that town. Another specimen of this moth has, I understand, been also caught in Aberdeenshire, in the parish of Fyvie. Mr. Yuill has also in his collection two specimens, caught in the neighbourhood, of the Convolvulus Hawk-moth *(Sphinx convolvuli).*—H. O. FORBES, Drumblade.

The Bedeguar of the Rose.—I noticed a great abundance of this gall in Ayrshire some weeks ago. In this neighbourhood it is not nearly so abundant. —A. T. SCOTT, Perth, September, 1871.

The "Devonshire Woody Gall of the Oak."—This has appeared both here in Berwickshire, and in Roxburghshire within the last year. It occurs also in various parts of Northumberland.—JAMES HARDY, Oldcambus, by Cockburnspath, August 28th, 1871. [Dr. R. C. R. Jordan, writing in the August number of the Entomologist's Monthly Magazine gives an interesting account of the arrival of this gall at Birmingham. He says, "In our own days *Dreissena*

polymorpha, amongst molluscs, *Cynips Kollari* amongst insects, and *Anacharis alsinastrum* amongst plants, have so naturalized themselves in our island, that it would be utterly impossible to eradicate them. Of these examples, *Cynips Kollari* is to me of special interest. Although noticed by me in Devon, certainly for forty years at the least (since we used its galls for marbles, when I was quite a child), yet it did not reach Birmingham until 1860, when it was first noticed by me in the town—a fact not to be wondered at, considering how often its galls were brought from the south by tourists. It was not, however, until the autumn of 1866 that it was first seen by me invading Birmingham, along the hedges on Worcestershire side. The two streams have since met, and *C. Kollari* is to be found in both town and country." We shall be glad to hear if the galls of *Cynips Kollari* have been observed elsewhere in Scotland. As regards the above-mentioned mollusc *(Dreissena polymorpha)*, the following incident will serve to show how it may easily be accidentally introduced into a locality. Mr. William Herd showed me some shells, which he had found attached to some logs just brought by rail to the Goods Station at Perth. They belonged to this species, and one of them, on being placed in a cup of water, showed signs of life. Now, if these logs—instead of having been placed in the Goods Station—had been taken to the harbour, and, as might very probably have happened, come in contact with the water, the *Dreissena* would probably have become naturalized at Perth. Most likely it was in this manner that this mollusc became established in the Forth and Clyde Canal, and in other canals.—ED.]

The "Cotton Gall of the Oak."—Mr. W. H. Kidd (of Godalming, Surrey) who has paid much attention to gall insects, had a theory that this was not found north of a line drawn from the Thames to the Severn. I have, however, found it in Perthshire and Inverness-shire, and should like to know where else it occurs in Scotland. The gall cannot be easily mistaken, from its resemblance to a tuft of pure white cotton-wool.—F. BUCHANAN WHITE.

Captures of Lepidoptera at Rannoch.—My brother and I visited this most productive hunting ground again this summer, about the middle of August, and had the pleasure of taking another specimen of *Noctua sobrina*, together with the following rather local species :- *E. blandina ; C. davus ; D. obfuscata ; F. pinetaria ; L. olivata ; M. rubiginata*, var. *plumbata ; C. munitata ; C. testata ; C. populata ; C. imbutata ; X. rurea*, var. *combusta ; C. graminis ; C. Haworthii ; A. porphyrea ; N. glareosa ; N. conflua ; N. Dahlii ; N. cerasina (neglecta) ; O. suspecta ; E. viminalis ; A. occulta ; A. tincta ; H. adusta ; C. solidaginis ; P. interrogationis ; S. anomala ; S. alpinalis ; C. margaritellus.* I may also mention, that from some larvæ taken last year, I have reared, amongst other commoner species, one of each of the following :—*T. cratægi*, *S. illustraria*, and *F. conspicuata.*—THOMAS HUTCHINSON, Grantfield, Leominster.

Crambus myellus in Aberdeenshire.—Of this species I have to record two captures in addition to those already published. Of these one was taken in Glen Muick, in July, 1870, by Mr. Sim, naturalist in Aberdeen ; while the other (verified by Dr. Buchanan White) was taken at Fyvie some years ago, and is now in the University Museum. Both the specimens are somewhat rubbed, but still distinctly recognizable. In a collection made at Fyvie, besides the above, the most interesting species are the following :—*M. Artemis*, *S. ocellatus*

(one), *S. convolvuli*, *Chærocampa celerio* (one), *Demas coryli* (not rare), *A. ligustri*, *A. myricæ*, *N. lutosa*, *A. pyrophila*, *T. subsequa*, *T. orbona*, (var. *Curtisii*), *E. lutulenta*, *A. herbida*, *A. occulta*, *H. rectilinea*, *P. festucæ*, *S. lunaria*, *P. pilosaria*, *D. obfuscata*, *E. punctaria*, *E. pendularia*, *H. aurantiaria*, *L. hexapterata*, *A. derivata*, *P. lignata*, *C. psittacata*, *C. suffumata*, var. and *C. obliquaria* ; also *Stenopteryx hybridalis*. Near Aberdeen I last summer took *Spilodes sticticalis*, and *Scopula ferrugalis*, but only one specimen of each. All the above are now in the University Museum, and were all undoubtedly taken in Aberdeenshire.—J. W. H. TRAILL, University, Old Aberdeen.

Sphinx convolvuli in Orkney.—I have received information of the capture of *Sphinx convolvuli* lately at Harray.—ID.

Insanity in a Dog.—In a former number of the "*Scottish Naturalist*" there appeared a request that those who have observed cases of insanity, or madness (as distinguished from rabies) in animals, should put them on record. Such a case came under my own observation some four years ago, and I give accordingly a brief account of it :—Billy, the unfortunate patient, was a favourite terrier dog, of a breed between the "Dandie Dinmont" and Skye Terrier; he was of very active habits and shewed much affection for all about him ; he was reared by hand from the time he was a few weeks old. When Billy was about fifteen months old we noticed a change in his disposition ; he no longer indicated any desire to accompany us in our walks, or showed those signs of active pleasure and affection he had been used to display. This increased till he became sullen and morose, and would not even come when called by his name ; and then he used to absent himself from home for a whole day sometimes. The house where he lived was situated at the foot of a hill, in this neighbourhood, and it was discovered that Billy during these absences, used to betake himself to a lonely part of the moor, and there occupy himself with howling in a most persistent and dismal manner. I did not see or hear him myself thus engaged, but have no reason to doubt the accuracy of my informants on this point. Again the illness advanced a stage, and Billy became the victim of a new symptom,—viz., a tendency to turn round in one direction, I think towards the left, but am not sure on this point. This rapidly increased till at last directly he stood up he commenced turning round and round till he was exhausted and lay down again. This turning became so constant that he could not even stand up to eat on account of it, and as he was becoming a wretched object from damage done to himself by knocking against things, I gave orders for him to be destroyed, and this was done the day after I left home for a month. There was accordingly no examination made of his brain ; this is much to be regretted, as it would have no doubt revealed amply sufficient causes for his illness. Some time after being buried he was exhumed, and his skull is now in the museum of Dr. Grierson of Thornhill. It is a well developed skull, and exhibits nothing peculiar. I should think the course of his illness extended over about three months. This case was clearly one of cerebral disease, accompanied by symptoms quite similar to those which, when occurring in man, are called insanity.—D. SHARP, Thornhill, Sept. 6, 1871.

PHYTOLOGY.

THE ALTITUDES ATTAINED BY CERTAIN PLANTS.

By F. BUCHANAN WHITE, M.D.

BOTANY in general, and British botany in particular, owes much to the labours of Mr. Cottrell Watson, whose "*Cybele*" and its "*Compendium*" are, we imagine, known to, and frequently referred to by, every botanist who is not a mere collector. Not the least interesting part of the "*Cybele*," especially to the botanist in the Highlands, are the statistics of the vertical range of plants; and the object of the present paper is to call attention to the fact, that certain plants have a higher (or lower) vertical range than is indicated in the "*Cybele*" or its "*Compendium*." When we consider, however, the extent of the rocks and corries which, on the hills, are the especial habitats of many plants, and the various circumstances—such as heat and moisture—required for the growth of such plants, it is not surprising that some sheltered ledge, concealed perhaps by neighbouring rocks, and not very accessible, should have escaped the notice of botanists accumulating statistics on altitude. Such a ledge was shown to me on Lochnagar by Mr. Roy, where, amidst many plants of the rare *Mulgedium alpinum*, several species were growing luxuriantly at a far higher altitude than that indicated by Mr. Watson. There are some other plants, however, that cannot come under this category, and which either grow in localities readily accessible and easily examined, or which have had their altitudes ascertained and published at a date prior to the publication of the "*Compendium*." We especially refer to Professor Dickie's "Botanist's Guide," published in 1860—a work which might well be taken as a model for all Local Floras. In several cases Mr. Watson might well have availed himself of Dr. Dickie's observations.

The origin of the present list was thus. Happening to talk about the altitudes of certain plants with Messrs. Roy and Traill of Aberdeen, we found that each of us knew of some plants with a higher vertical range than is generally supposed. Consequently, we began to take notes in our excursions among the hills, and soon added several more species to the list. In it is included also some altitudes given by Dr. Dickie, and which have not come under our observation; to these are appended the initials G.D.

PLANT.	Altitude in feet.	Locality.	Altitude in feet given in Comp. Cybele Britan.
Caltha palustris L.	3600	Lochnagar	3480.
Fumaria officinalis L.	1100	Braemar	900.
Nasturtium officinale Br.	1200	G.D.	1150.
Brassica sinapistrum Boiss.	1400	Braemar	1200.
Capsella bursa-pastoris D.C.	1450	„	1200.
Viola arvensis Murray	1450	„	1150.
Lychnis diurna Sibth.	3500	Lochnagar	2700.
Lychnis vespertina Sibth.	1400	Braemar	1150.
Githago segetum L.	1450	„	900.
Stellaria nemorum L.	2500	Caenlochan	1200.
Arenaria trinervis L.	1200	Braemar	900.
Spergula arvensis L.	1450	„	1050.
Spergularia rubra St. H.	1250	„	600.
Scleranthus annuus L.	1200	G.D.	1050.
Elatine hexandra D.C.	1627	Loch Callater	Low Grounds.
Geranium sanguineum L.	1200	Braemar G.D.	1200?
Geranium sylvaticum L.	3200	Lochnagar	2700.
Geranium dissectum L.	1250	„ G.D.	900.
Empetrum nigrum L.	4100	G.D.	4050.
Trifolium hybridum L.	1450	Braemar	
Trifolium medium L.	1450	„	1050.
Astragalus alpinus L.	2200	Craigendal	2400-2550.
Vicia sylvatica L.	2300	Clova	1680.
Lathyrus macrorhizus Wim.	2300	Craigendal	2160.
Prunus Padus L.	2750	Loch Esk	1050.
Rubus chamæmorus L.	3800	Ben na Bhuird	3240.
Rubus Idæus L.	2400	Caenlochan	1980.

Plant.	Altitude in feet.	Locality.	Altitude in feet given in Comp. Cybele Britan.
Rubus suberectus And.	1300	G.D.	
Fragaria vesca L.	2500	Glen Callater	1950.
Potentilla anserina L.	1350	Braemar	1050.
Sibbaldia procumbens L.	4200	Ben Macdhu G.D.	4080.
Alchemilla alpina L.	4170	G.D.	3990.
Rosa canina L.	2300	Craigendal	1350.
Myriophyllum spicatum L.	1627	Loch Callater	1200.
Epilobium angustifolium L.	3200	Lochnagar	2700.
Epilobium montanum L.	1800	Glass-allt G.D.	1590.
Sanicula Europæa L.	1200	Braemar G.D.	1050.
Conopodium denudatum Koch.	2400	Caenlochan	1592.
Meum athamanticum Jacq.	1480	Braemar	1380.
Angelica sylvestris L.	3200	Lochnagar	2700.
Caucalis anthriscus Huds.	1450	Braemar	1350.
Galium saxatile L.	4000	Ben Macdhu	3890.
Galium mollugo L.	1200	Braemar	1050.
Asperula odorata L.	1400	,,	1200.
Carduus heterophyllus L.	3200	Lochnagar	2160.
Carduus crispus L.	1150	Braemar	900.
Centaurea Cyanus L.	1386	,, G.D.	1050.
Petasites vulgaris Desf.	1250	Ballater G.D.	945.
Matricaria inodora L.	1450	Braemar	1200.
Artemisia vulgaris L.	1400	,,	1200.
Filago minima L.	1000	Inver	750.
Gnaphalium uliginosum L.	1100	Braemar	900.
Senecio sylvaticus L.	1180	,, G.D.	1050.
Crepis virens L.	1500	Drumochter Pass	1050.
Mulgedium alpinum Less.	1700 / 3500	Canness & Lochnagar	2100-2700.
Sonchus arvensis L.	1450	Braemar	990.
Pyrola minor Sw.	2500	Caenlochan	1500.
Pyrola media L.	2500	,,	1800.
Pyrola secunda L.	2800	Near Lochnagar	2400.
Gentiana nivalis L.	2400	Caenlochan	2700.
Myosotis arvensis Hoffm.	1450	Braemar	1230.
Echium vulgare L.	1200	,, G.D.	750.
Lycopsis arvensis L.	1380	Lin Mui G.D.	1050.
Plantago lanceolata L.	2400	Caenlochan	2250.

PLANT.	Altitude in feet.	Locality.	Altitude in feet given in Comp. Cybele Britan.
Litorella lacustris L.	2500	Cairn Liath	1650.
Veronica hederæfolia L.	1200	Corgarff G.D.	900.
Melampyrum sylvaticum L.	1300	Altguisach G.D.	1050.
Euphrasia officinalis L.	3760	Lochnagar	3600.
Rhinanthus cristagalli L.	3000	Glen Callater	2550.
Pedicularis palustris L.	2800	Callater Table-land	1800.
Mentha arvensis L.	1450	Braemar	1050.
Galeopsis Tetrahit L.	1450	„	1200.
Lamium amplexicaule L.	1200	„	600.
Ajuga reptans L.	2400	Caenlochan	2190.
Utricularia vulgaris L.	1627	Loch Callater	1500.
Trientalis Europæa L.	3000	Lochnagar	2790.
Polygonum convolvulus L.	1200	Braemar G.D.	1050.
Polygonum Persicaria L.	1350	Loch Muick G.D.	1200.
Chenopodium album L.	1180	Braemar	900.
Euphorbia Helioscopia L.	1450	„	1050.
Euphorbia Peplus L.	1100	„ G.D.,	1050.
Salix pentandria L.	1700	Canness	1350.
Salix nigricans Sm.	2900	Glen Callater	2400.
Salix arbuscula L.	2550	Little Craigendal	2400.
Salix phylicifolia L.	2200	G.D.	2100.
Salix lanata L.	2900	Above L. Kandor	2700.
Salix Lapponum L.	3700	Lochnagar G.D.	2700.
Salix herbacea L.	1660-	Bennachie G.D.	$\frac{1860}{4320}$.
Quercus Robur L.	1500	Pannanich G.D.	1350.
Malaxis paludosa Sw.	1600	Altguisach G.D.	1500.
Orchis mascula L.	2500	Caenlochan	1500.
Habenaria viridis Br.	3300	Lochnagar	2550.
Goodyera repens Br.	1000	Ballochbuie G.D.	600.
Juncus castaneus L.	2000-	Glen Callater G.D.	$\frac{2400}{3000}$.
Juncus trifidus L.	4300	Ben Macdhu	4230.
Sparganium natans L.	1627	L. Callater G.D.	1590.
Potamogeton lucens L.	1100	River Muick G.D.	600.
Potamogeton heterophyllus Sch.	1627	L. Callater G.D.	900.
Tofieldia palustris Huds.	2650	Craigendal	2400.
Eleocharis pauciflora Link.	2600	Glen Callater	2100.
Schænus nigricans L.	1600	Glen Callater G.D.	1050.

PLANT.	Altitude in feet.	Locality.	Altitude in feet given in Comp. Cybele Britan.
Carex panicea L.	3700		G.D. 2280.
Carex ampullacea Good.	3000	Callater Table-land	2700.
Phleum pratense L.	1640	Glen Callater	1050.
Calamagrostis Epigejos Rot.	1000	Ballochbruie	G.D. 750?
Aira cæspitosa L.	3500		G.D. 2940.
Aira flexuosa L.	3760	Lochnagar	3690.
Aira caryophyllea L.	1400	Braemar	G.D. 1350.
Melica nutans L.	1600	Glen Callater	G.D. 1350.
Koeleria cristata Pers.	2000	Khoil	G.D. 1350.
Poa pratensis L.	2900	Morven	G.D. 2250.
Glyceria fluitans Br.	2200	Loch Phadrig	G.D. 1500.
Festuca sciuroides Roth.	1250		G.D. 900.
Equisetum pratense Ehr.	1700	Caenlochan	1200.
Equisetum hyemale L.	1700	Canness	600.

SCOTTISH GALLS.

By J. W. H. TRAILL, M A.

HAVING paid some attention during the last and present summers to the galls occurring on plants which have came under my notice, I now give the results as a slight contribution to our knowledge of those occurring in Scotland.

I have not studied the galls in connection with the insects causing them, but only in connection with the plants on which they occur, so that, so far as the occupants of the galls are concerned, I can give only the classes to which they belong.

This list is also the poorer that I have not specially looked for galls on plants except in regard to one or two species, but merely taken them while botanising ; still I trust, despite its deficiencies, it may be of some use to those who may be working at the subject, by directing attention to a few plants previously overlooked, as well as being in some cases a guide as to what part of the plant to examine for them. Almost all of them

were collected by me in Aberdeenshire and Kincardine, especially in the valley of the Dee, from the coast to Braemar; those on the alpine *Salices* occurring on the mountains at from 2000 to 3000 feet above the sea.

VIOLA CANINA L.—On the leaves, the hind margin rolled up, and fleshy, purplish, and smooth; contains one or more dipterous larvæ.

LOTUS CORNICULATUS L.—*(a)* Galls terminal, seemingly an abortive shoot made of leaves overlapping, green, about ⅛-inch diameter; *(b)* distorted flowerbuds; they become much enlarged and swollen, and seldom flower, are readily seen, contain usually several small reddish dipterous larvæ, and sometimes one seemingly lepidopterous larva; occur on sandy bents on the links.

VICIA SEPIUM L.—Leaflets of terminal leaves are folded face to face (the upper side internal), and become fleshy and hardened, but not discoloured; each leaflet contains several white dipterous? larvæ. One plant at Banchory.

PRUNUS COMMUNIS Huds.—On leaves, chiefly marginal, projecting most below; form irregular; colour dirty light green; sometimes many on a leaf; common.

PRUNUS PADUS L.—On leaves (on upper side), erect, attached to leaf by a slender footstalk, 1-16th to 1-8th-inch in height, by half as much in greatest diameter, colour reddish brown; common where *P. Padus* occurs.

SPIRÆA ULMARIA L.—Common on upper surface, red, often numerous on a leaf, small size.

ROSA SPINOSISSIMA L.—Galls usually on the leaves, sometimes on the branches, and rarely on the fruit; form rounded, oval, or irregular; leaflet frequently completely changed into a gall, with only a narrow serrated wing round it; colour reddish, smooth and hard, size variable, ⅛ to ½-inch; contains one to four or more cells, with one Rhodites larva in each; they retain their form when dried.

ROSA CANINA L.—*(a)* Bedeguar gall on branches, long and shaggy, reddish; scarce; I once found it near Stonehaven; *(b)* gall formed of leaflet as in *Vicia sepium*, each leaflet

contains one dipterous larva; *(c)* gall on leaves, chiefly on the under surface, sessile, but with only a small point of attachment to the leaf, hence readily rubbed off, shape of an apple, or slightly irregular and flattened, hard, not yielding to pressure between the fingers, light green, smooth or with small scattered knobs, central cavity small, walls of irregular thickness, usually containing several cells, in each of which is one larva; size of a small pea; *(d)* on leaves, chiefly on the upper surface; sessile round or slightly flattened, yielding to pressure of fingers; dark green or reddish, usually smooth, sometimes with scattered knobs, central cavity large, walls of uniform thickness, slight; one larva in each. I am not sure as to whether *(c)* and *(d)* are distinct or merely modifications of the same gall. The larvæ in both seem to be hymenopterous.

PIMPINELLA SAXIFRAGA L.—Gall formed of a seed much inflated, usually both seeds of the pair become galls, sometimes only one of them. They are very readily noticeable in the umbels; are green, rounded, smooth, and about ⅛-inch in diameter, walls thin, central cavity large; each contains one deep orange dipterous larva.

(To be continued.)

FUNGI.

HANDBOOK OF BRITISH FUNGI; BY M. C. COOKE, M.A. London: Macmillan & Co.

LIST OF FUNGI COLLECTED NEAR FORRES; BY THE REV. JAS. KEITH, M.A. Aberdeen: Printed for the Aberdeen Natural History Society.

HALF a century or so ago, when botanists were less abundant, and the ascertained British Flora less extensive, there were perhaps more persons who "went in" for every group, and consequently some of the Floras of the period treated of all orders of plants from *Phanerogamia* down to the

Algæ and *Fungi*. Notable among these were Gray's "Natural Arrangement," and Withering's "Arrangement." Since that period, however, the investigation of the lower orders of plants has made such progress, that most botanists are obliged to limit their attention to a single group, or part of a group; and hence the necessity of such manuals as Mr. Cooke's "Handbook of British *Fungi*." Thirty-five years ago the Rev. J. M. Berkeley published, as one of the volumes of the "English Flora," descriptions of all the species of *Fungi* then known as British, but up to the present time there has been no attempt to publish another Mycological Flora of the British Isles, therefore Mr. Cook ehad no easy task when he undertook the publication of such a work. This involved the preparation and arrangement of descriptions of nearly three thousand plants, the comparison of specimens and figures, and the measurement of spores; the result is, that we have a volume of nearly 1000 pages, containing descriptions of 2810 species, and illustrated by upwards of 400 woodcuts and 7 plates.

In the arrangement of the *Hymenomycetes* the author has followed the illustrious, and now venerable, Fries, and Mr. Worthington Smith. To the latter botanist, he acknowledges his indebtedness for the measurements of the spores of the *Agaricini*, and for the drawing of many of the woodcuts.

Mr. Cooke apologises for the absence of an introduction, and for the imperfection of that part of the work relating to the distribution of the species. To supply the place of the former he hopes some day to publish another work. With regard to the indication given of the distribution of the various species in Britain and elsewhere, we think something more might have been done, though this is a matter of but secondary importance. In many cases, too, the season of the year at which the species may be found is not indicated. A mistake (in our opinion) of greater importance is the adoption of *subgenera*—a mode of division which we neither believe in nor see the advantage of. If the genus *Agaricus*, for example, containing upwards of 450 British species, is of too unwieldy dimensions, by all means let it be broken up, if characters sufficiently marked to constitute several genera are found: but why call these *subgenera*? As far as we can see, the chief result is to replace the binomial

system of nomenclature founded by Linnè, by a trinomial one, and to give the student additional—and to many persons unintelligible—words to remember. For instance, why should we have the trouble—not to mention the loss of time—of saying "*Agaricus (Psathyra) spadicco-griseus*," instead of "*Agaricus spadiceo-griseus*," or "*Psathyra spadiceo-griseus*"? Another pet aversion of ours is the manufacture of "English names" for species which have not *common* names of their own, and in this respect Mr. Cooke sins very deeply. *Psalliota campestris*—we beg pardon, *Agaricus (Psalliota) campestris*—is known throughout Britain as the "Mushroom"; but who calls the above-mentioned *Agaricus (Psathyra) spadiceo-griseus* the "Bay-grey Psathyra."

We shall, however, be much surprised if the study of *Fungi* in Britain does not receive a great impulse from the publication of Mr. Cooke's two well-got-up volumes, and the best thanks of the botanical world are due to him for his enterprise in undertaking and publishing such a work

The other work whose title appears at the head of this article is one of the meritorious publications of the Aberdeen Natural History Society—an association which generally and sensibly confines its publications to works bearing on the Fauna and Flora of the north-east of Scotland, and is thereby doing good service to science at large.

The author, who, we believe, has not been studying *Fungi* for any great length of time, but who has been successful in adding several striking species to the British list, enumerates in this pamphlet all the *Fungi* found by him near Forres, up to the end of 1870. No less than 129 species of *Agaricus* are included, and other genera of the larger species are well represented, but comparatively few of the smaller genera and species are mentioned in the list. We hope that Mr. Keith intends publishing a list of the many species he is sure to find when he turns his attention more closely to the *Micro-fungi*. Among the many interesting species mentioned, we notice *Fistulina hepatica*, which we do not remember seeing recorded before as a Scottish species. Mr. Keith marks it as very rare, which as it is a species of high character as an esculent, we hope our fungivorous friends in Forres will bear in mind.

Cerastium triviale Link., var. alpinum Koch.—On a visit to little Kilrannoch (the station for *Lychnis alpina*) with Mr. Roy last August, we found this variety not very uncommonly. It may be distinguished from the common form by its fewer-flowered panicle, more elongated pedicels, and petals twice the length of the sepals (Grenier & Godron say—Flore de France; I., p. 271—twice or thrice the length). It has not before, I think, been recorded as British. I may here note that little Kilrannoch is in Forfarshire; Dr. Hooker in the "Student's Flora" places it, by some mistake, in Perthshire.—F. BUCHANAN WHITE.

Monstrosity of Scabiosa succisa.—I recently found a plant of this species with double flowers, each stamen being degraded into a petal. This form of *S. succisa* is not, I believe, very common. *Scabiosa succisa* affords a good example of protandry.—ID.

Local Plant-names.—I read with much interest the notes in your Journal upon Scottish plant-names. Would you allow me a corner in which to say how very glad my friend Mr. Holland (Moberly, Knutsford), and myself would be of any lists, communicated through your pages or otherwise, towards our book on plant-names, especially local ones, which is rapidly progressing. We very much want more Scottish names than we have at present.—JAMES BRITTEN, Royal Herbarium, Kew, July 10th, 1871.

VARIOUS NOTES.

AT the meeting of the British Association, Sir Walter Elliot read an important paper upon the "The advantage of systematic co-operation among Provincial Natural History Societies," pointing out the evils of isolation, and suggesting two modes of remedying the evil, and making available the useful information often brought forward by such societies, and which, being published in the local transactions, was lost to the great body of naturalists. We are now glad to learn that an influential committee has been appointed to consider and report upon the best means of rendering scientific organization more complete and effectual. The committee are also instructed to enquire into the best means of advancing science by means of lectures. These, we presume, are to be given in localities destitute of such advantages as are afforded by the neighbourhood of schools of science—such as university towns; and we understand that the committee have power to act, with the approval of the Council, during the course of the present year, if judged desirable.

The Royal Society of Edinburgh, acting upon a suggestion of Mr. Milne Home, have adopted a "Scheme for the Conservation of Remarkable Boulders in Scotland, and the indications of their positions on Maps." We trust that all who have it in their power will try to assist the Society in this matter. Papers and schedules giving further information may be obtained from the Secretary of the Royal Society, Edinburgh. We may possibly allude to this subject on a future occasion.

THE BRITISH ASSOCIATION IN EDINBURGH.*

(By our own Correspondent.)

"Nec semper arcum tendit Apollo."

WHILE in Edinburgh, attending the meeting of the "British Association for the advancement of Science," in August last, we received an invitation from the Editor of the "*Scottish Naturalist*" to make some sort of Report for that journal, on the results or proceedings of the said Parliament of Science. In accepting the Editor's invitation to occupy 6 or 8 pages of the "*Scottish Naturalist*" with such a report, it has appeared to us preferable to give a summary of our own general impressions, rather than to take up the limited and valuable space offered, by attempting to describe the meeting, or chronicling the papers read—even those relating more or less immediately to *Scottish* Natural History. The proceedings of the Association—all the general circumstances of its Edinburgh meeting—are already, presumably, well known. Full reports were given at the time in all the Edinburgh newspapers; and copies of these reports are still to be had, in sets of the said papers, of date between the 3rd and 11th August, 1871. More accurate revised reports have since appeared in "*Nature*," the "*Athenæum*," and various other journals of easy access to the readers of the "*Scottish Naturalist.*" And still further, reports—in the form of abstracts of the papers read, revised by their authors—will appear in due time in the annual volume of the Association for 1871. The social or popular aspects of the meeting have already formed the theme of comment by the newspaper press in all parts of the kingdom, from the "*Times*" down to the humble provincial weekly. In short, all the arrangements of the meeting have been described and criticised in every possible way by all classes of writers, in all kinds of serials, and in all parts of the country; and it seems, therefore, unnecessary to add to narratives or criticisms of *this* sort. But we think there is room for a critique by a Working Country Naturalist on the *real*—as contrasted with the apparent—advantages and disadvantages of such gatherings, as a means of advancing Science. Such a criticism—honestly and fearlessly made—is likely to possess more real interest, if not a more substantial or permanent value, to Scottish naturalists in general, than merely ephemeral narratives. We propose, then, to put upon record in these columns certain general personal impressions—regarding the working of the Association, as illustrated by the Edinburgh meeting—from the point of view of a Working Provincial Naturalist, who confesses to sharing in all Carlyle's hatred and horror of every sort of sham or humbug, and of mere talk, as contrasted with work! Though dealing with the subject, however, from a Naturalist's point of view, it is impossible to separate its *social* from its scientific aspects: for, as will immediately appear, its social aspects are perhaps the more

* Our Correspondent's letter should have appeared in No. IV., but was unavoidably "crushed out."—Ed.

important of the two, even to the most eminently scientific members of the Association !

We may prefix our observations with this general conclusion, that such congresses, as that which now occurs annually under the auspices of the "British Association," possess (1) certain decided advantages : (2) sundry questionable advantages : and (3) a large proportion of very decided disadvantages. It is but fair that we should first set forth what appear to us to be their *advantages* ; next, it may be well to regard the *questionable* advantages, which by some may be regarded as *dis*advantages ; and lastly, as honest critics, we must catalogue what seem to be their *disadvantages* or defects.

I. ADVANTAGES.—(*a*) *Decided.*

(1) The meetings of the "British Association" afford an admirable opportunity of becoming acquainted with the personal appearance, at least, of scientific or other celebrities—foreign as well as British—previously known only by their works or reputation. At the Edinburgh meeting the Country Naturalist had the opportunity of making *this* sort of acquaintance with Owen, Huxley, Herbert Spencer, Tylor, Bowring, Carpenter, Adams, Andrews, Babington, Bateman, Belcher, Bohn, Crookes, Perkins, Etheridge, Gassiot, Glaisher, Sir Richard Griffith, Hardwicke, Huggins, Gwyn-Jeffreys, Joule, Lankester, Lockyer, Balfour Stewart, Macalister, Markham, Clerk-Maxwell, Pengelly, Richardson, Roscoe, Sclater, Sharpey, Dr. Angus Smith, Dr. Edward Smith, Stenhouse, Stokes, Sylvester, Tristram, Waugh, Williamson, Willis, Davidson, Rae, Bonney, Le Neve Foster, Lord Lindsay, Lowe, Prestwich, Strachey, Vignolles, Godwin-Austen, Cayley, and a host of stars of lesser magnitude : as well as the Abbé Moigno and Dr. Jansen, of Paris, Van Beneden of Louvain, and several other distinguished foreigners : not to mention the Emperor of Brazil, and Miss Lydia Becker, both of them attractions in their respective ways : and our own Sir William Thomson, Lyon Playfair, Bain, William Chambers, and other notabilities, representing the science and literature of Edinburgh, Glasgow, Aberdeen, St. Andrews, Perth, and other parts of Scotland.

(2) The Association gatherings furnish an admirable rendezvous for the *reunion* of friends and correspondents from all parts of the country.

(3) The reception-room, in particular, is a most convenient place for *introductions* : and in this and other respects the room in question is the most important feature of the Association's meetings.

(4) These meetings are also convenient for the transaction of all sorts of *business*—as that between authors and publishers. At such business conferences, not only are authors brought into intimate contact—for the first time, it may be—with their publishers, but with celebrated writers, whose well-known works happen to have emanated from the same firm. Thus we had ourselves the good fortune at Edinburgh to be summoned by the agent of one of the most enterprising publishing firms of the United States, to a business conference with some of the leading *savants* or philosophers of this country—to wit, Professors Huxley, Bain, and Balfour Stewart, Mr. Herbert Spencer, and Dr. Carpenter.

(5) The meetings of the Association afford a pleasant means of seeing most favourably the chief cities of Britain, and the scenery of their vicinity. From this point of view alone, the mere *Tourist* makes a good investment of the twenty shillings which constitute him or her an Associate for the year, and

entitle to most of those privileges of the Association that are valued by the public.

(6) The reception-room, as well as the sections, public discourses, conversazioni, and excursions, constitute an interesting *psychological study*. The student can compare his *ideal* with the reality: he has an opportunity of investigating the much-heard of "eccentricities of genius": and he may engage himself amusingly in observations on the "Natural History of Bores,"—social as well as scientific—of reformers, enthusiasts, hobbyists, and visionaries of all kinds!

(b) Questionable.

(1) The Meetings of the "British Association" are a pleasant—if not profitable—means of social and scientific *dissipation*. But the dissipation is so continuous, and so concentrated, that it becomes a positive nuisance—a weariness to the flesh and spirit—to perhaps nine-tenths of those who take a full share in the proceedings—the full value of their ticket.

(2) Such meetings constitute, apparently, an attractive means of diffusing scientific information among the general public: less, however, perhaps, by means of the papers read, than by the objects displayed at the sections, exhibitions, conversazioni, and excursions.

(3) There is a straining after *sensationalism* or novelty—even in matters of science—which, while it may serve its immediate *ad captandum* purpose, is apt to overshoot its mark, and bring ridicule both on science and the Association—the cultivators of the one—the members, or attenders, or supporters, of the other. This remark must be held, unfortunately, to apply to the President's suggestion about germ-bearing aerolites—a suggestion which throws no light on "the origin of life," and has been the subject merely of derisive criticism by all sections of the press and public.

(4) It is to be *hoped* that a certain amount of *real* work is achieved—for instance, by means of the committees appointed by the general council for special investigation. But, on the other hand, it must be borne in mind that all the greatest achievements of science have been the fruits of *individual* or *personal* effort and enterprise—unsolicited, and for the most part unaided. The "British Association" was established "for the advancement of science": or, more specifically, its objects are—(1("to give a stronger impulse, and a more systematic direction, to scientific inquiry: (2) to promote the intercourse of those who cultivate science in different parts of the British Empire with one another, and with foreign philosophers: (3) to obtain more general attention for the objects of science, and the removal of any disadvantages of a public kind which impede its progress." That certain of these objects are fairly attained there can be no doubt, though whether they are so by the best possible machinery is open to question. That *all* these aims are fully realised can scarcely be asserted: and some of the reasons why may be found in the next and longer category of disadvantages or defects attending the operations of the Association. On the whole, however, the *good* attained *may* be sufficient to justify the existence of the Association, and to warrant and repay the patronage or attention that are bestowed upon it.

II. DISADVANTAGES.

(1) There is a superfluity of *mere Talk*. There are too many would-be "Admirable Crichtons," who are prepared to talk—and who do not scruple to talk—on any and every subject, social or scientific!

(2) People too frequently speak who have no qualifications for public exposition. It matters not, to such an audience, what may be their scientific acquirements or literary reputation, if speakers cannot express themselves clearly, fluently, intelligibly. The man or woman who has a weak or disagreeable voice—who cannot command appropriate expressions *extempore*—or whose knowledge of English grammar and composition is deficient, should assuredly *not* venture to speak before the "British Association." From this point of view, the oratory of our University Professors was not distinguished. By far the best speeches we heard were the *impromptu* utterances of two mere visitors—so-called "practical" men—the one a London watchmaker—the other a Leeds engineer!

(3) There is a strong tendency to the dissipation of time by the making of prepared speeches on the subject of a paper, instead of a mere criticism on the paper itself.

(4) There is a wonderful tendency on the part of people accustomed to *dogmatise*, either from the Pulpit, the Bar, or the Teacher's Rostrum, to criticise subjects they do not understand!

(5) Many of the speakers have really nothing to say—to the point, or of the slightest real value: they *can* throw no light on a given subject, and they *do* not.

"Parturiunt Montes: nascitur ridiculus Mus!"

(6) The meetings are beset by *bores*: more usually, however, of the *social* science, than of the pure science, type—though not the less troublesome on that account.

(7) Objectionable *personalities* are apt to be introduced into discussion here as elsewhere.

(8) The *excessive length* of the public addresses was a subject of universal and deserved complaint. This remark applies to all the three public lectures: but more especially, it was said, to Professor Abel's, which lasted more than two hours.

(9) The papers read at the sections are also, as a rule, much *too long*, even were they of general interest, which usually they are not. They should not occupy more than ten minutes or a quarter of an hour in delivery: and due time should be allowed for discussion or remark on each.

(10) The *character* of the papers, moreover, is not adapted for such an audience, which consists mainly of the general public, including a large proportion of *ladies*. No less than 754 ladies' tickets were taken out at the Edinburgh meeting. And this does not represent one-half of the ladies who attended the meetings, or the gaieties connected with them: for ladies' tickets are transferable, so that half-a-dozen ladies or more were admissible, on different occasions, with the same ticket. The meetings are, moreover, sedulously attended by reporters for the Press, who are ready to make capital—*pro bono publico* throughout the land—of everything that is said or done—that is seen or heard of—at so pretentious an assembly. The papers selected should therefore possess, as far as possible, a *general* interest. People go expecting and desiring to hear

"The grand debate,
The popular harangue, the tart reply,"

rather than mere dry scientific facts.

(11) Much *trash* is presented in the form of papers read to sections: unsup-

ported assertions—untenable theories—the appearance of which at such a time and place can only be explained on the supposition that nothing better is to be had!

(12) Others of the papers submitted are *second-hand*. They have already—perhaps repeatedly—been presented to the public in some other form or guise. The announcement for the first time of any *really new and important* discovery or fact must be so rare—if it has ever occurred at all—as to be practically unknown.

(13) Not a few of the papers—excellent though were their subjects, and the treatment thereof—were adapted rather for the *Social* Science Congress at its Leeds meeting. They were, however—and improperly, as I think—admitted into Section F. [Economic Science and Statistics]: a section which ought to be handed over bodily to the sister "National Association for the promotion of *Social* Science."

(14) The same author frequently reads several papers. We have known as many as eight papers submitted by one author at a single meeting (*e.g.*, that of Dundee, in 1867,) to different sections; of which papers, abstracts were published in the Association's Transactions for that year. At the Edinburgh meeting there were five authors each of whom read four papers: four who read three: and twenty-two who read two each.

(15) There appears, to be *too great laxity* on the part of the sectional councils in the admission of papers: as well as an unfortunate selection, frequently, both of the papers and their readers—having regard on the one hand to the nature of the audiences, and on the other to the length of time at disposal.

(16) Insufficient, inconvenient, or unsuitable accommodation for hearing the lectures and papers frequently renders pleasant or profitable listening impossible. Not only so, but any persevering attempt thereat speedily becomes physically exhausting, and finally intolerable.

(17) There is an *excess of conviviality* and gaiety. Three public evening Lectures in the Music Hall—the audience being all in full dress: two evening Conversazioni—also in full dress: two days of Excursions: a Private Ball: the Theatres every night: two Organ Recitals by day: the Scott Centenary Banquet and Exhibition—furnished too much excitement to be crowded beneficially into the short space of a week or ten days. But, besides these *public* recreations, there were endless *private* Hospitalities—whatever the "*Times*" may have said to the contrary—several of the University Professors and other private citizens keeping open house throughout the meeting: so that the country Naturalist had to encounter daily invitations to Breakfast and Dinner.

(18) The arrangements for social enjoyment were not, at Edinburgh, uniformly successful, by reason chiefly of the want of proportion between the number of ticket-holders and the provision made for them. Thus at the University Conversazione, three thousand persons were *packed* in a Library Hall capable of comfortably accommodating only three hundred: the result whereof was *a cram and stew*—a struggle, of the most undignified kind, for hats, cloaks, and refreshments; while the music was so placed that it could only be heard by those who ventured forth bareheaded from the conversazione hall to the open quadrangle of the College! Again, at the Melrose excursion, where there were 300 ticket-holders, the accomodation provided was barely fitted for fifty persons, and the result was

an amount and kind of discontent that threatened to give itself a very public degree or form of expression !

(19) The season of the year usually selected for the meetings of the Association, while highly suitable for the *excursions* that form so pleasant a feature in its proceedings, is most *un*suitable for lengthened *indoor* discourses. At Edinburgh the *heat* was frequently quite stifling and intolerable, rendering patient or persevering listening utterly out of the question.

(20) Many of our leading Naturalists, though they attend the meetings of the "British Association," do not read papers, and take no active part in its proceedings. On the other hand, it is an obvious punishment to them to subject themselves to the heat and crowding of the sectional rooms, and to the nuisance of listening to "twice-told tales," or to manifest nonsense !

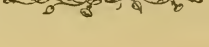
(21) Many of our leading Naturalists do not attend such meetings at all, regarding them as mere exhibitions of talk and sham—of egotism, superficiality, and dissipation !

(22) Some Naturalists, who are not in the habit of attending the Association's meetings, do not send papers, because (1) of the trouble involved in furnishing abstracts to reporters for scientific and other serials, and for the general press, as well as to the editor of the official report of its proceedings : (2) of the comparatively limited circulation of the annual volume which contains these proceedings : and (3) of the conviction that such an audience and such a volume are not those most fitting for the reception or record of abstruse or purely technical papers.

(23) The Association is too peripatetic. It leaves behind it no *permanent* effect in the locality it visits : whereas it might develope *local* affiliated associations capable of collecting much valuable information regarding the flora and fauna, geology and archæology, trades or industries, history or traditions, of each city and district visited.

(24) The Association is too much *in loco pauperis* : too much dependent on the subscriptions wrung—frequently most unwillingly—from the wealthy inhabitants of this city or that.

The result of summing up and balancing the disadvantages against the advantages of the present mode of conducting the operations of the "British Association"—as illustrated by the Edinburgh meeting—is the conviction that such an organization—"for the promotion of Science" *by its popularisation*—is in thorough accordance with the spirit of the age : but that the details of its operations are capable of great improvement. In particular, there is much which is at present objectionable, that may gradually, with care, be eliminated : while there are certain advantageous features that might—and in course of time probably will—be added. As at present constituted, the "British Association" must be regarded as mainly an increasingly fashionable means of social and scientific dissipation or recreation. It has only a quasi-scientific character, and its very existence depends on popular, not on scientific, support. The real scientific work done is very small ; and it could be done more efficiently in a much quieter, less expensive, and less ostentatious way.



ZOOLOGY.

THE BRITISH SPECIES OF CRAMBUS.

BY F. BUCHANAN WHITE, M.D.

THE group of small moths comprising the genus *Crambus* has not that amount of attention, that it deserves, paid to it by young British collectors, owing I believe in great measure to the difficulty beginners find in determining their specimens. I have taken an opportunity, therefore, of essaying to lighten these difficulties, and to direct more attention to this interesting genus, the life-histories of most of the species of which have still to be worked out.

In the preparation of this paper I have consulted the works of Zeller *(Chilonidarum et Crambidarum genera et species)*, whose arrangement I have adopted; Stainton *(Manual of British Butterflies and Moths, vol. II.)*; Herrich-Schäffer (*Systematische Bearbeitung der Schmetterlinge von Europa, vol. IV.)*; and Staudinger *(Catalog der Lepidopteren des Europæischen Faun-engebiets)*; besides examining recent specimens of all the British species (with one exception).

It was at first my intention to have described the Scottish species only, but as several of the other British species will probably be detected in Scotland, I have included all as yet found in Britain. In addition I have given short descriptions of a few European species that may perhaps occur in Scotland. Of the ninety-one species included in the European Fauna, only twenty-six have yet been found in Britain.

All reference to the earlier stages of the species has been purposely omitted, for the reason that as yet very little is known. It is to be hoped, however, that the energy of British observers will not allow this long to remain the case. The larvæ, (which

have sixteen legs, and are of dull colour, with the usual spots conspicuous,) of some species, at least, feed on moss, within silken galleries. Among these are *falsellus* (which I have reared from larvæ feeding on various species of moss growing on walls and rocks), and *hortuellus* (Treitschke; *Die Schmetterlinge von Europa, IX.* i. 84). The larvæ of *fascelinellus* feed on the sea-wheat grass *(Triticum junceum)*, spinning silken galleries about the roots of the plants (see notes by C. G. Barrett in *Entomologist's Monthly Magazine*, VI. 144; and by W. Buckler, in the same journal, VII. 160).

I have seen the eggs of several species. That of *pinellus* is oblong-oval, with about twelve sharp somewhat distant longitudinal ribs, connected by finer and closer ridges; it is whitish in colour. The egg of *margaritellus* is greenish-yellow, oblong, and slightly oval, rounded at each end, and one end slightly smaller; the surface is shining, and covered with slight oval depressions placed side by side—not end to end—and arranged in wavy longitudinal lines. The egg of *pratellus* is oval, more pointed at one end, pale yellow, and ornamented with slight longitudinal ridges connected by slight cross-bars. The eggs of all the species I have seen were not fastened to any object.

Some contractions and terms used in this paper require explanation. F.-w. =front wing. H.-w.=hind wing. Costa=the front margin of the wing. Cilia=the fringes. Central line=a transverse line crossing the wing about the middle. Hind line=a transverse line crossing the wing near the hind-margin. In some species both these lines are present; often, only the hind line; in a few species, neither. *L.*=a line (the twelfth of an inch). The size (from tip of one wing to tip of the other) of each species is given in lines.

CRAMBUS Fab.

Head with two ocelli. Tongue long. Labial palpi long, porrected, forming a long beak, partially covered by the maxillary palpi. Antennæ usually simple. Front wing oblong, central cell reaching to the middle, and twelve veins running to the margins; the 8th vein (counting from the inner margin) springs from the 7th, and the 9th from the 8th; hind-margin generally blunt, tip somtimes produced. Hind wings broad, the 7th vein springing from the apex of the anterior part of the central cell, and the 8th from the 7th. Front wings with no stigmata, but often with a pale central longitudinal streak, and with two transverse lines (one or both of which are some-

times obsolete or absent). The wings are folded round the body when the insect is at rest.

A.—**Argyroteuchia** H.—*Tip of front wing produced. Apical cilia paler than the wing, and bordered inwardly by a distinct dark line. Cilia either altogether metallic, or with a shining part below the middle of the hind-margin, which is there rounded, and marked with (generally conspicuous) marginal spots. The hind line, angulated or interrupted above,* and usually shining or silvery, and margined with darker, starts obliquely from the costa. Most of the species are adorned with pearly-white or white longitudinal streaks.*

a) The dark apical marginal line double. Cilia below middle of hind-margin shining. Hind line angulated on the fold. The central line divides the wing in the middle.

ALPINELLUS H.—F.-w. (with tip very much produced) ashy-brown, with a central longitudinal white streak, extending from the base to the hind-margin and continued in the cilia. The central line, brown, angulated very acutely above and more slightly on the fold, intersects the white streak. The hind line, dull whitish margined inwardly with brown, angulated very acutely above and more slightly on the fold, touches the hind-margin, and is interrupted there. Cilia metallic below the middle. H.-w. grey. 8-9 *L.*

July, August. Taken by Mr. Moncreaff, (to whom I am indebted for specimens), near Southsea. It occurs in sandy grassy places (especially in fir-woods) in France (S.W.), Germany, Hungary, Switzerland, and Livonia. It is not a mountain species, as the name would imply.

CERUSELLUS Schiff. S. V.—F.-w. (with tip only slightly produced) brown in the male, greyish-white dusted with brown in the female. The two lines (grey margined with yellowish-brown in the male, white margined with yellowish-ochreous in the female), acutely angulated above, and the hind one also, but more slightly, on the fold. Cilia metallic. H.-w. greyish-brown. 6-6½ *L.*

June. Central and Southern Europe. In Britain as far north as Lancashire.

b) Apical marginal line simple, margined outwardly with white. Cilia metallic. Hind-margin with dark spots below the middle. Hind line silvery, angulated above. Central streak pearly-white or white. Central line obsolete.

1. *Central streak entire. The space between it and the costa, of the ground colour.*

* "Above" means at the upper part of the line, *i.e.*, nearer to the costa than to the inner-margin.

HAMELLUS Thnb.—F.-w. (with tip slightly produced) slightly glossy, greyish-brown. Central white streak broad, acuminated at the apex, but not reaching the hind line, and with a tooth below in the middle. Hind line dull silvery, edged inwardly with brown; between it and the tip of the wing is a triangular white spot. Marginal spots somewhat elongated. H.-w. grey. 11 *L.*

July. In Europe as far north as Sweden and Finland; in Britain as far as Lancashire.

PASCUELLUS L.—Palpi above, and centre of head and thorax, white. F.-w. glossy, brownish-ochreous, white on the inner-margin. Central streak broad, pearly-white, situated near the costa (especially at the base), acuminated, not toothed; between it and the hind line is a white spot. Hind line silvery, edged with brown; before it, on the costa, is a white spot, and between it and the tip of the wing another white spot. Marginal spots somewhat elongated. H.-w. greyish-white, darker towards the apex. 10½-11½ *L.*

June, July. North and Temperate Europe. In Britain as far north as Inverness-shire; rather local in Scotland, frequenting damp meadows and moors.

Zeller mentions a variety from Saxony and Brunswick, which has the palpi, head, thorax, and anterior wings yellowish-brown, the central streak and spots concolorous, and hind wings grey.

[*Extinctellus* Z. (an aberration of *pascuellus*, according to Staudinger), is greyish-golden, costa grey, white streak obsolete, and the white spot before the silvery hind line (which is obsolete) not conspicuous; hind wings grey. It occurs in Iceland.]

SILVELLUS Hb., *adipellus* Tr.—F.-w. (with tip scarcely produced) glossy, ochreous-brown, paler on the inner-margin. Central streak broad, pearly-white, distant from the costa, rather blunt at the apex, and not toothed; from its apex a white spot runs to the hind-margin. Hind line dull silvery, margined with yellowish-brown. H.-w. pale grey. 11 *L.*

June. Central and Northern Europe. Local in Britain, occurring only in the south of England and Ireland.

ERICELLUS H.—Palpi brown. F.-w. (with tip obsoletely produced) glossy, yellowish-fuscous, paler on the inner-margin. Central streak pearly-white, narrow, distant from the costa, acute at the apex, not toothed; between it and the hind line is an oblong white spot. Hind line dull silvery; between

it and the tip of the wing is a white spot. Marginal spots margined inwardly with white. H.-w. dark grey. 10-11 *L.*

July. Central and Northern Europe. Local in Britain, having only been found as yet in Perthshire (Rannoch), Inverness-shire (Spean Bridge), and Sutherlandshire (Inveran and Inver). On moors.

[*Heringiellus* H.S. is another northern species, and might occur. It is dark fuscous-brown, with a short bifid white streak, and a white spot between the streak and the hind line, but not near either. *Alienellus* Zk., also a northern species, is dark brown, with a toothed central white streak, a white spot before the hind line, and a series of short parallel white lines under the spot.]

Note.—The above four species bear a strong resemblance to each other, but may be easily distinguished :—*hamellus* by the single central white streak *toothed* below ; *pascuellus* by the *colour of the head and thorax*, and by the central white streak *near the costa*, as well as by the evidently *produced tip* of the front wing ; *silvellus* by the white spot at the end of the white streak being *continued up to the hind-margin ;* and *ericellus* by the *narrow* central white streak.

2. *Central streak longitudinally fissured, or with a narrower white streak between it and the costa.*

ULIGINOSELLUS Z.—Palpi above, and head and thorax in the centre whitish. F.-w. (with tip very slightly produced) glossy, pale brownish-ochreous, inner-margin narrowly white. Central streak white, close to the costa at its basal half, fissured below by the sub-costal vein, the lower branch toothed below in the middle, and continued nearly to the hind line, its apex acuminated ; an oblong white spot between the central streak and the hind line, which is silvery. H.-w. whitish, grey along the costa. An aberration of the male has the central streak smoky. 8-10 *L.*

End of June. Occurs in Silesia and Piedmont. Local in Britain, and only in the south.

PRATELLUS L.—F.-w. (with tip produced) greyish-brown, (paler in the female) ; a sub-costal line, a narrow central streak toothed below beyond the middle, and a wedge-shaped spot between their extremities, white ; an oblong white spot before the silvery hind line. H.-w. grey. Sometimes the sub-costal line and wedge-shaped spot are concealed by fuscous. 9-10 *L.*

May-August. Central and Northern Europe. The commonest species in Britain, occurring probably throughout.

DUMETELLUS H.—F.-w. (with tip produced) brownish or greyish ochreous : a short subcostal line, a sharp-pointed central

streak acutely toothed below beyond the middle, and an oblong white spot at its extremity, pearly-white. Hind line silvery. H.-w. grey. 9½-10½ *L.*

June, July. Central and Northern Europe. Somewhat local in Britain. In Scotland it has been noticed at Musselburgh, Rannoch, Strathglass, and Braemar.

Note.—These three species are very like, but may be distinguished:—*uliginosellus*, by the *fissured* central streak and *pale* hind-wings; *pratellus* by the *dull* white and *narrow* sub-costal and central streaks; and *dumetellus* by its rather longer wings, *short* sub-costal streak, and *shining* white and *broader* central streak.

B.—F.-w. not emarginate, obtuse, often with the veins conspicuous. Cilia metallic. No central streak. Hind line slightly arched.

a) **Chrysoteuchia** H.—*F.-w. veins more or less conspicuous. Hind-margin yellowish, with black spots.*

HORTUELLUS H.—F.-w. ochreous, lined with fuscous between the veins. Hind line obtusely angulated, silvery blue margined with yellowish brown. A short silvery blue line before the tip. Cilia shining metallic. The brown angulated central line (not mentioned by Zeller or Herrich-Shäffer) is often present. 10-10½ *L.*

a. Var. *cespitellus* H.—F.-w. ochreous, not fuscous, between the veins.

b. Ab. *fuscescentellus.*—F.-w. altogether fuscous.

June, July. Central and Northern Europe. Common throughout Britain. *a.* Switzerland, &c. *b.* "More frequent in England,"—Zeller.

In many Scottish examples the hind and apical lines are pale silvery, and the marginal spots faintly brown.

b) **Thysanota** H.—*F.-w. veins more or less conspicuous. Both lines present. Hind-margin scarcely punctured.*

CRATERELLUS Sc. (1763); *rorella* L. (1767).—Head ferruginous; palpi very long. F.-w. broad, yellowish-white, lined with brown between the veins. Lines brown, the hind one margined with whitish. A small brown double line below the tip. Cilia shining metallic. 9½-10 *L.*

Var. *Cassentiniellus* Z.—Palpi longer. F.-w. Central line thickened. Apical line single. Eight brown streaks between the hind line and hind-margin (in *craterellus* there are said to be nine). 10-11 *L.*

June. Central and Southern Europe. The var., Southern Europe. In Britain both are very rare, and have occurred only in the south. I have not seen British examples. By some authors *Cassentiniellus* is considered distinct : I follow Staudinger in uniting it to *craterellus*.

CHRYSONUCHELLUS Sc.—Head ferruginous, palpi long. F.-w. whitish-ochreous brown, with fuscous scales between the veins. Lines brown ; central one broad, hind one margined outwardly with white ; between it and the tip is a fine brown line. 10-11 *L.*

May, June. Central Europe. Local in Britain, occurring as far north as Worcestershire.

C.—F.-w. not emarginate nor obtuse. Tip often acuminated. Cilia variegated, rarely metallic.

a) Cilia tesselated with whitish lines or spots.

1.—*The two lines obscure; the central widely diffuse, the hind serrated and outwardly margined with whitish. The spaces between them and the bases paler or whitish.*

[These two northern species might occur :—

Truncatellus Ztt., which is grey, cinnamon-coloured along the costa, and ochreous on the inner-margin ; lines brown, the central thickened in the middle, the hind slender, sinuate-dentate, and margined with white. Cilia shining grey, rarely with white streaks.

Maculalis Ztt., (alpine as well as northern), is blackish-fuscous, with a narrow white streak before, and a broader one in, the middle ; the last streak is widened into a spot beyond the middle. The hind line is serrate and sinuate above, and the cilia have white streaks in them.]

2. *A central white streak in most of the species. White spots, margined with fuscous, before the hind line.*

FALSELLUS S.V —F.-w. whitish and ochreous, streaked with fuscous ; a narrow white streak from the base scarcely reaches beyond the middle, and is toothed below ; from its extremity springs two fuscous streaks. An oblique white spot precedes the angulated fuscous hind line, which is double, and is indented near the inner-margin. Cilia shining grey, with a few white streaks. H.-w. grey. 9-10 *L.*

July, August. Central Europe. Not uncommon in England ; more local or less observed in Scotland (Edinburgh, Perthshire, Aberdeenshire).

(To be continued.)

ON THE CACHALOT OR SPERM WHALE (PHYSETER MACROCEPHALUS) OF THE NORTH EAST OF SCOTLAND.

BY ROBERT WALKER, F.G.S.E.

NUMEROUS and conflicting as have been, and to some extent still are, the opinions held by Naturalists as to the number and proper arrangement of the different genera and species of whales, none perhaps have caused more discussion, and lead to greater diversity of opinions, in this department of natural science, than the Sperm Whales described by Sir R. Sibbald in his "Phalainologia Nova." The first of these is his *Balæna macrocephala, quæ binas tantum pinnas laterales habet.* This was the Sperm Whale as understood by him, of which he gives a notice in one of the chapters of his work. The next is *Balæna macrocephala, quæ tertiam in dorso pinnam sive spinam habet et dentes in maxilla inferiore arcuatos falciformes.* He gives a somewhat long description of a male of this kind that stranded at Limekilns, in the Forth, in February 1698. It was 52 feet long. The lower jaw contained 21 teeth in each side; the upper had no teeth, but had cartilage pits into which the teeth of the lower jaw were received when the mouth was shut. This specimen it will be observed, he says, had a dorsal fin. The next is a *Balæna macrocephala tripinnis, quæ in mandibula inferiore dentes habet minus inflexos et in planum desinentes.* This specimen was thrown ashore in Orkney, in 1687, and had, he was told, a dorsal fin resembling a mizen-mast. Although Sibbald describes both these whales, it does not appear that he saw either of them himself, or indeed anything pertaining to them, excepting some of their teeth, and a part of the eye of the Forth animal, which were sent to him. He figures two of these teeth, and they certainly look exceedingly like those of the common Cachalot. The sharp tooth of the Limekilns animal representing the young form, the Orkney tooth, the old and worn condition. The Limekilns whale, when stranded, struggled so much in its efforts to escape, that it partly buried itself in the sand, and Sibbald was told that its true dimensions could not be taken. A figure of it, however, was brought to him, as sketched on the

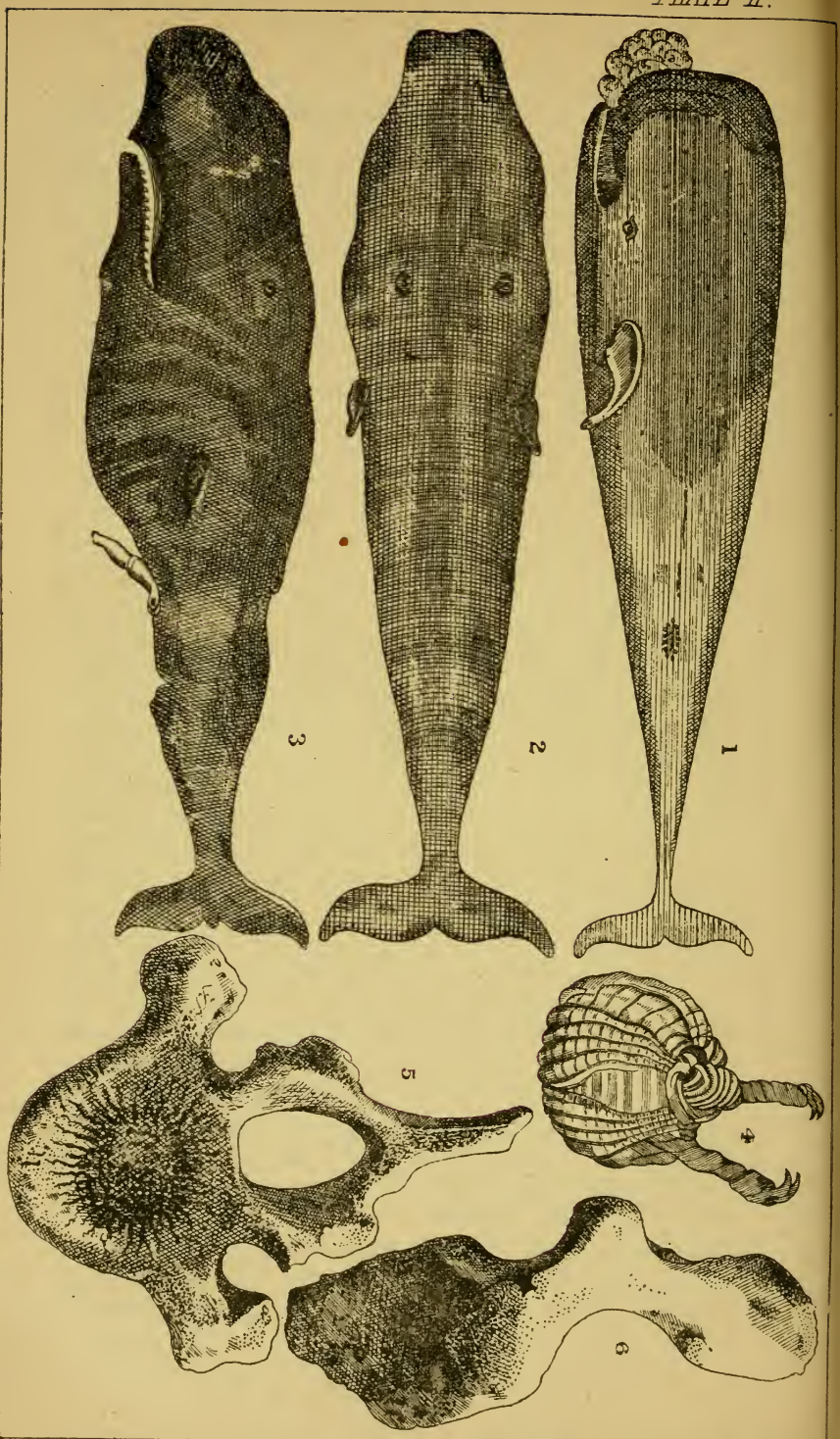
spot where it lay ; and he states that he caused (I suppose with the assistance of this figure) one to be drawn according to the proportions stated to him by the chief cutter up, and engraved. Sibbald thought the figure brought to him resembled the figure of a Sperm whale in the forty-second plate of Johnstone's Historia Naturalis. I have not seen Johnstone's figure, but Brandt and Ratzeburg* give a copy from Johnstone of the figure I presume that Sibbald refers to. This shows the animal laid on its back, and does not exhibit the high truncated head of the Cachalot. One can easily see that Sibbald, in attempting to construct the figure of the whale in this way, was placing himself entirely at the discretion of his informant, who had been in Greenland, and who, with the best intentions, might almost unconsciously impart more or less his previous ideas of the form of the Baleen whales, to the animal, partly buried in the mud, he was trying to describe : and Sibbald, apparently knowing nothing whatever of the shape of the Sperm whale, was completely at this man's mercy. At any rate they managed between them to make the figure of a Whale, with the lower jaw and teeth of a Cachalot, which on the whole, barring the lower jaw, does not differ much from the shape of the *Balæna* as given by Sibbald. What adds to the likeness, he placed the blow-hole on the front of the head, possible because Clusius† had previously done so in his Sperm whales. From the account Sibbald received of these two whales, he believed them to be specifically distinct from the common Sperm whale, mainly, it would seem, because he was told that each had a fin on its back ; his informant comparing the fin on the Orkney animal to the mizen-mast of a ship. He was not aware—indeed it was not known in his day—that the Sperm whale had a hump on its back exactly, or nearly so, where he places the dorsal fin on his whale. Had Sibbald known that the Cachalot had such a hump, it is more than likely that he would have at once suspected that this protuberance had been mistaken for a dorsal fin by his informants. Clusius' description, however, of the Cachalots stranded in Holland, in 1598 and 1601, contained no notice of either a hump or dorsal fin, neither had any other author recorded the fact, previous to Sibbald's time, so far as I can learn. Indeed, this structure seems to

* Medizinische Zoologia. † Exoticorum.

have been first pointed out, as given in Cuvier,* by Théodore Hasæus, Theologian of Bremen, in a dissertation on the leviathan of Job, and the whale of Jonah, 1723. The specimen he describes had 52 pointed teeth in the lower jaw, "avec une bosse sur le dos et une autre près de la queue, qui ressemblait à une nageoire." Sibbald also thought that the sharp teeth of his young animal, and the worn teeth of the old, were of sufficient importance to separate these whales specifically.

Besides these, he notices a shoal of small whales, 102 in number, that were met with in Orkney, varying in size from 12 to 24 feet, with teeth only in the lower jaw. Sibbald had afterwards, at least more than one opportunity of personally examining examples of the Sperm Whale, whether he did so or not is perhaps doubtful. The first of these occurred when another Cachalot stranded at Cramond, in 1701. An account of this animal is preserved in an original copy of "Phalainologia" in the library of the Royal College of Physicians, Edinburgh. It is a copy of part of a letter from Mr. James Paterson, keeper of the Balfourean Museum, Edinburgh, to Mr. E. Lhwyd, keeper of the Ashmolean Museum, Oxford, dated Edinburgh, 22nd July, 1701, and is as follows. "There was lately a pretty big whale came in at Cramond. It had no whale-bone, and teeth only in the lower jaw, which (according to Sir R., *i.e.*, Sir Robt. Sibbald) is the characteristic of the kind which has the spermaceti. You have the figure in Johnston, Tab. 42 of his fishes. Diverse of our Physicians were present at the opening of the head, where they got two barrels of spermaceti. This filled up the whole cranium; they could find no other thing they could call the brain, if it were not a friable cineritious-like substance, which seemed very improbable. They found the sperm not only in the head and spina-dorsa, but (what perhaps has not been hitherto observed) dispersed through the whole body, in the glands, whence they prest it out in considerable quantities. The Chyrurgions spoke of buying the skeleton; but I do not know how it came about, the owners disposed of all another way, so that neither they nor we got anything of it. Dr. S. got a tooth. He has made a description of it, and says he has materials for a second part of his "Phalainologia." Our whale was a male;

* Ossemens Fossiles.



1. Balæna fœmina, pinnis et canda sinuatis. 2. Balæna Macrocephala in faciem obversa, ut dorsum appareat. 3. Eadem in latus decumbens. 4. Pediculus Ceti Bocconi. 5 and 6. Vertebræ.
Fig. 1 2. 3. and 4 are from an old engraving. Fig. 5 and 6. from drawings by Mr Walker.

the penis appeared near 7 feet when out of the body. The whole length of the creature was near 52 feet, and the circumference of the biggest part of it about 30 feet. The nether jaw was only 3½ feet about, and had 48 teeth in it; the upper jaw had sockets lined with cartilage to receive them." The same book contains an original plate of figures of whales, with the following description: "This plate I found in a book of original drawings of Sir Robert Sibbald's, which I met with accidentally some years ago. All the explanation I could make out was as follows—Fig. 1, the original drawing is marked in Sir Robert's own hand, A whale cast in at Rosyth Castle. Figs. 2 and 3, marked in Sir Robert's hand, A Spermaceti whale; and in another hand, Whale at Monyfeeth, Feb. 23, 1763. Side, fig. 3, but it did lay half upon its side, that one eye and a little of the belly was sanded; 57 feet long, and 56 (36?) round; both under and all the skin blackish-blue, very smooth, and as thick as a bull's, and all white fat within and next the skin. Back fig. 2, to represent the tail. Fig. 6, the *Pediculus Ceti* of Boccone,—*Recherches et Observations Naturelles*, pp. 293 and 287. See Sir Robert Sibbald's description of it, Phil. Transact. No. 308." "Penes, E. W."

The first of these figures (Plate II. fig. 1.) is far from being a good representation of the Cachalot. It has, moreover, a good deal of the look about it, of having been drawn, not from the animal itself, but from a description given to Sibbald by some person who recollected seeing it. It is however, unmistakeably intended to represent the Sperm Whale. There is a waved like appearance in front of, and proceeding from, the mouth, as if meant to show the animal breathing by that orifice. We know that Sibbald * believed that some of the *Balænidæ* "with horny plates in the upper jaw, had no spout in their head, but two nostrils like these of a horse." One of this kind he says stranded near Burntisland. It does not clearly appear that Sibbald recognized the Cramond animal, or the one figured on his plate, to be ordinary Sperm whales, as well as the other (Plate II., fig. 2 &.3,) which he designates correctly enough, although the shape of the head in this is not very well represented. Perhaps this may have been because of the two figures, this one

* Hist. of Fife.

came nearest, in this respect, that of his Limekilns Cetacean. However this may be, in his History of Fife after noticing the Sperm whales he goes on to state that "There is another sort of them, which I take to be the Orca very Plinii, it hath big teeth in the lower jaw, and small teeth in the interstices betwixt the cases, which receive into them the great teeth of the lower jaw. One of these stranded above Cramond-Inch. It was but fifty and some odd feet long; I take it to have been a young one. Both these mentioned had spouts in their foreheads, by which they threw up water," &c. This is beyond doubt the description of a Cachalot, if not the identical individual at Cramond already noticed, and if Sibbald had examined these whales himself he must have observed that the spouts were not on the forehead, but on the anterior edge of the truncated snout. The Orca of Pliny is the Orca of the present day, although in justice to Sibbald, it may be stated that Cuvier thought that the Orca taken in the port of Ostia, and which Claudius attacked, was a Cachalot. It is now known that the Cachalot does not pursue and kill either Whales or Seals, and that it would not be attracted by hides, its food being almost confined to cephalopods. I do not mean in this, to underrate in the least the attainments and labours of Sibbald in this difficult department of Zoology. He was one of the pioneers of science, and did good work in his day. Had his descriptions been taken for what they were worth, and estimated according to the knowledge of the subject that existed, in the age in which they were written, bearing in mind, at the same time, the source from which he received his information, there would, perhaps, have been fewer discrepancies in zoological literature. As it was, however, all the whales he described, "whose great heads always contain spermaceti," were admitted into the Linnean system as distinct species by Artead, to whom Linnæus entrusted the arrangement of the cetaceans and fishes. Artead divided the whales of this kind into two genera, *Physeter* and *Cotodon*, the former embracing those of Sibbald, with dorsal fins, the latter the finless kinds. Linnæus changed this arrangement afterwards, and united these two genera into one, under the name *Physeter*. They then stood thus:—*P. cotodon*, containing Sibbald's 102 small Orkney whales; *P. macrocephalus*, the true Sperm whale as then understood; *P. microps*, Sibbald's Limekilns animal;

P. tursio, Sibbald's old Orkney whale with the worn teeth. This somewhat unfortunate arrangement must have placed innumerable difficulties in the way of Zoologists, who—as was long the custom—always attempted to identify the Cetaceans they met with, with one or other of those described in the Linnean system. Indeed it is not perhaps too much to say, that no satisfactory evidence exists to prove that any specimen of *P. microps*, or *P. tursio*, have been met with since the days of Sibbald. And as Artead describes *P. macrocephalus*, "*Ph. dorso impenni, fistula in cervice*," it need scarcely be stated that no Sperm whale has yet turned up, nor is, from the co-relation of parts, ever likely to do, with the blow-hole in the neck. This mistake, however, Clusius seems to be at least as much responsible for as Sibbald. Bayer* figures a whale stranded at Nice in 1736, which Dr. Gray believes to be a representation of *P. tursio*. Cuvier,† on the other hand considered it only a bad figure of a Cachalot. Dr. Gray has still sufficient confidence in Sibbald to retain *P. tursio*, as a species, in his excellent Catalogue of Seals and Whales. Amongst other British Naturalists, Pennant,[1] Shaw,[2] Jenyns,[3] Bell,[4] and others, called *P. tursio* the High-finned Cachalot. Fleming adopted all the Linnean whales of this kind, and calls *P. microps* the Spermaceti whale. None of these authors thought it necessary to increase the number of species of Sperm whales. On the continent, they were increased at a rather rapid rate. Bonnaterre,[5] following Linnæus, increased the number of species to six, Lacepéde,[6] came after, and made eight of them, Desmarest made another addition, and so on, until Cuvier[7] took up the matter, and after a critical examination of all the evidence relating to the subject he could obtain, he stated that there was only one species of Cachalot, and in this, of course, he included the large Sperm whales of Sibbald, whom he blames for having described the Cachalot twice. Eschricht[8] likewise states that Sibbald's Limekilns, and Orkney whale "with the high dorsal fin," were nothing else than a young and an old specimen of the common Cachalot; and that the best evidence of their being

*Act. Nat. Cur., 1733. † Hist. Nat. des Cétacés.

1 Brit. Zoology. 2 General Zoology. 3 Brit. Vert. Animals. 4 Brit. Quadrupeds. 5 Cetaces. 6 Cetaces. 7 Oss. Fossiles. 8 Orca, Ray Soc.

so, are the teeth described and figured by Sibbald himself. Flower,[1] in an able paper on the skeleton of a Sperm whale from Tasmania, and after comparing the bones of this animal with all those of the Cachalot that had stranded on the shores of this country, within his reach, states that he is quite unable, from the material at present available, to point out any constant difference of specific value between the Cachalot inhabiting the Australian seas and that occasionally visiting our northern coasts. And he concludes by saying, that if the Linnean genus *Physeter* is to be kept in abeyance until the rediscovery of Sibbald's "*Balæna macrocephala tripinna*," it is to be feared that it may ultimately disappear altogether from zoological literature. Beal[2] also states, from his observations of the animals themselves, alive and dead, that "The large full-grown male, appeared the same in every part, from New Guinea to Japan, from Japan to the coast of Peru, from Peru to our own island, while their females coincided in every particular." Sibbald's *Pediculus ceti* Boccone (Plate II., fig. 4.) is evidently a specimen of *Coronula balænaris*. This parasite was sent to Sibbald by Mr. Foster, a Regent in the university of St. Andrews, and was taken off the side of a whale stranded there. What whale this may have been is somewhat difficult to determine. In a case of this kind we can only attempt to indicate which appears on the whole the most likely species.

There are some two or three genera of *Cirripedes*—or Barnacles, as they are commonly called—that are in the habit of attaching themselves to the skin of the larger whales. Of the *Balanidæ* so met with, *Coronula* and *Tubicinella* are the most common. Besides these, some of the *Lepadidæ*, or pedunculated kinds, are also found adherent to whales. And sometimes the whale is infested with both the sessile and pedunculated species at the same time. Ellis[3] figures a *Coronula*, with an example of *Conchoderma aurita* attached to it, that was taken off a whale stranded in Norway. These commensal parasites, of which Van Beneden[4] takes *Coronula* as a type of his *Oikasitæ*, are not found on all the large species of whales. It seems probable that those that are so troubled with them may have

1 Zool. Soc., 1868. 2 Sperm Whale. 3 Phil. Trans. 1758.
4 Brit. Association, 1870.

each its peculiar kind fixed on it. For instance, *Megaptera longimana*, according to Eschricht,[1] is always infested with *Diademi*, and a species of *Otion (Conchoderma)*, while, on the other hand, *Cirripedes* are never found on any species of *Balænoptera*. Scoresby[2] says the *Mysticetus* found in southern regions (Nordcaper) is often covered with barnacles, while those of the Arctic seas are free from these shell-fish. In this he is borne out by Eschricht and Reinhardt,[3] who state that the Nordcaper is always infested by a Cirripede belonging to the genus *Coronula*, and they direct attention to this fact, as one of the characteristic distinctions between that animal and the common Greenland whale, which is never troubled with *Cirripedes*. Darwin, I believe, only admits of the existence of one species of *Coronula*. It would thus appear that we may dismiss *Balæna* and *Balænoptera* from the Cetaceans likely to have brought Foster's *Coronula* to our shores. This will still leave three large whales, either of which, perhaps, may have done so: these are the Nordcaper, *Megaptera*, and the Cachalot. I am not aware of the first of these ever having been stranded on our coasts. The second has occurred but seldom. The third pretty frequently, more especially it would seem, in the 17th and 18th centuries. But although the two former undoubtedly have these parasites attached to them, in the case of the latter the evidence on this point is not quite so strong. From the accounts given by Bennett[4] and others, it would appear to be chiefly the pedunculated *Cirripedes* that have been observed on the Cachalot. Warwick, in notes sent to Dr. Gray, states that he constantly found the whale of the Cape covered with *Tubicinella* and *Coronula*; but the Sperm whale was seldom or never so covered. Hamilton[5] says that "the skin of this whale is so dense that usually large shells attach themselves to it as to a rock, and there fix their permanent abode. These shells, which are very numerous, are sometimes mistaken for white patches of the skin." Besides, from what I can learn from men who have been engaged in the Sperm whale fishery, I have reason to believe that *Coronula*, or Barnacles as they call them, are met with on that whale. However this may be,

1 Dan. Tran. Gray Cat. Seals and Whales. 2 Arc. Regions.
3 Cetacea, Ray Society. 4 Whal. Voyage. 5 Whales, Nat. Lib.

there is an old vertebra of what I take to be a Sperm whale in the University library, St. Andrews, where I believe it has long been preserved. This bone, I am inclined to think, from what little I can learn about it, is a relic of Foster's whale,—the animal from which he obtained the *Coronula* he sent to Sibbald. May it not also have belonged to the whale figured by Sibbald on the same plate, although stated by another to be a whale stranded at Monifieth. Be this as it may, Figs. 2 and 3 appear to me to be evidently a copy of a drawing taken of the animal itself—not made from recollection—by some competent observer, as we may at any rate suppose Foster, from his position, to have been. The long and rather attenuated appearance of the snout, was probably caused by the position in which the animal lay. For it has to be borne in mind that all large whales when stranded are very apt, from their own weight and other causes, to present a misshapen appearance. The single blow-hole, its italic *S* like shape and position toward one side of the truncated snout, are all admirably represented on this, perhaps, the oldest drawing in existence, if not the first made, of a Cachalot, showing the correct shape and position of this orifice. Nearly all the old authors were mistaken both as to the shape and position on the head of the blow-hole of this Cetacean. As we have already seen, Linnæus places it at the neck. Schreber[1] and others represent it as circular. Hunter[2] says it is transverse. F. Cuvier says semi-circular. Schwediawer,[3] however, points out, in 1783, that the "spout" in this whale was on the very anterior edge of the head, bending obliquely to the left side. Colnett,[4] Huggins,[5] Beale,[6] and Bennett,[7] give good figures of the Cachalot; but these were all taken, I presume, when the animals were newly killed, and still floating in the water. The old vertebra above noticed is, I consider, the tenth dorsal of a youngish Cachalot. It has been a good deal knocked about, and exhibits marks of bad usage. Its present size is:—length of centrum, 6⅜ inches; total breadth over the transverse processes, 19 inches; total height, 22 inches; the neural spine is incomplete at the upper end, and may have been originally an inch or two longer. For comparison I

1 Saugthiere. 2 Phil. Trans. 1787. 3 Phil. Trans. 1783. 4 Voy. Sou. Atlantic. 5 and 6 Sperm Whales. 7 Whal. Voyage.

give the sizes of the corresponding vertebra, of the Cachalot described by Flower:*—length of centrum, 8¾ inches; extreme breadth, 23¾ inches; extreme height, 28 inches. This whale was said to have measured 60 feet in length, and was of course a larger animal than the one to which the vertebra in question pertained. Figure 5 (Plate II.) is a front view of this vertebra, and shows the form of the nearly complete bony ring, on each side, which, when completed is not unlike the foramen for the vertebral artery, on the cervical vertebræ of most mammals. This ring is formed by a process or tubercle, ascending from the upper and outter ends of the lower transverse processes until they nearly meet the reduced diapophysis, which springs from the outer anterior edges of the neurapophysis, descend outward and downward, until these processes join together in old animals, and form a complete bony ring on each side of the vertebra. The ends of these processes are broken off on both sides of our specimen, but as near as I can judge, when entire, those on the left side would be within a ¼ or ⅜ of an inch of meeting together. The centrum of the vertebra is broader than high, and the neural canal is vertically oval. Figure 6 (Plate II.), side view.

Mr. J. Robertson describes a Cachalot in the Philosophical Transactions, 1770, that stranded at Cramond in December, 1769. This specimen was 54 feet long, and its greatest circumference, a little behind the eye, 30 feet. The head was nearly half the length of the animal. The lower jaw was 11 feet long, and contained 23 teeth on each side. The truncated upper jaw was 9 feet high, projected 5 feet beyond the lower, and had 23 sockets in it on each side to accomodate the teeth of the lower jaw. The pectoral fins were placed 5 feet behind the corners of the mouth, and measured 3 feet in length and 18 inches in breadth. According to the statistical account, two specimens of the Sperm whale stranded at Cramond in 1769, both 54 feet in length. One, which measured 52 feet in length, is said, in a foot note in Adamson's edition of Sibbald's History of Fife, to have been thrown ashore at Earlsferry, in 1758. Mr. Alderson, in the Cambridge Philosophical Transactions, 1827, describes another, 58½ feet long, that stranded at Tunstale in

* Zool. Soc. 1868.

Holderness, in April, 1825. The skeleton of this animal is mounted and preserved at Burton Constable. Another example of this whale was cast ashore in July, 1863, near Thurso. The skeleton is in the British Museum.

From the foregoing it will be seen that to the present time there is no satisfactory evidence of the existence of more than one species of Sperm whale, and that the number of species recorded as British have in the main been all founded on the ordinary Cachalot, which has in these cases been mistaken for another species.

ST. ANDREWS, November, 1871.

LIST OF BIRDS FOUND AT ROSSLYN AND NEIGHBOURHOOD.

BY LIEUT.-COLONEL WEDDERBURN.

Merlin (*Falco æsalon*)—very common during winter. Kestrel (*Falco tinnunculus*)—common all year round. Sparrow Hawk (*Falco nisus*)—common. Hen Harrier (*Circus cyaneus*)—one male specimen some years ago in Rosslyn, seen by myself. Short-eared Owl (*Otus brachyotus*)—rare. Long-eared Owl (*Otus vulgaris*)—rare. Tawny Owl (*Ulula stridula*)—very common. White Owl (*Strix flammea*)—common. Great Shrike (*Lanius excubitor*)—several specimens seen, and one shot by myself. Great Tit (*Parus major*)—very common. Cole Tit (*Parus ater*)—very common. Blue Tit (*Parus cæruleus*)—very common. Long-tailed Tit (*Parus caudatus*)—very common. Spotted Flycatcher (*Muscicapa grisola*)—very common. Kingfisher (*Alcedo ispida*)—very rare, only once seen. Raven (*Corvus corax*)—occasional on Pentland Hills. Crow (*Corvus corone*)—almost extinct. Hooded Crow (*Corvus cornix*)—almost extinct. Rook (*Corvus frugilegus*)—common everywhere. Jackdaw (*Corvus monedula*)—very common. Magpie (*Pica caudata*)—very common. Jay (*Garrulus glandarius*)—common. Creeper (*Certhia familiaris*)—common. Cuckoo (*Cuculus canorus*)—common. Nightjar (*Caprimulgus europæus*)—common in Rosslyn den. Swift (*Cypselus apus*)—common. Swallow (*Hirundo rustica*)—very common; when out shooting some years ago, I saw a swallow of the year flitting about on 2d November; a few years afterwards, when fishing on Tweed, on 2d November, Col. Learmouth and I saw two swallows flying about in the middle of a heavy snow storm. Martin (*Hirundo urbica*)—common. Sand Martin (*Hirundo riparia*)—common. Pied Wagtail (*Motacilla alba*)—common. Grey Wagtail (*Motacilla cinerea*)—common. Meadow Pipit (*Anthus pratensis*)—common. Tree Pipit (*Anthus arboreus*)—rare, but one or two to be seen every year. Skylark (*Alauda arvensis*)—very common. Snow Bunting (*Emberiza nivalis*) occasional, common on Pentlands. Bunting (*Emberiza miliaria*) common; breeds. Black-headed Bunting (*Emberiza schœniclus*)—occasional; breeds. Yellow Hammer (*Emberiza citrinella*)—very common; breeds. Chaffinch (*Fringilla cœlebs*)—very com-

mon; breeds. Mountain-finch (*Fringilla montifringilla*)—rare. Sparrow (*Passer domesticus*)—a good deal too common; breeds. Greenfinch (*Fringilla chloris*)—very common; breeds. Siskin (*Fringilla spinus*)—occasional; breeds. Linnet (*Linota cannabina*)—not very numerous; breeds. Redpole (*Linota minor*)—uncommon; breeds. Twite (*Linota montana*)—Pentland Hills, common; breeds. Bullfinch (*Loxia pyrrhula*)—not very numerous; breeds. Crossbill (*Loxia curvirostra*)—several specimens shot in winter of 1867. Starling (*Sturnus vulgaris*)—immense flocks; breeds. Dipper (*Hydrobata cinclus*)—very common; breeds. Missel Thrush (*Turdus viscivorus*)—common; breeds. Fieldfare (*Turdus pilaris*)—very common; breeds. Redwing (*Turdus iliacus*)—very common; breeds. Thrush (*Turdus musicus*)—very common; breeds. Blackbird (*Turdus merula*)—very common; breeds. Ring Ouzel (*Turdus torquatus*)—common on Pentlands; breeds. Hedge-sparrow (*Accentor modularis*)—very common; shot a white variety; breeds. Robin (*Sylvia rubecula*)—very common; one bird, for years, used to sit on my children's perambulator for miles, and stay in house; breeds. Redstart (*Sylvia phœnicurus*)—very common some seasons; breeds. Stonechat (*Sylvia rubicola*)—common; breeds. Wheatear (*Sylvia œnanthe*)—common; breeds. Whitethroat (*Sylvia cinerea*) very common in all the hedge-rows; breeds. Willow Warbler (*Sylvia trochilus*)—very common; breeds. Wren (*Sylvia troglodytes*)—common; breeds. Goldcrest (*Regulus cristatus*)—common; breeds. Wood Pigeon (*Columba palumbus*)—very common; first hard weather tremendous flock, supposed to come over from Norway,—if weather continue very severe, they fly away to the various farms near Musselburgh. Pheasant (*Phasianus colchicus*)—very numerous, seen several of what is called the Bohemian variety. Black Grouse (*Tetrao tetrix*)—a good few on Pentlands; breeds. Red Grouse (*Lagopus scoticus*)—common on Pentlands; breeds. Partridge (*Perdix cinerea*)—common; breeds. Red-legged Partridge (*Perdix rufa*)—very rare, only two been noticed on Pentlands, about 14 years ago. Quail (*Perdix coturnix*)—rare, but seen several specimens; breeds. Golden Plover (*Charadrius pluvialis*)—common during migration; breeds on Pentlands. Dotterel (*Charadrius morinellus*)—occasional on Pentlands. Pee-wit (*Vanellus cristatus*)—common; breeds. Heron (*Ardea cinerea*)—common; breeds. Bittern (*Botaurus stellaris*)—supposed to have been seen on Pentlands, cannot vouch for it. Curlew (*Numenius arquata*)—common; breeds. Common Sandpiper (*Tringa hypoleucos*)—common; breeds. Woodcock (*Scolopax rusticola*)—not very numerous; breeds. Snipe (*Scolopax gallinago*)—widely spread, not numerous; breeds. Jacksnipe (*Scolopax gallinula*)—not common; breeds.* Landrail (*Crex pratensis*)—common some seasons; breeds. Water-rail (*Rallus aquaticus*)—a few specimens been got. Moorhen (*Gallinula chloropus*)—common on the ponds. Coot (*Fulica atra*)—common on the various ponds. Greylag Goose (*Anser palustris*)—seen in their migration north and south. Brent Goose (*Anser brenta*)—saw one in 1863, on Compensation Pond, and one or two afterwards. Mute Swan (*Cygnus olor*)—kept as pets on many sheets of water; breeds. Wild Duck (*Anas boschas*)—common; breeds. Teal (*Anas crecca*)—not uncommon; breeds. Wigeon (*Anas Penelope*)—not uncommon. Tufted Duck (*Anas fuligula*)—Some years common on the Compensation Ponds. Golden Eye (*Anas clangula*)—to be seen during winter, Red-breasted Merganser (*Mergus serrator*)—common during winter. Dabchick (*Podiceps minor*)—occasional. Red-throated Diver (*Colym-*

* Is Colonel Wedderburn sure of this?—Ed.

bus septentrionalis)—one or two been killed. Black Guillemot (*Uria grylle*)—one caught in the avenue to my house at Rosslyn, during a strong easterly gale. Green Cormorant (*Phalocrocorax cristatus*)—one shot on North Esk a few years ago. Arctic Tern (*Sterna arctica*)—occasional on Compensation Ponds. Black-headed Gull (*Larus ridibundus*)—very common. Common Gull (*Larus canus*)—common. Lesser Black-backed Gull (*Larus fuscus*)—common. Herring Gull (*Larus argentatus*)—common.

Liberton House, near Edinburgh, October, 1871.

Rare Birds in Aberdeenshire.—A fine adult male specimen of the Great Snipe (*Scolopax major*, Gem.,) was shot on the estate of Durras, in the beginning of October last. This bird, generally accounted rare, would (if a little attention were given by those who have opportunity of visiting the localities the bird frequents), I have no doubt, be found to be more common than is generally supposed.

For the last few weeks considerable numbers of the Great Spotted Woodpecker (*Picus pipra*, M'Gll.,) have been sent me from various parts of the county; and several have been seen in the gardens around the city.

The Bohemian Wax-wing (*Bombycilla garrula*, Jen.,) has also put in an appearance in greater numbers this season than for some years back. Some have been sent me, and I have received information from gentlemen in the country, of others having been seen, and unfortunately in many instances killed.—G. SIM, 20 King Street, Aberdeen, Dec. 4, 1871.

The Bohemian Wax-wing in Aberdeenshire.—I have observed five specimens of the Bohemian Wax-wing (*Bombycilla garrula*) here. Two of them were shot by Mr. Morris, on the 16th of this month. They had been feeding on the berries of the Hawthorn.—J. GARROW, 40 Market Place, Inverurie, Nov. 27, 1871.

Capture of Notodonta trepida.—A pair (male and female) of the Large Prominent Moth (*Notodonta trepida*) were taken by Mr. James Robertson, near Kilgraston, on May 20th, between 8 and 9 o'clock a.m. The female layed eggs the same day. The eggs hatched on June 8th, and the caterpillars became chrysalids about the end of July and the beginning of August.—MELVILLE JAMIESON, yr., Perth, Sept., 1871.

Sesia bembeciformis in Fife.—Between the 18th and 21st July I took a pair of *Sesia bembeciformis*, and saw about a dozen of its empty pupæ sticking out of three old sallows (*Salix Caprea*) at Balmuto. These three trees are now nearly dead from the borings of the larvæ. I find Mr. Jenner-Fust has not admitted this Clearwing as a native of Scotland—all the alleged Scotch stations being marked by an o in his paper on the "Distribution of Lepidoptera in Great Britain."†

A few specimens of *Dianthœcia conspersa*, and solitary ones of *D. capsincola*, *D. cucubali*, and *Aplecta herbida*, are the only other captures worth notice I have made this year, since the date of my last communication.—J. BOSWELL SYME, Balmuto, Kirkcaldy, Sept., 1871.

Galls in Scotland.—I observe with great satisfaction that records of the occurrence of Galls in Scotland are likely to occupy a prominent portion of space in the "*Scottish Naturalist.*"

† It occurs in several Scottish counties.—ED.

That the "Cotton Gall of the Oak" occurs in this county is certain. I learn from my friend Dr. Innes, of Forres, that four or five years ago he met with the gall in question in the utmost profusion in the Darnaway Forest, belonging to the Earl of Moray.

Oribata geniculata.—About two years ago, whilst looking for the larvæ of *Trachea piniperda* in the Chapelton Muir Wood here, I noticed many incrassated or gouty-looking swellings in the lateral branch-tips of *Pinus sylvestris.* Thinking they might be galls of some sort, I gathered and sent a quantity to Mr. Müller, who bred a mite from them, quite new, I believe, to this country, viz., *Oribata geniculata* Latreille (following Hartig).

Batoneus populi on *Populus tremula.*—Some time in the spring of this year, while searching for fungi at Sluie, on the banks of the Findhorn, in company with Dr. Innes, I noticed the branches of the aspens (which are here of natural growth) to be loaded with beautiful reddish-green downy excrescences, ranging in size from an inch in diameter to that of the closed fist. A box of these were sent off to Mr. Müller, who has since published them as the work of a mite, *Batoneus populi,* first found and described by Herr L. Kirchner, from specimens discovered by him in Bohemia. This, I presume, has not been found elsewhere in Britain.*—GEO. NORMAN, Forres, 8th Oct., 1871.

Reversed variety of Helix nemoralis L., var. hortensis.—A few days ago, on looking over some shells of the above species, which I had picked up upon the links near Aberdeen, during the summer, I found among them a specimen with the whorls reversed; this monstrosity is mentioned in Jeffrey's British Mollusca as of very rare occurrence. This shell, along with most of those ocurring on the links, has the colours very dull and faded looking. It is rather hard to assign any cause for this loss of colour, as the animals in these faded shells seem quite healthy; and in the same localities, and under the same circumstances, other specimens occur which have shells of the ordinary colours.—JAMES W. H. TRAILL, Old Aberdeen, Oct., 1871.

Wild Cats.—I have been lately informed that no less than ten Wild Cats *Felis Cattus)* have been killed on one property in Badenoch. One which I have in my hands at present measures 3 feet 6 inches from nose to tip of tail.—R. PATON, Perth, November, 1871.

A Happy Family.—A few years ago, a cat I had gave birth to kittens, some of which were kept, and the others destroyed. Shortly afterwards, my children brought in some newly-born rabbits, which, as I did not wish them to be kept, I told the children to give to the cat—thinking she would speedily make an end of them. To my surprise, however, the cat at once adopted them in place of the lost kittens. Happening a few days afterwards to find a squirrel's nest with young ones in it, I thought I would see if the cat would likewise adopt them, and so brought them home and placed them with the cat. My expectations were realized, and I had the pleasure of witnessing the interesting spectacle of a cat suckling kittens, rabbits, and squirrels all at one time. The end, however, was sad: the cat went out one day and never returned, and so the happy family perished miserably.—W. HERD, Scoonie Burn, by Perth, August, 1871.

* I have noticed similar galls in Inverness-shire and Ross-shire.—ED.

PHYTOLOGY.

SCOTTISH GALLS.

By J. W. H. TRAILL, M.A.

(*Continued from page* 125.)

GALIUM VERUM L.—*(a)* Gall irregular in shape and often split open, the surface smooth and shining, as if rubbed with butter, colour pinkish; galls usually in small groups on the stem. *(b)* Gall (?) on the leaf shoot, terminal, and consisting of a bunch of leaves twisted spirally, those on the outside green and fresh, but those inside withered, empty in third week of September; not common. On the links near Old Aberdeen a very common gall-like body also occurs abundantly on the fruit; it is greenish; the surface is naked, but wrinkled, and the form irregular; it varies in size, but is frequently pretty large. I never could find an occupant in it.

GALIUM PALUSTRE L.—The gall is terminal, and consists of a compact rosette of leaves, which are slightly fleshy, and of a purplish colour. It is readily observed; on close examination, one whitish or reddish-orange dipterous larva may be found in each rosette.

GALIUM BOREALE L.—The gall is usually axillary, sometimes terminal; and is seemingly an abortive leaf-bud. It is small and compact, and consists of overlapping scales, which enclose a small central cavity. The surface is greyish-green and is covered with short hairs. Each contains one reddish-orange dipterous larva. Often several galls occur on one plant. Occurs abundantly at Banchory, in September.

CARDUUS ARVENSIS Curtis.—The gall is terminal, and is seemingly an abortive flower-bud. It is greyish and hairy externally, and internally consists of small bracts with much

woolly stuff, among which are several reddish dipterous larvæ.

ACHILLEA PTARMICA L.—*(a)* This gall in origin and appearance much resembles the last, but is of a reddish grey-colour. It is terminal, and sometimes is nearly concealed by a tuft of leaves. Internally are many small cells among woolly substance, in each of which is a reddish larva of *Cecidomyia floricola* Winnering. This gall is common in Aberdeenshire. *(b)* Seems to be an abortive leaf. There are usually from two to six on the stalk among the terminal leaves. They are sessile, about ¼-inch long, and ovate. The surface is smooth and reddish, or slightly greenish. Each contains one reddish dipterous larva. Rather scarce, November.

ACHILLEA MILLEFOLIUM L.—(*a*) Resembles (*a*) on *A. ptarmica* closely in every respect. Not uncommon. (*b*) The gall is axillary, sessile, and usually rather low on the stem. In shape it is rounded or irregular, length ⅛ to ¼-inch. The surface is smooth, glossy, and green or brown. Each contains one white larva, and splits open above when the larva is ready to emerge. In one locality near Old Aberdeen these galls are abundant.

HIERACIUM BOREALE Fries.—Gall consists of a swelling on the stem, either terminal or at a node; sometimes the swelling occurs on the peduncles near the flower-head. The size varies much, in some cases being small and hardly perceptible, in other cases very large, some being even 1¼ inch in diameter. The average size is from ¼ to ¾-inch in diameter. The shape may be rounded, spindle shape, or irregular; the surface smooth or covered closely with greyish hairs; and the colour green, or purplish. Internally it is very hard and woody, and contains a variable number of cells, in each of which is one white hymenopterous larva. Rather common along the Dee at Banchory.

CAMPANULA ROTUNDIFOLIA L.—*(a)* Galls axillary or forming a terminal cluster, sessile and not over 1-5th-inch in diameter. Each seems to be an abortive flower-bud. They are globular or somewhat flask-shaped; smooth, green, and

monothalamous. Each contains one larva of *Cecidomyia campanulæ* Müller. This gall is abundant on the sandhills along the coast north of Aberdeen, and also along the rocky coast south of the Dee. *(b)* This gall consists of a much enlarged and distorted flower-bud and seed capsule. Either the flower is distorted or never shows itself, the bud being early affected. Colour green; surface smooth and fleshy. Internally contains one or two cavities; in each there is one larva of a beetle (*Gymnetron campanulæ*). It is very abundant along the coast south from Aberdeen, and also locally several miles inland.

Vaccinium Vitis-Idæa L.—Galls in terminal shoots. They consist of reddish fleshy leaves overlapping so as to leave a central cavity, in which is a dipterous larva. On Morroine Hill, in Braemar.

Fraxinus excelsior L.—The galls occur along the midribs of the leaflets; they are long and comparatively narrow, and project along the midrib, below; they are open above, but the edges keep close together when fresh; they are thus very inconspicuous, especially above. Surface downy below; colour like the leaf. Each is mono- or polythalamous according to its length; and each cell contains one orange dipterous larva. Local; but abundant at Banchory, on a few trees.

Veronica chamædrys L.—The gall is terminal, seemingly an abortive leaf-shoot. It is ovate, about ¼-inch diam., and attached by the broad end; externally it is reddish, and covered with grey hairs; internally it consists of leaflets overlapping, and padded between with woolly substance, among which are several cells, each of which contains one reddish-orange larva of *Cecidomyia veronicæ* Brami. Very common.

Thymus serpyllum L.—Galls terminal, woolly, consisting of the undeveloped leaves and flower-heads. The whole plant assumes a woolly appearance, which is very conspicuous. Larvæ reddish. Galls very common.

Mercurialis perennis L.—Gall (?) on under side of leaf. It

was flattened, green, and covered with bristly hairs. I did not get it properly examined. Very scarce.

URTICA DIOICA L.—The galls occur on the leaves, usually at the top of the stem there is a cluster of them. They occur one on each side, at the base of the leaf; they project most below. Colour light green, surface rough and hairy, and form irregular; fleshy; contain several larvæ of *Cecidomyia urticæ.*

SALIX FRAGILIS L.—The gall is on the blade of the leaf, and is not connected with the midrib or veins. Form oval, and much more prominent below the leaf; surface naked and rough; colour bright and red above, paler or green below; varying from ⅛ to ½-inch in length, $\frac{1}{10}$ to ¼-inch in breadth, and rather more in depth. It is monothalamous, the central cavity being at first very small, and the walls thick and irregular, but finally the walls are reduced in thickness, and the cavity increases. Contains one whitish or greenish saw-fly larva.

SALIX ALBA L.—Occur on the leaves singly, but from two to six on each leaf. Form flattened above, conical below, colour reddish-yellow. They are smooth and thin-walled; and each contains one hymenopterous larva.

SALIX CAPREA L.—(*a*) The galls in this, as in most of the other willows, are on the leaves. They are well seen on the upper surface, but project most below. They are smooth and dark green above, covered with short yellowish hairs below. Form irregularly conical; structure very hard and woody. They are monothalamous, snd open by a hole in the apex of the cone below. All I found (in September) were empty. (*b*) The galls are hardly seen on the upper sides, but project much below. Structure soft and thin walled; colour green or yellowish-green; surface covered with short hairs. Each contains one hymenopterous larva.

(To be continued.)

Notes on Scottish Plants.—In the "Journal of Botany" for November there are one or two things of interest to Scottish botanists. One is a paper read by the celebrated Robert Brown, before the Edinburgh Natural History Society,

on January 26, 1792. This paper. which had never before been published, is on the "Botanical History of Angus," and among other plants noticed are *Eriophorum alpinum*, *Schœnus mariscus*, &c. Of *Dorouicum pardalianches* the author remarks that it "grows in shady ground several miles west from Montrose. This plant has never yet been found in England, but was observed in Scotland, by Mr. Lightfoot, in some parts of Annandale; as he always found it near buildings, however, he concludes that it has probably escaped from gardens. But in the place which I now mention this could not possibly have happened; and I likewise met with it in Perthshire, in a situation which confirms me in this opinion; and besides, it may be remarked, that it is a plant very rarely, if ever, to be found in gardens, at least, in this age. I would therefore, upon the whole, suppose the plant to be an original native of this country; though it may be found in situations which may lead to the opinion of its having escaped from gardens."

In the same magazine Professor Thistleton Dyer communicates a note upon *Exobasidium vaccinii* Woronin, a gall-like fungus affecting *Vaccinium Vitis-Idæa*, and gives as the only British localities, Perthshire and Aberdeenshire. Besides these localities (where I have noticed the diseased plants of *Vaccinium*) I may mention Ross-shire (Achilty), and Inverness-shire (Strathglass), as stations. There seems to be a real gall not very dissimilar in appearance to the Fungus, upon the same plant.—F. BUCHANAN WHITE, November. 1871.

Correction of Error.—In the paper on the "Altitudes attained by certain plants" (page 119), one sentence would seem to imply that Mr. H. C. Watson had not consulted Professor Dickie's "Botanist's Guide." This was an error on my part, as a reference to Cybele Brittanica, iv., 348, will show.—F. BUCHANAN WHITE, November, 1871.

VARIOUS NOTES.

In the "Journal of the Scottish Metereological Society" for July 1871, Mr. Buchan finishes his valuable paper upon the rainfall of Scotland. In concluding, he remarks that "the figures of the rainfall point to great differences of climate at places comparatively near each other, especially in the Highlands. In this respect, Inverness-shire presents greater extremes of climate than any other county in the British Isles. At Culloden the rainfall scarcely amounts to 25 inches, and at Corrimony to 39 inches; whereas at Glenquoich it amounts to 101.53 inches, and at Sligachan, in Skye, probably to little less than 150 inches annually. Since, then, summer quarters in the Highlands, even in the same county, have climates so widely different, the figures on the map give information of the greatest value on this and other practical inquiries."

In the same journal for October 1870, and January 1871, is an extremely valuable and interesting paper by the same author, upon "The Temperature of the British Isles," illustrated by thirteen charts.

The Rev. W. A. Leighton has recently made a valuable addition to the library of the British botanist, in the form of a "Lichen Flora of Great Britain." We regret that our space will not allow us to notice the work at greater length. The author will perhaps, however, allow us to suggest that in the next edition a *more copious index* would add greatly to the value of the work.

F. Buchanan White, Delt. J. Wilson, Aberdeen. Taylor & Henderson, Lith. Abdn.

MAP OF SCOTLAND, SHOWING THE NATURAL DIVISIONS ADOPTED IN INSECTA SCOTICA.

INSECTA SCOTICA.

AN ESSAY TO CATALOGUE THE INSECTS INHABITING SCOTLAND.

INTRODUCTION.

IN publishing lists of the Scottish Insects, it will be advisable to indicate, so far as is practicable, the distribution of each species throughout the country. For this purpose Scotland has been divided into thirteen districts. (Plate III.) In selecting these, an attempt has been made to obtain natural divisions (such as those afforded by the basins of the larger rivers), instead of the arbitrary sections heretofore used for similar purposes.

The districts are as follows :—

EASTERN DISTRICTS.

1. Tweed.—The part drained by the Tweed and other rivers entering the sea between Berwick and Cockburnspath.
2. Forth.—The part drained by the Forth and other rivers between Cockburnspath and Fifeness.
3. Tay.—The part drained by the Tay and other rivers between Fifeness and Cratown.
4. Dee.—The part drained by the Dee and other rivers between Cratown and Pitsligo.
5. Moray.—The part drained by rivers between Pitsligo and Ord of Caithness, and by the Caledonian Canal as far west as Loch Oich.
6. Sutherland.—The part drained by rivers between Ord of Caithness and Cape Wrath.
7. Orkney.
8. Zetland.

WESTERN DISTRICTS.

1. Solway.—The part drained by rivers between the Liddel and Culzean Castle.

2. Clyde.—The part drained by the Clyde and other rivers between Culzean Castle and Loch Awe : includes Arran and Islay.
3. Argyle.—The part drained by rivers between Lochs Awe and Aylort : includes Mull, Tiree, and adjacent islands.
4. West Ross.—The part drained by rivers between Loch Aylort and Cape Wrath : includes Skye.
5. Hebrides.

THE LEPIDOPTERA OF SCOTLAND.

EDITED BY F. BUCHANAN WHITE, M.D.

PREVIOUS LITERATURE.

The only list of the Scottish Lepidoptera hitherto published is in Mr. H. Jenner Fust's paper "On the Distribution of Lepidoptera in Great Britain and Ireland," read before the Entomological Society, in 1867. In this paper, which should be in the library of every British Lepidopterologist, the author has adopted the artificial mode of division of the country into "provinces" and "sub-provinces," and has indicated, as far as was then known, the range of all the species ascertained to inhabit Scotland. During the three years that have elapsed since the publication of this work, our knowledge of the Scottish Lepidoptera has been considerably increased.

In addition to this list, several excellent local lists exist. Among these may be mentioned the Rev. Dr. Gordon's "List of Lepidoptera of the Province of Moray," published in the *Zoologist,* Aug., 1861 ; Dr. Lowe and Mr. Logan's "Lepidopterous Insects of Midlothian," published in the "*Naturalist*," 1852 ; and the "Fauna Perthensis," Part I., published by the Perthshire Society of Natural Science, 1871. There are, besides, notes (of more or less value) of the Lepidoptera of several Scottish localities, in the various magazines, and in the publications of various societies.

SOURCES OF INFORMATION AND ASSISTANCE WITH THE PRESENT LIST.

Besides consulting the lists and notices cited above, I have applied for information to all entomologists, who I had reason

to suppose were likely to know anything regarding the Lepidoptera of Scotland. I now avail myself of an opportunity of acknowledging the assistance thus received (without which this list could not have been compiled), and of offering my sincere thanks to the givers thereof. To save space and avoid repetition, I here indicate, under each district, the names of those to whom I am indebted for information regarding the district.

Tweed—J. Hardy, A. Kelly, J. Turnbull. *Forth*—W. Cameron, T. Chapman, J. P. Duncan, R. Hislop, Dr. W. D. Paterson, H. T. Stainton, Dr. Boswell Syme, A. Wilson. *Tay*—C. G. Barrett, E. Birchall, F. Bond, N. Cooke, J. Cooper, J. C. Dale, J. P. Duncan, H. Jenner Fust, Dr. Battershell Gill, A. Guthrie, W. Herd, J. B. Hodgkinson, T. Hutchinson, J. Lamb, T. Marshall, E. G. Meek, Sir T. Moncrieffe, D. P. Morison, A. Simpson, Jas. Stewart, John Stewart. *Dee*—J. W. H. Traill. *Moray*—E. C. Buxton, A. Davidson, Rev. Dr. Gordon, G. Norman, J. Thomson. *Orkney*—J. W. H. Traill. *Solway*—Sir W. Jardine, Miss Jardine, W. Lennon, W. Douglas Robinson. *Clyde*—Dr. A. Chapman, T. Chapman, J. C. Dale, J. P. Duncan, J. Dunsmore, J. B. Hodgkinson, J. W. Peebles. *Argyle*—E. Birchall, E. C. Buxton, N. Cooke. *West Ross*—A. Davidson, H. Jenner Fust. *Hebrides*—H. Jenner Fust.

PLAN OF THE LIST.

The NAMES used in this list are those which, according to the law of priority, rightly belong to each species. In some instances, the name thus used is not that by which the species has been generally known in Britain, and in these cases the latter name has been given also; for the rest of the synonymy I refer the reader to Staudinger & Wocke's elaborate "Catalog der Lepidopteren des Europæischen Faunengebiets" (Dresden, 1871).

To indicate the COMPARATIVE SCARCITY OR ABUNDANCE OF INDIVIDUALS of a species, the terms "abundant," "common," "not common," "rare," &c., are used. These require no explanation beyond this, that "rare" means that single individuals of the species are of occasional, but not frequent, occurrence; and that "very rare" implies that only two or three

examples have been met with. "Local" means that a species, though not rare as regards individuals, is yet very restricted in its range in any district.

To indicate the PHYSICAL FEATURES of the habitats of the various species, and at the same time to be economical of the space at our disposal, the following terms are used:—"hortensal," which means that the species frequents gardens or their vicinity; "agrestal," inhabiting cultivated ground; "pascual," inhabiting meadows, either natural or artificial; "nemoral," inhabiting woods; "ericetal," inhabiting heather-covered moors; "rupestral," frequenting rocks or dry banks; "riparial," frequenting the banks of rivers or lakes; "maritime," frequenting the sea-coast; "palustral," inhabiting marshes; "aquatic," inhabiting the water at some stage of existence; "alpine," not found under a considerable elevation on the mountains.

The ALTITUDE to which a species ascends on the mountains is indicated in the case of those species which have been observed at or above 1000 feet above the sea-level. Most of the altitudes given are from observations taken by Mr. J. W. H. Traill and myself on the mountains of Braemar, but a great deal remains still to be done in this department.

The ASCERTAINED DISTRIBUTION is shown first on the East, and then on the West side of the country. An o occupies the place of the name of a district in which the species has not been observed, but as in some cases the species probably occurs there, and only requires observation, a ♀ indicates the probable occcurrence.

The RANGE OF A SPECIES FROM NORTH TO SOUTH is shown by the degrees of Latitude within which it has been detected. This part of the list will probably (and I hope soon) require amendment, as our knowledge of the species inhabiting the extreme north of Scotland increases.

For the sake of comparison, the RANGE OF THE SPECIES IN EUROPE PROPER is briefly indicated. The Polar Regions are those surrounding the arctic pole; the Boreal Regions are those above 62 or 63 degrees of north latitude.

The GEOGRAPHIC TYPE shows the character of the range of species in the countries of the European Fauna. These countries include all in which 60 per cent. of the species are species found in Europe proper, and extend from Greenland and Labrador on

the west, to eastern Siberia on the east, and northern Persia and northern Africa—as well as Madeira and the Canary Islands—on the south. The "Territorial" Type includes all the species found in all the countries of the European Fauna; the "European," species occurring throughout Europe proper, but not throughout all the countries of the European Fauna; "Central" means that the metropolis is in the Central countries of Europe; "Centro-septentrional," that the distribution is from the centre northwards; so in like manner "Centro-meridional," "—oriental," "—occidental," from the centre to the south, east, or west, as the case may be. On the other hand, "Septentriono—," "Meridiono—," "Oriento—," or "Occidento-central," implies that the supposed metropolis of the species is in the north, south, east, or west (as the case may be), with an inclination towards the central countries. "Northern," "Southern," "Eastern," or "Western," require no special explanation. "Alpine" implies that the species has its metropolis on the mountains of Central Europe; "Alpine and boreal," that having its metropolis on the mountains of central Europe, the species has at some period reached northern Europe and having found appropriate conditions, has established itself there; "Boreal and alpine" of course means the converse. It may be here remarked that a species which can only find the appropriate conditions for existence at a high elevation on the Alps, finds the same conditions at sea-level in the North, and in intermediate localities at an altitude, of course, varying with the propinquity to the Alps, or to the North. The altitudes vary in different species. When a species is confined or nearly confined to a single country, the type is of that country, *e.g.* "Scottish," "British," &c. Fuller particulars as to the range of the species will be found in the above-mentioned "Catalog" by Dr. Staudinger.

In connection with the "Type" a word or two may be said as to the "Derivation" of our species. Comparatively few species have originated in Britain; the majority came from Central Europe at the time when land communication with the continent still existed. In those cases where the derivation seems to have been different, the probable origin is indicated. I may here mention that there is an excellent paper on this subject, by Dr. Jordan, in the "Entomologist's Monthly Magazine," (vol. viii. p. 45).

The "TYPE IN BRITAIN" shows the character of the species as far as Britain only is concerned. Thus the "British" Type includes all species that range throughout Britain; the "English," species that are more especially southern, but which reach the south of Scotland; "Scottish," those that have their metropolis in Scotland, and become rare or disappear towards the south; "Intermediate," those that occur in North England and South Scotland, becoming rare farther north or south; "Alpine," true mountain species. The Types in Britain are for the most part the same as those adopted by Mr. Jenner Fust in the paper cited above.

The TIMES OF APPEARANCE, both of the Imago and of the Larva are briefly noticed. The dates are chiefly from my own notes taken in Scotland, supplemented from other sources. I have especially to thank Mr. W. Buckler for information on this subject. At one time I thought of comparing the range of the species and of the food-plant, but finding that in most instances they did not correspond, and that probably where one food-plant ceased to occur, its place was taken by some other (allied) plant, I have only done so in a few instances.

The record of the occurrence of VARIETIES or ABERRATIONS is an essential part of the list. These terms are used in the Staudingerian sense, and may be thus defined. A "variety," or local race, is a definite and permanent form occupying the place of the typical form in a locality. In many cases these races are considered by some authors to be distinct species, and it may, perhaps, be not unreasonable to believe that in course of time, and by continued development of their peculiarities, they may become distinct species. A very great interest is thus attached to these varieties. In the case of some species, Dr. Staudinger is in doubt whether to consider them distinct species or more fully developed varieties: to these he applies the term "Darwinian species." An "aberration" is a form occurring in the same locality as the typical form. It may be constant, and occur frequently; on the other hand, it may be found once, and never be reproduced again. It is to the constant and occasionally-occurring form that I think the term "aberration" should be restricted, the other forms partaking more of the character of monstrosities or "sports." It should be noticed, also, that what is the "variety," or local race in one country, may occur

along with the typical form (but less frequently), and be an "aberration" in another country.

In connection with this subject, may be considered the DIFFERENCE THAT THERE OFTEN IS BETWEEN EXAMPLES OF THE SAME SPECIES FROM NORTH AND SOUTH BRITAIN. In many species there is no difference; in others the difference is more or less marked, but not constant; and in others the difference is so well defined, and so constant, that the northern examples may be considered as forming a "variety" or local race. It was my intention to have indicated as far as practicable the differences between northern and southern examples, but I have, in the meantime, abandoned that intention except in the more striking cases. I may mention however, that the differences (when there are any) may be thus tabulated :—Northern specimens may differ from Southern : 1stly, in Size; 2ndly, in Colour; 3rdly, both in Size and Colour : a) they may be larger, with (1) colour more intensified (*i.e.*, in the bright-coloured species the colour brighter, in the dull-coloured, the colour infuscated); (2) colour more dilute : or b) they may be smaller, with (1) colour more intensified; (2) colour more dilute.

Finally, I have here and there introduced a short notice of certain species that *may* possibly yet be detected in Scotland. Doubtful Scottish species are distinguished by having a [prefixed.

RHOPALOCERA.

NYMPHALIDÆ Leach.

MELITÆA Fab.

AURINIA Rott. (1775); *Artemis* S.V. (1776). Local. Ericetal.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde Argyle o o

LAT. 55°-57°40". RANGE IN EUROPE. Central and northern, except the polar regions. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. July-May. FOOD-PLANT. Scabious (*Scabiosa succisa*). The alpine var. *Merope* Prun. (smaller and darker) may occur on some of the mountains.

ARGYNNIS Fab.

SELENE Sch. Common. Ericetal and nemoral. Ascends to 2000 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde Argyle ♀ o

LAT. 54°50″-57°50″. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May-August. LARVA. June-May. FOOD-PLANT. Violet (*Viola sylvatica*).

EUPHROSYNE L. Less common than *Selene.* Ericetal and nemoral. Ascends to 1700 feet.

DISTRIBUTION—EAST. o Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde Argyle West Ross o

LAT. 54°50″-57°50″. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May-July. LARVA. June-May. FOOD-PLANT. Violet (*Viola sylvatica*). A smaller darker var. (*Fingal* Hbst.) occurs in Northern Europe.

AGLAIA L. Common. Ericetal and nemoral. Ascends to upwards of of 2500 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray Sutherland o o
WEST. Solway Clyde Argyle ♀ o

LAT. 54°50″-58°30″. RANGE IN EUROPE. Throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June-September. LARVA. August-July. FOOD-PLANT. Violet (*Viola sylvatica*) and Scabious (*Scabiosa succisa*).

[**ADIPPE** L. Rare. Nemoral and pascual.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway? o o o o

LAT. (?) RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. July. LARVA. August-June. FOOD-PLANT. Violet (*Viola sylvatica*). Further evidence is desirable as to the occurrence of this species in Scotland.

(To be continued.)

ZOOLOGY.

THE BRITISH SPECIES OF CRAMBUS.

BY F. BUCHANAN WHITE, M.D.

(Concluded from page 141.)

b) Catoptria H.—*Cilia lined with white, or unicolorous. A central white or pearly-white streak.*

1. *Central streak once or twice divided.*

PINELLUS L., *pinetella* L.—F.-w. acute, yellow-brown, paler on the inner-margin. The pearly-white central streak is obliquely divided in the middle, and its acuminated extremity faces the middle of the hind-margin. Hind line obscure, pale yellow, obtusely angulated in the centre, and indented near the inner-margin. Cilia fuscous shining. Centre of head and thorax white. 11½-12 *L.*

July, August. Central and Northern Europe. Widely distributed in Britain, occurring as far north as Ross-shire, but not very common. This species does not fly so readily in the daytime as many of the other *Crambi*, and is best obtained by searching at night with a lantern on dry banks.

[*Conchellus* S. V., an alpine and boreal species, resembles *pinellus*, but is larger, and has white cilia; its ab. *rhombellus* Z. has the apical part of the white streak rhomboidal and pointing to above the middle of the hind-margin. *Mytilellus* H., found in France and Austria, is yellow, and has the central streak obliquely divided *beyond* the middle, and the angulated hind line narrow and white. It is a smaller species than *pinellus*. Staudinger gives "Anglia" as a doubtful habitat, on what authority I do not know.]

MYELLUS H.—F.-w. acute, yellow-brown, paler at the base and inner-margin. The pearly-white central streak is *twice* divided by fuscous, the third part being linear. Cilia grey, with a few white streaks. Centre of head and thorax white. 12-13 *L.*

July. Central Europe and Finland. Only a few specimens have occurred in Britain—in Perthshire (Glen Tilt and Rannoch) and Aberdeenshire (Braemar, &c.) It has probably the same habits as *pinellus* and should be looked for at night.

[*Speculalis* H. is somewhat darker, and has the inner-margin narrowly white, and the third portion of the central streak arcuate; *permutatellus* H.S. is paler, has the inner-margin white, and the third part of the streak sinuate; *luctiferellus* H. has in addition a white spot before the tip, and the inner-margin interrupted with white. These species are found on the mountains of Central Europe].

2. *Central streak undivided.*

MARGARITELLUS H.—F.-w. acute, yellowish-ferruginous. Central streak dilated and acuminated at the end, reaching nearly to the hind-margin. Cilia unicolorous. Centre of head and thorax white. 9-10 *L.*

Var. *anglicanus.*—F.-w. yellowish-fuscous.

July, August. Central and Northern Europe. In Britain rather local and commoner in the north than in the south. A common species in the Highlands of Scotland, frequenting damp grassy places in open woods, often in company with *Erebia Œthiops* (*Blandina*). Zeller remarks of the var. that "the English form is so singular that we might consider it a distinct species." Scottish examples appear to belong to the typical form.

[The alpine species *pyramidellus*, Tr., has variegated cilia; *fulgidellus*, H., is cinnamon-coloured, has the inner-margin and a line before the anal angle, white, the central streak touches the hind-margin by two teeth, and is toothed below; the cilia are variegated, and the hind wings are white; the antennæ of the male are serrated.]

LATISTRIUS Hw.—F.-w. elongated acute, greyish-ochreous brown, slightly shining. The white central streak, entire and very slightly dilated beyond the middle, extends to the hind-margin, and is continued in the cilia, where it is obscurely forked. On the hind-margin is a row of more or less distinct black spots. H.-w. pale grey. Antennæ of male slightly crenate below the tip. 10-12 *L.*

July. A local species. Western France, Livonia and Britain. In Scotland it is rare, having only been found in Perthshire (once) and in Arran.

FURCATELLUS Ztt.—F.-w. dark brown. The slender central streak a little dilated beyond the middle, and not reaching the hind-margin, has its lower edge beyond the middle somewhat jagged. Cilia unicolorous, greyish in the male, whitish in the female. H.-w. dark grey in the male, paler and with whitish cilia in the female. 9-10 *L.*

July, August. The Alps, Scandinavian Mountains, and Lapland. In Britain, it has been taken in Wales, the Lake District of North England, Perthshire, Aberdeenshire, and Inverness-shire. A mountain species : in Britain not found below an elevation of ? 2000 feet. It frequents grassy places.

[*Radiellus* H., another alpine species, may be distinguished from *furcatellus* by its narrower, greenish, more shining wings, &c.]

c) Cilia variegated with whitish. Central veins slender, whitish. The two lines are somewhat fuscous, margined, the central interiorly, the hind exteriorly, with whitish.

FASCELINELLUS H.—F.-w. slightly elongated and obtuse, (more acute in the female) hind-margin rounded; ochreous-grey, the veins whitish-ochreous, and the inner-margin sprinkled with large fuscous scales. The two lines oblique, arched, and indented near the inner-margin, yellowish-brown mixed with fuscous and margined with whitish-ochreous, the central interiorly, the hind exteriorly. Hind-margin narrowly brownish-yellow, with 3-4 black spots at its lower half. Cilia greyish-brown variegated with whitish. H.-w. pale greyish-brown. 13-14 *L.*

July. Central Europe, South Sweden, Western France, and South-western Russia. In Britain very local, and has only been detected near Yarmouth. Closely allied to *jocundellus* H.S., and *ramosellus* Z. Zeller and Staudinger refer the *pedriolellus* of Stainton's Manual (II. 182) to the alpine species *spuriellus* H., which has not occurred in Britain.

d) Cilia unicolorous (sometimes metallic). Central vein often paler or silvery, margined with darker scales. Lines (when represented) margined, one interiorly, the other exteriorly, with whitish.

1. *Cilia metallic. Hind-margin yellowish, with black spots. Veins sprinkled with fuscous. No trace of lines. Palpi elongated.*

CULMELLUS L.—Palpi long, acuminate. F.-w. somewhat elongate, acute, hind-margin rather convex; pale ochreous, brown towards the costa; central veins paler, their branches separated by greyish-brown scales; hind-margin brownish-yellow with a row of black spots. Cilia pale golden, shining. The female is altogether paler. 8-9 *L.*

June, July. Central and North Europe. A very common species in Britain, occurring probably throughout.

2. *Cilia very rarely metallic. Central vein generally paler, margined below with darker. The two lines present.*

INQUINATELLUS S.V.—Palpi long. F.-w. elongate, acute, brownish-ochreous; central vein and its branches paler. Lines

arched, fuscous, more distinct towards the inner-margin, and several times interrupted; through the central line, just below the central vein, runs a short longitudinal fuscous streak; the hind line exteriorly margined with whitish. Hind-margin brownish-yellow with black spots. Cilia grey, shining. Sometimes the only distinct markings are the central longitudinal fuscous streak and the lower half of the hind line. 10½-12 *L.*

August. Central and Southern Europe. Not uncommon in the south, rarer in the north, of Britain. In Scotland it has been taken in Perthshire and Kirkcudbrightshire.

GENICULEUS Hw.—Palpi longer than the thorax. F.-w. rather elongate, acute; grey or brownish grey; the broad central vein and its branches pale-ochreous. Lines fuscous-brown, acutely angulated, and indented near the hind-margin; a longitudinal fuscous streak runs through the central below the central vein, and the hind line is narrowly exteriorly margined with white. Hind-margin spotted with black. Cilia pale golden, shining. 9-10 *L.*

July, August. Central and Southern Europe. Not uncommon in England; scarcer in Scotland (Ayrshire, Argyleshire, Perthshire).

CONTAMINELLUS H.—Palpi longly attenuate. F.-w. more or less elongate, acuminate, hind-margin rounded below the tip; ochreous-brown, basal half of the central vein paler, and margined below with dark fuscous, its branches separated by dark fuscous scales. Lines rather indistinct, brown, angulated and thickened in the middle. Hind-margin spotted with black in the middle. Cilia grey, not shining. H.-w. grey. Sometimes the front wings are altogether shaded with fuscous. 9½-10½ *L.*

July, August. Europe, except the polar regions. Rather a local species in Britain. In Scotland it has only been detected near Edinburgh. It occurs in dry pastures.

Note.—These three species may be easily distinguished from each other:—*inquinatellus*, by the *slightly* arched lines, and *slightly shining* cilia; *geniculeus*, by the *acutely* angulated lines, and *shining* cilia; *contaminellus*, by its *duller* colour and cilia.

3. *Cilia scarcely shining in most of the species. Front wings dull. No central line; the hind line (if any trace of it is present) may be*

discovered near the inner-margin. Some species have a whitish or silvery central vein posteriorly fissured.

TRISTELLUS S.V.—Antennæ setaceous; palpi long. F.-w. elongate, acute (acuminate in the female), hind-margin rounded below the tip; dull yellowish; central vein broadish, silvery or yellowish, its branches pale. Hind line indistinct, but usually a trace of it can be seen ascending from the inner-margin, sometimes it is altogether absent, and sometimes can be traced across the wing. Hind-margin scarcely spotted with fuscous. H.-w. grey. 11-14 *L.*

Ab. *b.* F.-w. yellowish fuscous, inner margin paler.

Ab. *c.* F.-w. central vein slender, opaque, white, interrupted and margined with fuscous. *Palcella* H.

Ab. *d.* F.-w. yellowish fuscous, central vein not paler. *Aquilella* H.

July to September. Europe except the polar regions. A very common species in Britain, occurring probably throughout.

SELASELLUS H.—Antennæ setaceous; palpi long. F.-w. less elongate, hind-margin rounded; greyish-ochreous, central vein thickened, silvery, bifid at its extremity, shaded with grey above. No hind line. Hind-margin scarcely spotted with fuscous. H.-w. grey. 10½-12 *L.*

July, August. Central and Northern Europe, in wet meadows. Not uncommon in England; in Scotland it has not yet been detected, but possibly has been passed over, from its resemblance to *tristellus*. From that species it may be separated by its broader wings, pale mealy ochreous colour never infuscated, and by the absence of the hind line.

[*Deliellus* H. is allied to the last two species, but may be distinguished by the shortly pectinate antennæ of the male, narrow, very pale ochreous front wings, with a white line (margined with fuscous) from the base to the tip, the more distinctly spotted hind-margin, and the whitish hind wings. It occurs in dry sandy places in Germany, &c., about the end of August. *Luteellus* S.V. occurs in dry grassy places in June and July, in Central Europe. In the male the front wings are somewhat broad, yellow, powdered with fuscous along the inner-margin, generally no trace of the hind line, and no fuscous spots along the hind-margin; the female has narrower pale grey front wings, dusted with fuscous, and the veins a little paler; in both sexes there is no paler central vein.]

4. *Cilia not metallic. Front wing shining, unicolorous, or suffused with darker along the veins. No lines.*

PERLELLUS Scop.—Palpi long, whitish or grey. F.-w. elongate, acute, hind margin rounded; shining; satiny-white, or

yellowish-white, or yellowish-ochreous, often with the veins suffused with grey or greyish-brown. H.-w. pale or dark grey. 12-13 *L.*

Var. and ab. *Warringtonellus* Stt.—Smaller. Palpi dark grey. F.-w. veins much suffused with greyish-brown. 9½-10½ *L.*

July, August. Central and Northern Europe. Somewhat local but not uncommon throughout Britain; it has been found as far north as Ross-shire. The var. is much more local, occurring chiefly on the south and west coasts of England, and on the west coast of Scotland (Kirkcudbrightshire and Ayrshire). Its exotic distribution is polar Norway, Finland, and Armenia.

[*Lithargyrellus* H., which has shorter palpi, less elongate and very shining pale ochreous grey front wings, with scarcely paler veins; or *rostellus* De la H., which has long grey palpi, oblong front wings, dilated at the end and very shining dirty grey, may perhaps be found.]

THE SCOTTISH FORM OF *ZYGÆNA EXULANS* HOCHENWARTH.

BY THE EDITOR.

LAST July Mr. J. W. H. Traill and I found, for the first time in Britain, a colony of a pretty Burnet moth, *Zygæna exulans*, inhabiting a hill in the district of Braemar, Aberdeenshire.

There are several interesting matters in connection with the Aberdeenshire colony of this species; and one, not the least in point of interest, is the tolerably plain evidence of the northern derivation of the colony. The geological and botanical features clearly show that the locality is an ancient shore of the glacial or post-glacial period, and it seems probable that the same agencies which brought from the north to this ancient shore its characteristic plants, likewise conveyed hither about the same time, and from the same quarter, the insect in question.

In the south of Europe *Zygæna exulans* inhabits the highest Alps and Pyrenees; in the north, it is found upon the mountains of the Scandinavian Peninsula, and in Lapland, where it occurs at all altitudes. The southern and northern races, however, differ so much that the latter has been described as a distinct species. Curiously enough, the individuals of the Braemar colony present characters intermediate between the

northern and southern forms and deserve, I think, to be described as forming a distinct geographical race.

The typical *exulans* Hchh. may be thus briefly described :— Wings subdiaphanous : the front ones dull greenish mixed with ochreous, with five carmine red spots arranged thus 2 2 1. The upper basal spot is long, and, running along the costa, overlaps the third spot, which is the smallest ; the fourth and fifth spots are the largest and roundish. The ochreous colour is more strongly marked around the spots and at the edges of the wing, and the fringe is also ochreous. The hind wings are pale carmine with a narrow dull green margin (narrower in the female). The hind-body is black, and covered with shaggy hair. Inhabits the higher Alps and Pyrenees : specimens from higher altitudes are more ochreous than those from lower.

The boreal variety *Vanadis* Dalm. is said to differ from the type by being very sparingly scaled and by not having any ochreous tints. Inhabits the Scandinavian mountains and Lapland.

The Scottish race, for which I propose the name *subochracea*, may be thus defined :—

Var. *subochracea.* Wings subdiaphanous : front ones dull green with five carmine spots of the same form and arrangement as in the type. Hind wings dull carmine with all the margins pale dull green. Male—tips of the fringes in all the wings greyish ochreous. Female—the collar (except in the centre), the legs, and the margins of the red spots more or less ochreous ; fringes as in the male, but more ochreous. This variety differs from the type by the absence of the ochreous tints (except in the female, which is slightly marked with ochreous), and by the broader green margin to the hind wings, of the same breadth in each sex ; and from the var. *Vanadis*, by the presence of the ochreous tints in the female, and by the more abundant scales on the wings. Inhabits Scotland (Braemar).

The larva of *Z. exulans* is said to be polyphagous, preferring heather and blaeberry. Some young larvæ that I had fed readily upon knotgrass *(Polygonum aviculare)* and white clover *(Trifolium repens).* They died however at the beginning of winter.

The exact locality in Braemar I at present (for obvious reasons) withhold.

Occurrence of Zelleria saxifragæ Stt. in Scotland.—When out one day, last July, collecting in Braemar, Mr. Traill directed my attention to a small moth at rest on a stone. This moth I boxed, and on examination find that it is *Zelleria saxifragæ* Stt., a species not met with before in Britain. It may be distinguished from *Z. fasciapennella* by "its whiter, neater appearance, by the medial fascia starting more obliquely from near the inner margin, and not reaching even to the subcostal nervure, and by the sharp darker lines in the apical cilia." *Z. saxifragæ* was first taken in the Engadine, and subsequently on the Kaiserberg, near Oberaudorf. The larva has been found feeding on *Saxifraga aizoon*, but as that plant is not a native of Britain, it probably also feeds on *Saxifraga aizoides*, among which plant my specimen was taken. The imago and larva are described and figured in the eleventh volume of the Natural History of the Tineina, p. 116, and pl. III., fig. 3.—F. BUCHANAN WHITE.

Capture of Steganoptycha augustana H.—I have been fortunate enough to take a specimen of this pretty rarity near Paisley.—J. DUNSMORE, Castlehead, Paisley, February, 1872. [This is probably the third specimen taken in Britain. The first was taken by Lord Walsingham, in the county of Durham in 1866. I took another specimen (not hitherto recorded) in Rannoch in 1867. As stated in the Ent. Mo. Mag., v., 252, the species standing in our list as *Steganoptycha* (or *Hypermecia*) *augustana* H. is *cruciana* L.—EDITOR *Sc. Nat.*]

New Locality for Mixodia Bouchardana.—I have met with an example of this moth here.—*Id.*

Note on Lasiocampa potatoria.—Has it been noticed that in Scotland the larva hybernates full fed, like that of *Bombyx rubi*? It is so in Bute and Mull, the only places where I have seen this moth in Scotland. Near London, &c., it is met with half-grown in autumn, and feeds up to June, so that in Scotland the moth appears about two months earlier than in the south of England.—J. BOSWELL SYME, Balmuto House, by Kirkcaldy, Feb. 12, 1872.

[I have only seen this species in the south-west of Scotland, and there in autumn the larvæ were less than one-third grown. Can any of the readers of the "*Scottish Naturalist*" give further information as to the habits of this species in Scotland?—EDITOR *Sc. Nat.*]

Early Captures of Lepidoptera.—As this season appears to be unusually early, I send a note of the dates of some of my captures :—January 30, *Phigalia pilosaria, Sarrothripa revayana;* February 12, *Hybernia leucophæaria;* February 20, *Hybernia progemmaria;* February 21, *Anisopteryx æscularia;* February 22, *Trachea piniperda;* March 3, *Tæniocampa gothica, T. stabilis*; March 6, *Asphalia flavicornis;* March 5-7, *Tæniocampa cruda, T. instabilis, Epigraphia avellanella.*—THOS. MONCRIEFFE, Moncrieffe House, by Perth, March, 1872.

Sesia bembeciformis.—Dr. Boswell-Syme is in error when he states at p. 154 of the "*Scottish Naturalist*" that this species is not admitted as a native of Scotland in my "Distribution of Lepidoptera," as a second inspection will convince him. When this was published, the evidence only seemed satisfactory with respect to one sub-province; other localities have since been recorded.—H. JENNER-FUST, Jun., Hill Court, Gloucestershire.

Bembidium paludosum at Glasgow.—I captured *Bembidium paludosum* three miles from Glasgow at the beginning of May, last year. Repeated searchings failed to produce more than one specimen. I do not think this elegant insect has been noticed in the west of Scotland before.—PETER CAMERON, Jun., Glasgow.

MEMOIRS ON SCOTTISH DIPTERA.

BY JAMES HARDY,
Secretary of the Berwickshire Naturalists' Club, &c.

No. 1.—THE SOW THISTLE STEM-BORING FLY. *(Cheilosia chalybeata*, Meig.*)*

THE only certain information that we possess concerning the œconomy of any of the species of Macquart's genus *Cheilosia*, in the early state, is the observation which Fallén has recorded, that the nymph of *C. ruficornis** had been found in the earth at the root of a tree. Macquart, as well as St. Fargeau and Serville, have too hastily inferred from this, and from finding no species developed from the Syrphoid larvæ destructive to Aphides, that they live in vegetable debris *(le terreau vegetal.)* [Macquart, *Ins. Dipt. du Nord de la France (Syrphies)*, iv. 50.] One species, however, that I have reared, subsists, like *Merodon*, on living vegetables. On the 18th of August, observing a round perforation near the base of the stem of the common Sow Thistle *(Sonchus oleraceus)*, I proceeded to cut it up, and found the interior had been penetrated upwards by a large white maggot, which had left a brown track behind it. The hollow in the under part of the plant contained a quantity of a dark brown liquor, like laudanum, which had exuded from the wounded parts. I afterwards detected many others in similar situations. In some instances the root was bored into as

* Of this species Zetterstedt (*Dipt. Scand.*, ii. 780,) remarks :—"*In truncis arborum viventium quercûs, ubi succus exstillat, imagines sæpe vidi;* IN VULNERE LARVAS *et in terra ad radicem ejusmodi arborum sauciatarum pupas obovatas, albidas punctis elevatis fuscis scabras, antice corniculis 2 brevibus erectis, et postice spinulis 6-8, fuscis instructas, medio mensis Julii sæpe legi.*"—EDITOR *Sc. Nat.*

well as the stem. Some larvæ were converted into pupæ *in sitû*, but others left the plant previous to their change taking place. In my first attempts to rear the perfect insect, I was baffled by one of the specimens giving birth to a black and red ichneumon—which in escaping drilled a round hole, of a diameter corresponding to the width of its body, in the puparium—and by others being unproductive. I was more successful afterwards, and obtained the fly in the autumn, from maggots collected in July; thus proving that there may be two broods during a season. I have met with it most frequently in dry banks in uncultivated glens.

The *maggot* is thick, and rough with wrinkles, sub-ovate, narrowed considerably behind, and somewhat suddenly contracted in front; finely granulated, and rather thickly shortly appressed pubescent; dirty-whitish; the anterior stigmata are marked by two approximating brown points placed above a hollow, in which the black oral hooks are received; the hinder end is somewhat conic, and is provided with a long projecting sub-linear granulated process, composed of two united parallel layers separated by a central longitudinal fissure; this process is widest at the base, where the skin of the body continues for a short distance to cover it, and is terminated at the tip by the stigmata, each of which has a pore; before it on each side there is a small tubercle, and behind it in a similar position, two sharp longish lobes; the anus is placed considerably forwards on the belly, and has two blackish hard plates, divided by a fissure; length 4½ lines.

The *puparium* is shaped and coloured somewhat like the maggot, being composed of the indurated larva skin; pale brownish white, or pale straw-tinted, nearly oval, convex, a little narrower behind, the front shortly contracted; the segments faintly separated. finely transversely striated, minutely granulated above and beneath, with the remains of a thickish short appressed pubescence; sides anteriorly indistinctly keeled; the tip bluntish; its middle with two parallel keels separated by a hollow; above it there is a fovea, which has two sharp keels convergent behind; beneath it lies an open pore, the fore-edge of which is puckered, and resembles an arch; hinder-end rougher, after a gradual slope on the top and sides, narrower, its sub-conic tip above with a long projecting light brown granulated process, as in the

maggot; at each side of the tip behind this, there is a tubercle on each side; the adjoining parts are nearly on the plane of the body, and the anus is indicated by a fissure; length 4 lines.

The *fly* agrees best with *Syrphus chalybeatus*, Meig. *Europ. Zweif. Ins.* iii. 294, of which he describes a male. There are some slight discrepancies; but as the species is subject to variety in its tints, I do not feel justified in considering it as different. It belongs to the genus *Cheilosia* of Macquart, to whose plates I must refer for a figure of the wing. It is somewhat narrowish, obscure olive-green, or, in the male, slightly blueish, shining; face with two tubercles, the upper largest; black, with several whitish patches and reflected tints, especially round the margins of the eyes; in some lights quite hoary; the head surrounded with whitish pubescence, hinder part of the head pale-greyish; front black or greenish, punctulate, wide in the female, but, in the male, the eyes almost meet, a triangular space being left in front and behind; eyes brown, yellowish white pubescent; antennæ smallish, the base black, with the third lenticular joint more or less deep fuscous, the first and second in such instances being paler next the joints, clothed with a thickish white or slaty down; seta apparently naked; thorax greenish or blueish-black, shining, finely punctulate, and having a fine retiform tracery on the surface, and a thickish yellowish white pubescence, mixed with black hairs; the pubescence white on the sides, in the female neither so long nor dense; scutellum concolorous, a shallow arched depression before the tip, pubescent; abdomen rather narrowish, flattish, oblong-oval in the males, broader and bluntish in the females, concolorous, reticulated, rather thickly yellowish pubescent, the pubescence mixed with a few black hairs; the belly, in the female, with the hinder edges of the segments, the base, and some tints on the middle subtestaceous; legs black, thighs with a pale yellowish pubescence, which becomes blackish on the anterior; tibiæ and tarsi on the inside and beneath with a shining thick short appressed yellow down; tips of the femora, base and tips of the coxæ yellow; the fore and middle tibiæ often with a black ring in the middle, the remainder being yellow; the anterior sometimes with the inside entirely yellow; the middle part of the hinder tibiæ sometimes brown; tarsi, on the outside, brownish, duskier towards the

tip, with the apices of the joints narrowly, and the inside, yellow; in some instances the fore and middle tarsi are almost yellow, and the hinder have only a fuscous patch on the outside in the middle of each joint; in dark specimens the tips of the tibiæ are concolorous, and the tarsi are blackish externally; poisers yellowish, covered by the white wing-scales, which are ciliated; wings glossy, brown nerved, the costa darker; stigma yellowish tawny; length, 4 lines; expansion of the wings, 6 lines. The fly occurs in meadows about the beginning of June.

This is the only species that I have succeeded in rearing; but if inferences may be drawn from larvæ, there are others of similar habits. A smaller kind often bores into the centre of the primrose and polyanthus *(Primula vulgaris)*, eats out the heart, and then descending into the root-stock, frequently destroys the plant. Another, considerably larger, occurs in the interior of the stem of the marsh thistle *(Cnicus palustris)*,* where eaten by a flesh-tinted lepidopterous caterpillar. This, I am persuaded, occasionally at least, preys upon the caterpillar; for, having enclosed several in a close box, along with some of the caterpillars, the latter had all disappeared next morning, whilst the maggots were as numerous as before. In both these instances the maggots pined away, without being converted into pupæ.

This article, written many years since, would be incomplete without reference to a paper on the "Metamorphoses of Diptera," in the "Nat. Hist. Review" for 1857, communicated to me by my friendly correspondent, the late A. H. Haliday. From this it appears that the transformations † of another species of *Cheilosia (C. scutellata)* have been traced. See Dufour, Ann. Sc. Nat. xiii. 1840, ix. 1848. Roser, Würtemb. Zroeyf. Ins. Boje, Ent. Zeit. Stet. xi. 1850. Perris, Ann. Soc. Ent. France.

Oldcambus, by Cockburnspath.

* Zetterstedt (*op. cit.*, *supra* xii. 4664,) says of *C. flavicornis* F., "*Larvæ mensibus autumnalibus vivunt devorantes in caulibus* CARDUI CRISPI, *ubi mox supra radices degunt, teste* BOIE, *Stett. Ent. Zeit.*, 1850, 212."—EDITOR *Sc. Nat.*

† In putrescent *Boleti, fide* Leon Dufour.—EDITOR *Sc. Nat.*

Cynips lignicola.—This has during the present season advanced five miles farther northward on the Berwickshire coast, and has now reached the confines of East Lothian. The galls are now plentiful on the outskirts of Penmanshiel wood and the Pease dean. A new centre of distribution has been discovered in the west of Scotland, on the oaks at Underwood, near Dunoon, a villa belonging to Mr. William Dickson, Alnwick, who has sent me authentic examples. From its smoothness and durability the gall is suitable for ornamental fancy work, and I have already, in the country, seen it employed, along with acorns, to decorate pine-scale picture frames. I am informed that similar advantage has been taken of it in London; thus furnishing a ready means for a general dispersion of the gall-fly.—JAMES HARDY, Oldcambus, March, 1872.

Corrections to List of Birds found near Rosslyn.—In sending you my few notes anent the birds of Rosslyn, I made a mistake, owing to some people calling when I was at work. I think the Jacksnipe *(Scolopax gallinula)* may breed on the Pentland Hills, but I *have not* myself seen eggs. I did so, however, several times at Auchterhouse, Forfarshire, where we used to reside. I never took the eggs, but have shot the young birds. That is now thirty years ago.—J. W. WEDDERBURN, Liberton House, by Edinburgh, 4th Jan., 1872.

—I think Colonel Wedderburn has made two or three mistakes in his list of birds found at or near Rosslyn. You have noticed the statement that the *Jack-snipe* breeds there. I feel convinced that this assertion is erroneous, and I think the same mistake is made about the *Fieldfare* and *Redwing*, the former always builds in society, and I do not think there is a single well-authenticated instance of this bird having bred in this country. The *Missel Thrush* is constantly mistaken for it, and the *Song Thrush* for the *Redwing*. The latter end of last October a large flock of *Missel Thrushes* appeared here. A service tree stands in the field, about thirty yards from my garden and they soon devoured every berry; I believe there were frequently thirty or forty in the tree at once. This species is generally extremely shy and wary, but these birds were quite tame. There is a large yew tree in the garden which was loaded with fruit, and after they had eaten all the fruit of the service, they attacked the yew berries. One day I was standing with a friend within five or six yards of the tree, and in the course of a few minutes more than thirty of these thrushes came into it, and took no notice whatever of us. I have no doubt that they came from the continent.—HENRY DOUBLEDAY, Epping, Essex, 11th Jan., 1872.

—In looking over Col. Wedderburn's list of birds occurring at Rosslyn (*Sc. Nat.* 152), I perceive several species given as breeding there which, it strikes me, require verifying. Is there not some error regarding the following—*Fringilla spinus*, *Turdus pilaris*, *T. illiacus*, and *Scolopax gallinula?* Touching the first species I know it breeds in the forests here, but is it certain that it does so in the south of Scotland? With regard to the three latter species, I am aware that instances have been given of their nesting in Britain, but these on investigation have been, I believe, not verified with certainty. Many birds in the list are not mentioned as breeding, which certainly must do so wherever they occur. —G. NORMAN, Cluny Hill, Forres, January, 1872.

Wild Cats.—Have the specimens of the so-called "Wild Cats" recorded by Mr. Paton as having been killed at Badenoch been verified by a naturalist? I ask this because I believe that the true *Felis Catus* is now nearly extinct in Britain, and that the animals usually so-called are nothing more than semi-wild in-

dividuals of the domestic cat. These, after several years' freedom in the forest, assume very large dimensions, hence their being frequently confounded with the true *F. Catus*. The domestic cat (*Felis maniculata*), it is supposed, came originally from Egypt.—*Id.*

[I have seen the Wild Cat mentioned by Mr. Paton, and can assure Mr. Norman that it is really a specimen of the true *Felis Catus* and *not* a tame cat run wild. The other specimens mentioned, I believe, were also true Wild Cats.—EDITOR *Sc. Nat.*]

Early singing of the Chaffinch.—On the 16th January, while walking in the beautiful Cluny Hill woods I heard the cheerful and well known call of the Chaffinch (*Fringilla cælebs*). For upwards of thirty years I have paid attention to the earliest dates of the singing of this bird, both in England and the continent, but have never before heard it sooner than the beginning of February. —*Id.*

THE STALK-EYED CRUSTACEA OF THE NORTH-EAST COAST OF SCOTLAND:

*With Descriptions of new Genera and Species.**

BY GEORGE SIM.

THE following list includes the stalk-eyed crustacea hitherto found on the coasts of Aberdeenshire and Kincardineshires, from Banff to Stonehaven, but refers more particularly to the neighbourhood of Aberdeen. It is the result of several years' labour, in which it has been my practice to visit the sea-beach every morning, and also to search the fishermen's lines as they came to land, and, when time would permit, to go to the rock-pools on the Kincardineshire coast, where many of my best specimens have been got; the fishermen, too, brought me some of the larger kinds (whose habitat is the open sea) which it is their practice to cast overboard as useless. In addition, I regularly attended the fish-market, and examined the stomachs of cods and haddocks, in which several species have been found which would not have been obtained otherwise, unless by the dredge; but this latter mode of search I have never had time to prosecute sufficiently. I have no doubt, however, that if it were gone about in a proper manner the list would be very much enlarged.

In drawing up the list I have followed the arrangement of Professor Bell. In it will be found three species which I believe have not been before described. The first of these is a new species of

* A paper read before the Aberdeen Natural History Society.

the genus *Thysanoessa* of Brandt, which I have called *Thysanoessa aberdonensis*. The other two appear to belong to genera hitherto undescribed. I have therefore constituted for their reception the new genera *Rhoda* and *Acanthocaris*, placing in the first, *Rhoda Jardineana*, which species I have dedicated to that eminent naturalist, Sir William Jardine, Bart.; and in the second, *Acanthocaris Livingstoneana*, so named as a mark of my esteem for Dr. Livingstone for his indomitable courage and perseverance as an African traveller and discoverer. Specimens of each of these species are in my own collection, and in those of my friends, Messrs. Willis and Hodge, who have both rendered me valuable assistance in this work.

Let no one suppose that the work is completed. There is yet much to be done, but we require workers. Let, therefore, those who have spare time commence the study, and I will guarantee them a rich harvest and much pleasure.

In a complete list of British stalk-eyed crustacea I would place *Acanthocaris* immediately after the genus *Phyllosoma;* but in the case of *Rhoda* I have been unable to determine where it should appear. I have placed it provisionally after *Acanthocaris;* but regarding the position of both genera I am somewhat in doubt, and will leave their proper place to be determined by some one better qualified for the task.

It will be seen that several individuals are enumerated in the list whose specific names are not given. Although certain as to the genera of these, I have been unable to refer them to their proper species, as all have been discovered since the publication of Bell's "Stalk-eyed Crustacea," and their names and descriptions published in several periodicals which I have had no opportunity of consulting.

STENORHYNCHUS PHALANGIUM Bell.—Common.

STENORHYNCHUS TENUIROSTRIS Bell.—Occasionally in cods' stomachs.

INACHUS DORSETTENSIS Leach.—Very common in cods' stomachs and in fishers' lines.

INACHUS DORYNCHUS Leach.—Occasionally on sands and in rock pools.

HYAS ARANEUS Edw.—Very common.

HYAS COARCTATUS Leach.—Very common.

CANCER PAGURUS L.—Common.

Pirimela denticulata Leach.—Rare.
Carcinus mænas Leach.—Very common.
Portumnus variegatus Leach.—Frequent.
Portunus puber Leach.—Rather rare.
Portunus depurator Leach.—Rather rare.
Portunus marmoreus Leach. (?)—Rare.
Portunus holsatus Fabr.—Very common.
Portunus pusillus Leach.—Very common in cods' stomachs.
Ebalia Pennantii Leach.—Frequent in cods' stomachs.
Ebalia Bryerii Leach.—Occasionally in cods' stomachs.
Atelecyclus heterodon Leach.—Very common on fishers' lines and in cods' stomachs.
Corystes cassivelaunus Leach.—Very rare.
Lithodes maia Leach.—Frequent from deep water.
Pagurus bernhardus Fabr.—Very common.
Pagurus Prideauxii Leach.—Rare.
Pagurus cuanensis Thompson.—Rare.
Pagurus lævis Thompson.—Frequent in haddocks' stomachs.
Pagurus Thompsonii Bell.—Common in cods' stomachs.
Porcellana longicornis Edw.—Common.
Galathea squamifera Leach.—Very common in rock pools.
Galathea strigosa Fabr.—Very common in rock pools.
Galathea nexa Embleton.—Frequent in rock pools.
Galathea dispersa Spence Bate.—Frequent from fishers' lines.
Galathea Andrewsii Kinahan.— do.
Munida Rondeletii Bell.—Rare.
Callianassa subterranea Leach.—Frequent in haddocks' stomachs.
Gebia deltura Leach.—Frequent in haddocks' stomachs.
Homarus vulgaris Edw.—Common.
Nephrops norvegicus Leach.—Frequent in cods' stomachs.
Crangon vulgaris Fab.—Very common.
Crangon spinosus Leach.—Rare.
Nika edulis Risso.—Once cast on the beach; occasional in cods' stomachs.
Hippolyte Cranchii Leach.—Common in rock pools.
Hippolyte Whitei Thompson.—Rare.
Hippolyte, 2 *sp.*
Pandalus annulicornis Leach.—Frequent in cods' stomachs.
Pandalus *sp.*—One specimen found in cod's stomach.
Palæmon *sp.*— do. do.

ACANTHOCARIS *nov. gen.*

Externæ antennæ crassæ, primo segmento permagno; internarum antennarum pars inferior (ex tribus segmentis) longior eadem externarum antennarum parte, et duabus multi-articulatis appendiculis instructa. Pedes omnes monodactyli, a parte anteriore retrorsum decrescentes. Oculi conici, pedunculis brevibus validis impositi. Testa (sive clypeus dorsalis) a parte posteriore altissima, sulco tenui in dorso post regionem gastricam arata, septem spinis in margine posteriore armata, et ab anteriore parte in rostro obtuso decurvato desinens. Sternum quoddam post testam usque ad extremam secundi abdominis segmenti partem porrigitur; intra hoc sternum respirandi instrumenta locata sunt. Abdomen pæne cylindricum. Telson (sive lamella caudalis media) bifurcatum, utroque aculeo spina valida immobili instructo, armatum senis mobilibus spinis per utrumque latus dispositis.

External antennæ thick, first segment very large; basal portion of the internal antennæ longer than that of the external, and furnished with two multi-articulate appendages. Feet wholly monodactyle, decreasing from before backwards. Eyes conical, set on short stout foot-stalks. Carapace deepest posteriorly, with a slight furrow on the dorsal aspect behind the gastric region, and armed with seven spines on the posterior margin, and terminating anteriorly in an obtuse decurved rostrum. A sort of sternum extending behind the carapace to the extremity of the second abdominal segment, within which sternum the respiratory organs are placed. Abdomen nearly cylindrical. Telson bifurcate, each point armed with a strong immovable spine, and six movable spines along each side.

Acanthocaris Livingstoneana *n. sp.*

(Plate IV., Fig. B.)

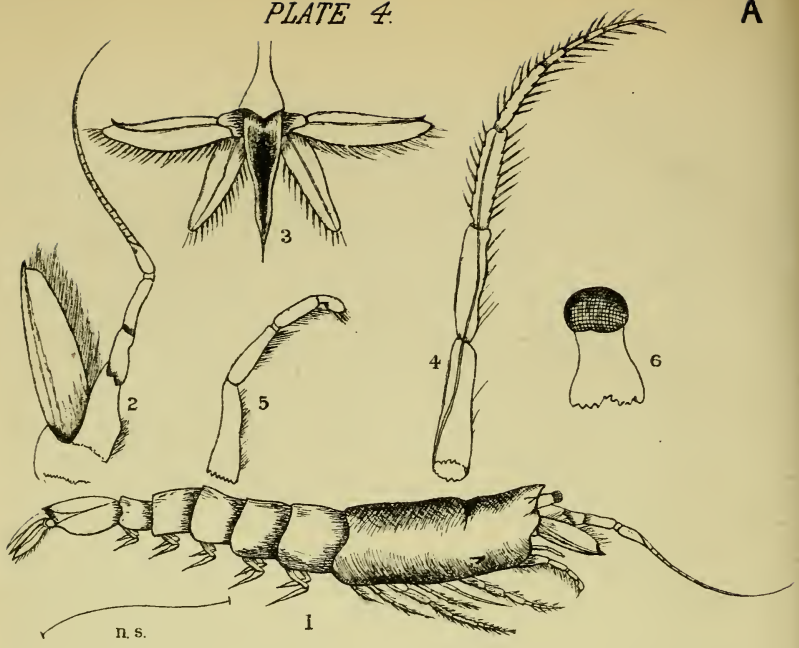
Carapace.—Smooth, with a slight transverse hollow on the dorsal aspect, and armed with seven sharp spines on the posterior margin. *Rostrum.*—A single depressed rather obtuse spine bent down between the eyes. *Eyes.*—Conical, covered with a sort of cap in front, and about one third longer than their short stout peduncles, the whole extending slightly beyond the joint of the antennal scale. *External antennæ.*—With the first segment three-fourths the length of the scale, rounded and slightly swelled in the centre; second, one-third the length of the first, movable portion stout at the base but becoming abruptly slender. As it was imperfect I cannot give its

exact length. *Antennal scale.*—Semi-ovate and furnished with a sharp spine at the extremity of its outer margin, whose inwardly bent point extends somewhat beyond the scale itself, which is ciliated on its inner margin and around the point to the base of the spine. *Internal antennæ.*—Inserted directly above the external antennæ; first segment long and stout; second, one-third the length of the first, and furnished with three spines on its outer margin; the two segments nearly reaching the base of the movable portion of the external antennæ; third, one-third longer than the second; movable portion and its filament broken, therefore I cannot give the length. *External pedipalps.*—Two pairs, both pediform; the internal pair terminating in an obtuse, slightly knobbed tip. *Feet.*—Simple, getting shorter from before backwards. The first pair robust, with the terminal segment not multi-articulate as in the succeeding pairs, the whole ciliated on their anterior margins, their filaments being ciliated on their posterior margins. *Abdomen.*—First five segments cylindrical; the sixth compressed on the dorsal edge (a transverse section would appear as a triangle with the lower corners slightly rounded); the last segment cylindrical, and somewhat swelled in the centre; the first two segments lie in a sort of sternum, which is composed of four pieces and within which are placed the respiratory organs, composed of numerous long filaments, along which are placed many minute cilia. Between the sixth and seventh segments there is a tuft of softish spines on the dorsal aspect. *Tail.*—Telson *depressed*, bifurcated, with six movable spines on each side, and one immovable at each extremity. Lateral laminæ lanceolate, the outer ones ciliated all round, but on the outer margin the cilia become shorter and stouter (might be called spines), the inner ones but half the breadth of the outer, ciliated on their inner margin and for one-third of the outer. The body is of a rather clear opaque white throughout; and when at rest the tail is turned under the body at the junction of the fifth and sixth abdominal segments.

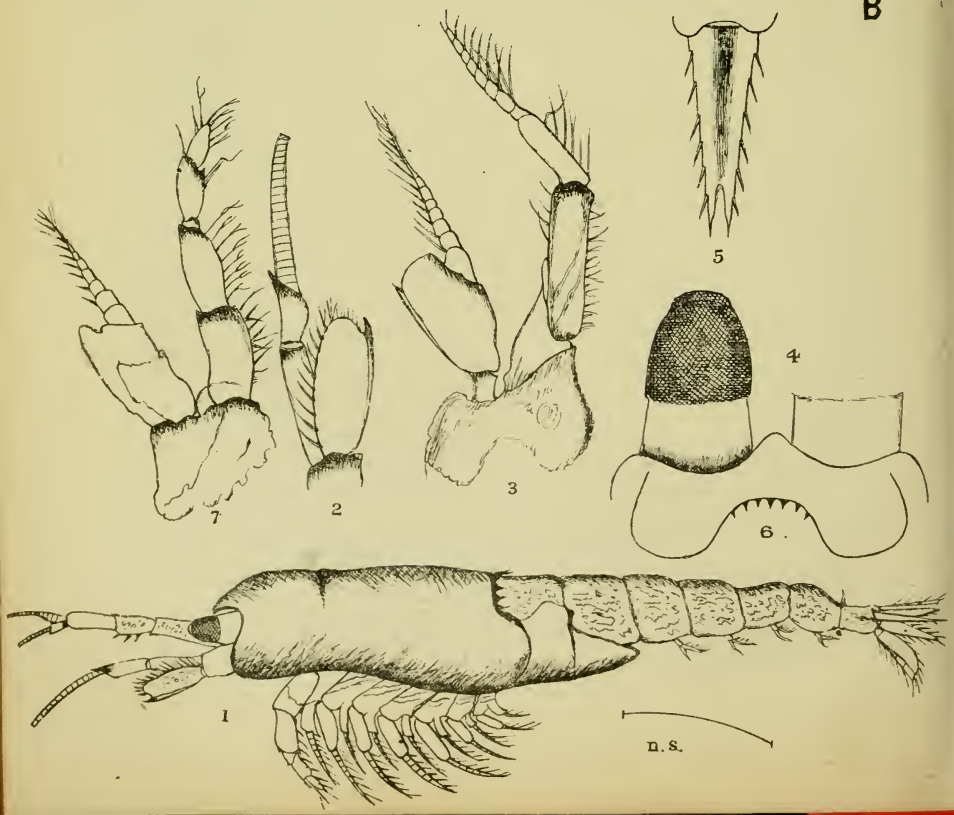
Three specimens are all that have been got of this species, and these were found on the sands at high water mark. The first one was alive and lived a whole day without water, shewing a tenacity of life much beyond what is usually observed in creatures of this order.

PLATE 4.

A



B



RHODA *nov. gen.*

Externæ antennæ modice crassæ, parte mobili extra curvata. Externi pedipalpi pediformes. Pedes omnes monodactyli; eorum par primum ceteris paulo crassius, et par quartum longitudine vix æquans; at horum utrumque est aliquanto longius paribus secundo, tertio, et quinto. Oculi orbiculares, pedunculis sublongis tenuibus impositi. Testa cylindrica, a parte anteriore in brevi obtuso rostro desinens; in testa prope utrumque foramen oculare, et in utroque latere recta primi pedum paris regione singulæ spinæ locatæ sunt. Abdomen cylindricum, præter ultimum segmentum, quod admodum compressum longius et altius est segmento pænultimo. Telson lanceolatum, in valida, acuta spina desinens.

External antennæ of moderate thickness, movable portion curved outwards. External pedipalps pediform. Feet wholly monodactyle, first pair rather thicker than the others, and somewhat shorter than the fourth pair, both being considerably longer than the second, third, and fifth. Eyes circular, set on rather long slender foot-stalks. Carapace cylindrical, terminating anteriorly in a short obtuse, rostrum, with a spine near each orbit, and one on each side in a line with first pair of feet. Abdomen cylindrical, excepting the last segment, which is very much compressed, and longer and deeper than the one preceding it. Telson lanceolate, terminating in a strong, sharp spine.

RHODA JARDINEANA *n. sp.*

(Plate IV. *fig.* A.*)*

Carapace.—Smooth, with a small tooth on each side in front of the insertion of the first pair of feet. Two spines directed upwards and forwards, one above each orbit. *Rostrum.*—A single compressed spine, directed slightly upwards. *Eyes.*—Rounded, slightly larger than the peduncles, which are cylindrical and about a-fourth the length of the antennal scale. *External antennæ.*—With the first segment half the length of antennal scale, depressed. Second and third segments extending together a little beyond the end of antennal scale, movable portion slender, bent abruptly outwards, and half of the length of the body, from the rostrum to the extremity of the central plate of tail. *Antennal scale.*—Lanceolate, terminating in a minute spine, ciliated on the inner margin. *Internal antennæ.*—Inserted outside and below the external, nearly two-thirds of the length of the first segment of external antennæ; cylindrical, termi-

nating abruptly as if broken off (or rudimentary?) *External* First and second segments short and cylindrical; third ovate, depressed, and longest; fourth similar but smaller. The whole furnished with bristles. *Feet.*—First and fourth pairs robust and much depressed; the fourth longer than the first; second, third, and fifth of equal length, and somewhat more than half the length of the fourth; sixth about one-third the length of the fifth. All are monodactyle, and furnished with bristles on their margins. *Abdomen.*—Cylindrical, excepting the last segment, which is greatly compressed, and longer and deeper than any of the rest. *False-feet.*—Long, ciliated, decreasing in length backwards, and furnished with filamentous ciliated appendages. *Tail.*—Telson *compressed*, grooved above, and rounded at the extremity, which is armed with a sharp spine; lateral laminæ longer than the central-plate, lanceolate, ciliated on their inner margins, the outer ones longest, and rounded at the apex, near to which is a *short* spine on its lateral margin.

Only one individual of this species has as yet been found. It was left by the tide at high-water mark, and when found it was of a highly polished opaque white throughout.

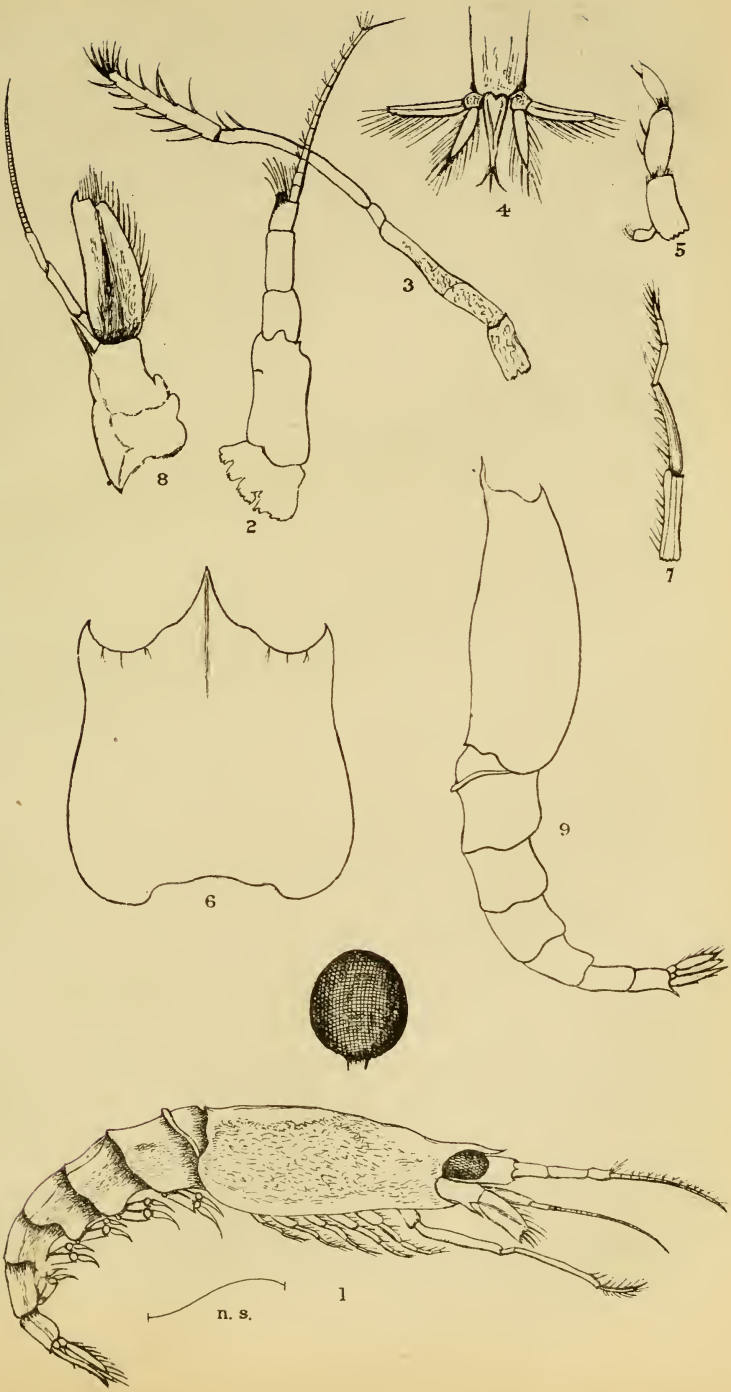
Mysis chamæleon J. V. Thompson.—Very common.
Mysis vulgaris J. V. Thompson.— do.
Mysis spiritus Norman.—Frequent.
Mysis *sp.*
Thysanopoda couchii Bell.—Common, cast on beach.
Thysanoessa borealis Norman.—Frequent on sands.

Thysanoessa aberdonensis, *n. sp.*

(Plate V., Fig. 1.)

Carapace.—Smooth, lateral margins terminating in a spine anteriorly, posterior margin roundly indented. *Rostrum.*—Straight, with a ridge along the median line, which forms the point of the rostrum. *Orbits.*—Open above. *Eyes.*—Large, set on short and very slender peduncles, which do not extend beyond the orbits. *External antennæ.*—First segment nearly one-fourth the length of the antennal scale; second and third, somewhat over three-fourths the length of the scale; movable portion, including the three segments, twice the length of the

PLATE 5.



antennal scale. *Antennal scale.*—Ciliated on its inner margin and at the apex, which has a small spine on the outer margin. There is also a long sharp spine at the base of the scale. *Internal antennæ.*—Inserted within, and on the same line with, the external antennæ ; longer and much stronger than the external ; movable portion ciliated on its inner margin, and furnished with a tuft of cilia at the extremity, and another at its base. *External pedipalps.*—Stout and pediform. *Feet.*—First pair very long ; last segment armed with about twenty long movable spines, arranged along each side and at the apex, and two on wrist ; remaining pairs gradually becoming shorter backwards. *Abdomen.*—Nearly cylindrical, narrowing rapidly towards the tail. *Tail.*—Telson spear-shaped, with a movable spine on each side, near the apex, and sometimes two spines on its upper surface ; *outer lateral laminæ* broad, truncate, ciliated on the inner margin ; *inner lateral laminæ*, narrowing to an obtuse point, ciliated all round.

Figure 9 (Plate V.) is the same as Figure 1, with this difference, that the last abdominal segment is furnished with a strong, sharp, recurved spine above its junction with the telson, which has always two spines on its median line, while *aberdonensis* generally wants them. These differences I do not think sufficient to warrant its being put down as a distinct species. It may, however, be a sexual distinction ; but this has yet to be determined.

This species *(aberdonensis)* is found in considerable abundance on our sandy beach, in the months of March and April, along with *T. borealis*, a species named by the Rev. A. M. Norman, for the identification of which I am obliged to that gentleman. The principal difference between *T. borealis* and *T. aberdonensis* is in the first pair of feet, which in *T. borealis* are terminated with from eighteen to twenty long sharp spines, all proceeding from the extremity of the limb : while in *T. aberdonensis* eighteen spines are arranged along the sides of the last segment of that member, and two more placed on the wrist. The body and rostrum also differ in the two species.

LOPHOGASTER TYPHICA Sars.—Occasionally cast on the beach.

In addition to the foregoing list I append the following

species, taken from the "Banffshire" list, as given by "W." in vol. v. of the "Naturalist," 1855 :—

INACHUS LEPTOCHIRUS Leach.
EURYNOME ASPERA Leach.
PINNOTHERES PISUM Leach.
PORTUNUS LINEPPES.

And he also adds POLYBIUS HENSLOWII Leach., "on the authority of the fishermen."

EXPLANATION OF PLATES IV. & V.

Plate IV. A. 1, **Rhoda Jardineana.**—2, External antennæ ; 3, tail ; 4, one of first pair of feet ; 5, external pedipalps ; 6, eye.

Plate IV. B. 1, **Acanthocaris Livingstoneana.**—2, External antennæ ; 3, second and succeeding pairs of feet ; 4, anterior margin of carapace and eye ; 5, telson ; 6, posterior margin of carapace ; 6, one of first pair of feet.

Plate V. 1, **Thysanoessa aberdonensis.**—2, Internal antennæ ; 3, one of first pair of feet ; 4, tail ; 5, external pedipalps ; 6, carapace ; 7, form of second and succeeding pairs of feet ; 8, external antennæ and scale ; 9, supposed additional species.

LIST OF HYDROID ZOOPHYTES FROM THE NORTH-EAST COAST OF SCOTLAND.

THE following list of Hydroid Zoophytes has been made up from specimens collected on the north east coast, from the town of Peterhead to the Sands of Cruden, and from a point about three miles north of the river Don to several miles south of the mouth of the river Dee. Part of this extent of coast is sandy, but the greater part is rocky.

For the notice of the occurrence of many of the species I am indebted to the kindness of the Rev. J. Yuil of Peterhead.

I have followed the nomenclature of Hincks.

HYDRACTINIIDÆ.—Hydractinia echinata, frequent on *Buccinum undatum.*

CORYNIDÆ.—Coryne pusilla, not uncommon ; *Syncoryne eximia*, very common.

EUDENDRIIDÆ.—Euaendrium rameum, not uncommon ; *Eudendrium ramosum*, common ; *Eudendrium capillare*, frequent.

ATRACTYLIDÆ.—Bougainvilla ramosa, common.

TUBULARIIDÆ.—Tubularia indivisa, common ; *T. larynx*, common ; *T. coronata*, not so common ; *T. bellis*, not uncommon ; *T. simplex*, rather uncommon.

PENARIIDÆ.—Vorticlava proteus, one specimen.

CAMPANULARIIDÆ.—Clytia Johnstoni, several specimens. *O. geniculata*, common ; *O. gelatinosa*, common ; *O. longissima*, common ; *O. dichotoma*, common ; *O. flabellata*, not uncommon ; *O. plicata. Campanularia volubilis ; C. caliculata*, not common, on red weed ; *C. verticillata ; C. integra*, Don mouth, Dr. Macgillivray ; *C. flexuosa*, common.

LAFOEIDÆ.—Lafoëa dumosa, not uncommon ; *L. fructicosa* (?), one specimen.

COPPINIIDÆ.—Coppinia arcta, one specimen.

HALECIIDÆ.—Halecium labrosum, common ; *H. Halecinum*, not uncommon ; *H. Beanii*, not common ; *H, muricatum*, common ; *H. plumosum*, common. *Ophiodes mirabilis* (?) one specimen.

SERTULARIIDÆ.—Sertularella polyzonias, common ; *S. Gayi*, not uncommon ; *S. rugosa*, very common ; *S. tenella*, C. W. Peach. *Diphasia pinaster*, uncommon ; *D. rosacea*, common ; *D. attenuata*, C. W. Peach ; *D. fallax*, very common ; *D. tamarisca*, common. *Sertularia pluma* (?) ; *S. pumila ; S. gracilis ; S. operculata*, common ; *S. filicula*, common ; *S. abietina*, common ; *S. argentea*, common ; *S. cupressina*, common ; *S. fusca*, not common. *Hydrallmania falcata*, several specimens. *Thuiaria thuia*, common ; *T. articulata*, not so common.

PLUMULARIIDÆ.—Antennularia antennina, common ; *A. ramosa*, common. *Aglaophenia myriophyllum*, not common ; *A. pennatula*, very rare. *Plumularia setacea*, a few specimens ; *P. Catharina*, not uncommon ; *P. obliqua*, rare—one specimen on a sponge ; *P. frutescens*, common,—fishermen's lines. *Hydra viridis*, fresh water, common ; *Hydra vulgaris*, fresh water, common.

H. O. Forbes, Aberdeen, February, 1872.

Scottish Spiders.—During the winter months, November and December, I made a small collection of spiders, in this vicinity, for the Rev. O. P. Cambridge, the well-known arachnologist, who has kindly furnished me with a report, which I hope will subsequently be enlarged. The following are new to Berwickshire, and either unrecorded for Scotland, or of rare occurrence :—*Clubiona reclusa*, Cambr. ; *Theridion signatum ; Linyphia ericæa ; L. circumspecta ; L. gracilis* (?) ; *L. crypticolens ; L. decolor*, Westring ; *L. cauta ; L. spec. nov.* (Pease dean) ; *Walckenæra nemoralis ; W. depressa ; W. nudipalpis*, Westring ; *W. punctata ; Epeira prominens*, Westring ; *E. bella*, Meade. The last is a pretty species, and is sparingly distributed in England. I find it in the Pease dean, among withered leaves of wood-rush (*Luzula sylvatica*) overhanging low banks.—James Hardy, Oldcambus, by Cockburnspath, 7th March, 1872.

PHYTOLOGY.

DESCRIPTION OF A SCOTTISH VENTURIA *(FUNGI SPHÆRIACEI)* NEW TO SCIENCE.

By M. C. COOKE, M.A.

Venturia atramentaria *n. sp.*—Hypophyllous, gregarious, forming irregular patches upon discoloured spots. Perithecia subglobose, clad with short, dense, patent hairs, black. Asci cylindrical; sporidia uniseriate, elliptic (immature).

On the under-surface of living but fading leaves of *Vaccinium uliginosum:* Lochnagar, Sept., 1871 (Buchanan White).

This species differs from *Venturia myrtilli* in the larger perithecia, shorter and denser hairs, and in its gregarious habit, since it forms small but black patches on the green leaves, at once recognised by the naked eye, whereas the scattered perithecia of *V. myrtilli* can scarcely be seen without a lens. The affinities of *V. atramentaria* are rather with such species as *V. Dickiei.*

London, February, 1872.

SCOTTISH GALLS.

By J. W. H. TRAILL, M.A.

(Concluded from p. 159.)

Salix aurita L.—Somewhat like *(b)* on *S. caprea.*

Salix repens L.—Galls red and very conspicuous on the upper surface. Form irregular, size small. Frequently several on a leaf. Each contains one hymenopterous larva. On a few plants in Braemar.

Salix nigricans Sm.—The galls are green, smooth, and oval in shape. They occur in pairs, one on each side of the

midrib. Each contains one saw-fly larva. They are common at the upper end of Glencallater, in Braemar.

SALIX VIMINALIS L.—The galls are marginal, consisting of the revolute edges of the leaf, which become fleshy and hard. Externally they are yellowish, smooth, and shining. Each separate gall is about ¼-inch in length, not more than $\frac{1}{12}$-inch in breadth, but usually a number are placed end to end. Each contained a larva of *Cecidomyia marginem-torquens* (?) Very abundant on one stunted bush near Old Aberdeen.

SALIX LAPPONUM L., var. *Stuartiana* Sm., and var. *arenaria* Sm.—The galls in form and position resemble those on *S. nigricans;* but are light greenish-yellow, and downy. They, like the last, occur in pairs. Each gall contains one hymenopterous larva. Common at the head of Glencallater.

SALIX ARBUSCULA L.—The galls are in pairs, as in the last two species, but they are rounder, and project more from the leaf. The surface is smooth. Each contains one hymenopterous larva. I have found these galls on one plant on Little Craigandal, in Braemar.

QUERCUS ROBUR L.—*(a)* Galls occur on the chief veins of the leaves on the lower surface. The shape is a flattened sphere, $\frac{1}{11}$-inch to ¼-inch in diameter. Colour light green or reddish. Surface smooth. Structure woody; walls rather thin. Contain each one hymenopterous larva. Usually several occur on a leaf, but they are not very common. *(b)* Artichoke gall, much resembling an artichoke on a small scale. It seems to be a diseased development of an acorn-cup, and contains a small diseased acorn, inside which is one white larva. The gall is always sessile, usually axillary, and single, but sometimes terminal, and then in twos. Length about 1 inch, breadth about ⅝-inch. About Banchory abundant on one tree, scarce on others. *(c)* On the blade or footstalk of the leaf; if on the footstalk, it remains attached when the leaves fall off. The form is very irregular, projecting both above and below the leaf; about the size of a pea. The surface is naked, smooth, and yellowish-green above, like the leaf below. Structure hard and woody, retaining its form when dried.

The galls are monothalamous, and the opening is made above or below indifferently. One stunted bush at Banchory was perfectly covered with them. I have met with them nowhere else.

ALNUS GLUTINOSA L.—(*a*) On the leaves, exclusively on the upper surface. Gall irregularly cone-shaped, attached by the apex, and about $\frac{1}{10}$-in diameter. The surface naked, but not smooth. Colour light reddish-yellow. Monothalamous, the cavity being proportionally large. Sometimes there are large numbers scattered irregularly over a leaf. (*b*) The galls (?) occur on the leaves where the side-veins branch off, and are chiefly conspicuous above as green or reddish knobs about $\frac{1}{10}$-inch in diameter, and usually in pairs along the midrib. The surface naked and wrinkled. Below they are open and with short hairs along the midrib and veins for some distance from the opening. I never could find an occupant.

ABIES COMMUNIS L.—The galls occur very abundantly on the young branches, forming swellings at the base, rarely at their tip. They consist of a mass of fleshy scales (seemingly modified leaves) closely overlapping, as the scales do in a cone, and leaving between them small cavities containing large numbers of purplish *homoptera*. After a time the gall becomes dry and hard, and the scales gape open. The size varies from about $\frac{1}{4}$-inch to 1 inch in length, and $\frac{1}{6}$-inch to $\frac{2}{3}$-inch in diameter.

JUNIPERUS COMMUNIS L.—The galls are on the young branches, and are terminal; they consist externally of 3 scale-like leaves (perhaps a diseased development of the fruit) which close together along the sides, leaving an opening at the apex; inside are three similar, but smaller leaves which enclose the cavity for the larva. The gall is green, smooth, and triangular, each side being about a $\frac{1}{4}$-inch broad. It retains its size and form when dry. The larva is that of *Hormomyia juniperina* L. It is very common in Braemar, scarce at Banchory.

TRITICUM REPENS L.—The gall is on the stem, and is due to a diseased state of the chief stalk, causing it to swell out laterally, and remain stunted; it emits several leaves and

consists of very short leaves or scales overlapping, so as to enclose a long narrow cavity. The gall varies from about ½-inch to 1½-inch in length, but I have never found it exceed ¼-inch in breadth. It is often a foot or 18 inches from the ground. The larva is hymenopterous. Not uncommon.

TRITICUM JUNCEUM Auct.—The gall is similar in structure to that on *T. repens*, but differs from it in the following respects, viz.—it is broader for its length, it is less apt to emit leaves, and is seldom more than an inch or two above the ground. The occupant is a white hymenopterous larva. The gall is very abundant on sand hills near Aberdeen.

EQUISETUM *sp.*—I once found attached to a creeping root of *Equisetum* flask-shaped excrescences of a black colour, and about the size of a pea. They were, however, empty, and I have not since met with more.

The following notes are supplementary to the first part of this paper, being descriptions of some galls since found by me, and also the names of the gall-makers, as far as I have been able to ascertain them with any certainty.

BRASSICA OLERACEA L., *forma acephala.* Kail.—The galls are on the stem at the ground, and consist of irregular swellings grouped together, each separately being about ¼-inch in diameter. Each is monothalamous, and the cavity is irregular in form. The walls are of moderate thickness, soft and tough, and externally wrinkled, and coloured like the root. Found by Mr. Sim, in February.

CYTISUS SCOPARIUS Link.—The gall consists of a diseased state of the pod, which remains green, fleshy, and stunted; part of it bulges out, forming a pretty large oval cavity, while the rest of the pod is flat. Externally the swelling is oval, about ¼-inch by ⅛-inch, and the walls are rather thin. No trace of seeds remain. All the galls found by me (in September) were empty. Not uncommon at Banchory.

TRIFOLIUM REPENS L.—The gall consists of a leaflet, which is folded so that the upper surface forms the interior of the gall. The part of the leaflet next the gall becomes swelled and hardened, and slightly yellowish in colour. Each contains one reddish or white dipterous larva. Usually only

one of the three leaflets is affected, sometimes two. These galls are very common at Old Aberdeen.

PRUNUS COMMUNIS Huds.—*(a)* Galls very much like those on *P. padus*, but stouter.

SPIRÆA ULMARIA L.—The maker of the galls on this plant is *Cecidomyia ulmariæ*, Bremi. They are cone-shaped, the apex projecting below the leaf; colour usually green or yellowish.

QUERCUS ROBUR L.—In December last, while visiting Dr. Buchanan White in Perth, we found several galls on oaks, on Kinnoul Hill, distinct from those which I have found in the Aberdeen district, and I therefore subjoin their descriptions, premising that these are taken from the dry galls. *(d)* "Silky-button gall," on the under surface of the leaves, several being on each leaf. They are of small size, round, depressed considerably above, and flattened below, and present a silky appearance, being covered with silky hairs lying flat along the sides, from above downwards, like a silk covered button. Structure woody and monothalamous, the walls being thinnest next the leaf. Formed by *Neuroterus numismatis*, Oliv. *(e)* The oak-spangle galls were very common on the under surfaces of oak leaves. They are round, seldom over ⅛-inch in diameter, and form a very low cone, the margins being almost flat. The gall is covered over with tufts of reddish brown pubescence on its outer surface; and has a single very shallow cell. The maker is *Neuroterus lenticularis*, Oliv.

In addition to these I also got several galls about the size of "marbles" on twigs of young oaks on Kinnoull, and which seem to belong to two or three different species, but as I am in some doubt about them, I refrain from describing them till the insects emerge.

The following list enumerates the species which form some of the galls formerly described by me, as far as I have been able to identify them:—On *Rosa spinosissima* L., by *Rhodites spinosissimæ*. On *Rosa canina* L. (*a*) Bedeguar, by *Rh. rosæ* L.; (*d*) by *Rh. eglanteriæ* H. On *Hieracium boreale* Fries., by *Aulax sabaudi* H. On *Fraxinus excelsior* L., by *Diplosis*

botularia, Winn. On *Salix fragilis* L., by *Nematus salicti* Fallén.

In conclusion, I would refer students of this subject to a paper on "British Gall-Insects" in the Entomologists' Annual for 1872, by Mr. A. Müller, both on account of the information about galls in the paper itself, and of the references given by him. Let us hope he will soon find himself able to begin his promised descriptive list of British galls.

Betula.—I have three specimens of a *Betula* from Ben Avon, Braemar, and Ben Vachart near Struy (J. Hall), which do not well accord with our recognized species, and I have long since labelled them *B. intermedia* or *B. humilis*. Colonel Brown of Thun, Switzerland, an excellent authority, named a plant of Dr. Balfour's from Clova, *B. intermedia* (Mag. Nat. Hist., ser. 2. i. 447); and I have long expected that in some of the mountain excursions of the Edinburgh professor, we should hear again of the plant. I am as unable as ever to name my specimens, which I have had since 1839 and 1842, and wish to direct the special attention of botanists who visit the Scottish Highlands to the small shrubby forms of *Betula* to be found there. Mr. H. C. Watson (Comp. Cyb Brit. 560) speaks of the plants as "error" but does not give his reasons either there or in Cyb. ii. 382, or iii. 507. The plants have nothing to do with my attempted split of *B. nana* adverted to in the same place.—C. C. BABINGTON (in Journal of Botany, new series, vol. I., March, 1872.)

VARIOUS NOTES.

Mr. M. C. Cooke, the accomplished mycologist, announces his intention, should he meet with sufficient support, of publishing a monthly magazine entirely devoted to cryptogamic botany. In conducting this magazine—for which the appropriate name "*Grevillea*" is proposed—Mr. Cooke will be assisted by various specialists—Dr Lauder Lindsay, Dr Braithwaite, &c. It is to be hoped that Mr. Cooke will be enabled to carry out his laudable plan.

Of Messrs. Sharpe and Dresser's work on the "Birds of Europe," several numbers have appeared since we last noticed it. The articles on the Hoopoe and Little Stint are especially noteworthy for their elaborateness and the amount of careful study that they display.

Entomologists, whose range of ideas extends beyond the confines of Britain, will find all the latest intelligence regarding their favourite science duly chronicled in the "*Petites Nouvelles Entomologiques*" which, under the editorship of M. E. Deyrolle (19 Rue de la Monnaie, Paris), appears on the 1st and 15th of each month. French entomologists are at present laudably engaged in raising funds to assist in "*la liberation du territoire*" from the occupation of the Germans.

Another French periodical which may interest some of our readers is the "*Feuille des Jeunes Naturalistes*," edited by M. E Dollfus, (29 Avenue Montaigne, Paris). This contains articles in various branches of natural history.

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 168.)

EDITED BY F. BUCHANAN WHITE, M.D.

PAPHIA L. Rare or local. Nemoral.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o Clyde o o o

LAT. 56°-56°30″ RANGE IN EUROPE. Nearly throughout.
TYPE. European. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. August-June. FOOD-PLANT. Violet (*Viola sylvatica*). *Paphia* is rather less northern in its European range than *Adippe*. Several other species of the genus, being both alpine and boreal, might occur, *e.g.*, *Pales* S.V., and *Niobe* L.

VANESSA Fab.

URTICÆ L. Abundant. Agrestal. Ascends to nearly 4000 feet. Larvæ seen at 1100 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde Argyle West-Ross ♀

LAT. 54°50″-57°50″ RANGE IN EUROPE. Throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June-June. LARVA. June-August. FOOD-PLANT. Nettle. Only single-brooded in elevated districts.

IO L. Not common in the south; rare in the north. Agrestal.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee Moray o o o
WEST. Solway Clyde Argyle o o

LAT. 54°50″-57°40″. RANGE IN EUROPE. Nearly throughout.
TYPE. European. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. August-May. LARVA. June-July. FOOD-PLANT. Nettle.

ANTIOPA L. Very rare. Agrestal?

DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. Solway Clyde o o o

LAT. 55°10″-56°40″. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. August-May. LARVA. June-July. FOOD-PLANT. Willow, Nettle, Birch.

PYRAMEIS Hub.

ATALANTA L. Common. Agrestal. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♂
Orkney o
WEST. Solway Clyde ♀♂ West-Ross o

LAT. 54°40″-59°10″. RANGE IN EUROPE. Nearly throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE. August-June. LARVA. July-August. FOOD-PLANT. Nettle.

CARDUI L. Occasionally common. Agrestal. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♂
Orkney o
WEST. Solway Clyde ♀♂ West-Ross o

LAT. 54°40″-59°10″. RANGE IN EUROPE. Nearly throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. August-June. LARVA. July-August. FOOD-PLANT. Thistle *(Carduus arvensis,* &c.*)*.

SATYRIDÆ HS.

PARARGE Hub.

ÆGERIA L., var. *Egerides* Stgr. Local. Rare in the north. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee o o o o
WEST. Solway Clyde Argyle o o

LAT. 55°-57°20″. RANGE IN EUROPE. Central, northern (except the boreal regions) and south-western. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. April, May; July, August. LARVA.

June; September, October. FOOD-PLANT. Grasses. The var. *Egerides* differs from the typical *Ægeria* (which is South European) in having the pale markings light ochreous and not yellow. Some authors consider the southern form to be the var. *Meone* Esp., but Dr. Standinger thinks that it is the *Ægeria* of Linnè.

MEGÆRA L. Common in the south. Agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. Solway Clyde o o o

LAT. 54°40″-56°40″. RANGE IN EUROPE. Nearly throughout.
TYPE. European. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. May; June-August. LARVA. June, July; September-March? FOOD-PLANT. *Dactylis glomerata* and other grasses. This species, which was formerly common in the Tay district, has disappeared of late years.

SATYRUS Fab.

SEMELE L. Common, but only so near the sea in the north. Rupestral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde Argyle ♀ o

LAT. 54°40″-57°40″ RANGE IN EUROPE. Nearly throughout.
TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June-August. LARVA. August-May. FOOD-PLANT. Grasses.

EPINEPHELE Hub.

JANIRA L. Common, except on the mountains. Pascual. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°40″-57°50″. RANGE IN EUROPE. Nearly throughout.
TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June-August. LARVA. July-June. FOOD-PLANT. Grasses.

Var. (and ab.) *splendida*.—Larger and brighter coloured; the apical spot of the front wing with two white dots.

Found by Mr. A. Davidson in the island of Longa, on the west coast of Rossshire. Mr. Davidson informs me that it is very plentiful in the island, and that it is the only form occurring there. Occasionally in Aberdeenshire (J. W. H. Traill). I have taken this variety in the island of Capri near Naples.

TITHONUS L. Local and not common. Pascual ?

DISTRIBUTION—EAST. o o Tay o o o o o o
WEST. o Clyde West-Ross.

LAT. 55°30″-57°50″. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. August-June. FOOD-PLANT. Grasses.

HYPERANTUS L. Common, except in the north. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee ♀ o o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°50″-57°40″. RANGE IN EUROPE. Central and northern (except the polar regions). TYPE. Centro-septentrional and -oriental. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August-June. FOOD-PLANT. Grasses.

Ab. *Arete* Mull. (underside with white spots, not eyes). Occurs with the type.

CŒNONYMPHA Hub.

PAMPHILUS L. Abundant. Ericetal. Ascends to 2500 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde Argyle West Ross ♀

LAT. 54°40″-57°50″. RANGE IN EUROPE. Nearly throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May-August. LARVA. June-September. FOOD-PLANT. Grasses.

TIPHON Rott. (1775) ; *Davus* F. (1777) ; ? *Typhon* Hw.

1. Var. *Philoxenus* Esp. (*Rothliebi* Stgr.). Local. Ericetal.

DISTRIBUTION—EAST. o o o o o o o o o
WEST. Solway o o o o

LAT. RANGE IN EUROPE. Britain and Southern Holsatia. TYPE. English. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. July-May. FOOD-PLANT. *Rhynchospora alba*. This is the form known in Britain as *Davus* or *Rothliebi*. From the next var. it differs in its colour darker above, the larger, more numerous and distincter eyes on underside of the wings, often visible on the upper surface, and the less distinct pale blotch on the upper surface of the hind wings. This form and the next never occur together, and the food-plants of the larvæ are probably different. The larva of this form feeds on *Rhynchospora*

alba, a plant which is often not a native of the localities frequented by the var. *Laidion*. In Scotland I know of but one locality for the var. *Philoxenus*, viz., Cloak Moss, near Dalbeattie. The *Rhynchospora* is common on this moss. *Philoxenus* is probably only found in low-lying localities.

2. Var. *Laidion* Bkh. Local. Ericetal. Ascends to about 2500 feet.

DISTRIBUTION—EAST. o Forth Tay Dee Moray ♀ Orkney Zetland.
WEST. o Clyde Argyle West-Ross ♀

LAT. 55°20″-60°40″. RANGE IN EUROPE. Scotland and Ireland. TYPE. Scottish. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. June, July. LARVA—? FOOD-PLANT—? (? *Eriophorum* and —?). This is the var. generally called *Typhon* by British collectors. It is the Scottish and Irish form, and may be distinguished from the preceding var. by its generally paler colour, smaller and fewer spots, less visible above, and by the usually more distinct pale blotch on the upper surface of the hind-wings. The food-plant of the larvæ is unknown. *Laidion* occurs from near sea-level to about 2500 feet above the sea. It is common in many places in Scotland.

3. Ab. *Isis* Thnb. This form, which only occurs as an aberration in Scotland, is the Lapland race. It is somewhat smaller, and has usually no eyes at all on the wings. It occurs with the var. *Laidion*, more especially in the north.

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

EDITED BY D. SHARP, M.B.

The following Catalogue of Scottish Coleoptera will be, in its general plan, similar to that list of the Lepidoptera of Scotland, by Dr. Buchanan White, at present in course of publication in the "*Scottish Naturalist*." The division of the country into thirteen districts therein detailed is adopted, and the ascertained occurrence of each species in each of these districts will be shewn. Unfortunately I can find no information as to the Coleoptera of several of these districts, and the Catalogue (unless further assistance should be furnished) will be nearly a blank as regards the northern and north-western districts. It will be well to repeat here, that where the name of a district is given this signifies that the species has occurred in that district; where the species has not (so far as I know) occurred in a dis-

trict, an o is placed instead of the name of the district; but this o is replaced by ☌ in those cases where the existence of the species in a district is highly probable, though not hitherto recorded.

The districts are of course always given in the same order and are as follows:—*East*—Tweed, Forth, Tay, Dee, Moray, Sutherland, Orkney, Zetland; *West*—Solway, Clyde, Argyle, (including Mull), West-Ross, (including Skye), Hebrides. For further details as to these districts, *vide* "*Scottish Naturalist*," vol. I., p. 161.

An attempt to indicate the general scarcity or abundance of each species is made by adding after the name of each species, such a term as "abundant," "common," "scarce," &c., &c.

I have also attempted to give some information as to the habitat of each species by means of the words, "maritime," in the case of those frequenting the sea coast; "riparial," those found on the margins of the rivers; "lowland," those more peculiar to the low grounds and marshy districts; "highland," those more generally frequenting the hills and mountains, and "alpine," those found at a considerable elevation on the higher mountains.

I shall not attempt to give more information than this, because if I did so I fear I should often lead the student into error.

A good Catalogue * of Scottish Coleoptera was published in 1853, by Mr. Andrew Murray; but in the twenty years that have passed since its publication, a large number of additional species have been detected, and our knowledge of certain families has been very largely increased. This Catalogue has been of very great assistance to me, and it is with great pleasure that I acknowledge my obligations to it. At the time of its publication it was considerably in advance of other entomological works of the period.

The number of students of Coleoptera in Scotland at present is but small—(may it soon largely increase!)—and therefore the entomologists who have been able to render me assistance are but few; on this very account however their information has

* "Catalogue of the Coleoptera of Scotland, by Andrew Murray." Blackwood & Sons.

beenof greater importance to me, and I have much pleasure in acknowledging my obligations to the following gentlemen :—

Mr. R. Hislop has given me information as to the Coleoptera of Berwickshire, Linlithgowshire, and part of Stirlingshire. The Rev. Dr. Gordon of Birnie has forwarded a list of the Coleoptera of the province of Moray, with some other information. Dr. Buchanan White has sent the names of a number of species occurring in the Tay district ; and also information as to a certain number of species from other localities. Mr. Dunsmore of Paisley has furnished as complete a list as he was able to do of the Coleoptera of the Clyde district. My other information has been derived from captures recorded in divers repertories, and from my own observations.

Any entomologist who will forward me local lists of Coleoptera to be utilised for the subsequent portions of this catalogue, will help to render the catalogue less incomplete, and will therefore greatly oblige me.

No synonymy is given ; the nomenclature being throughout that of the most recent catalogue * of British Coleoptera.

CICINDELIDÆ.

CICINDELA Schaum.

CAMPESTRIS L. Common. Lowland, highland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

Var. *funebris* Sturm. Very rare. Clyde.

[HYBRIDA L. Very rare. "One specimen in Glenfarg" (Tay). J. Allen Harker in *Proc. Perth. Soc. Nat. Sc.*

CARABIDÆ.

NOTIOPHILUS Schaum.

AQUATICUS L. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ o o

* "Catalogue of British Coleoptera, by David Sharp." London, E. W. Janson.

PALUSTRIS Duft. Not common. Lowland.

DISTRIBUTION—EAST. ♀ Forth ♀ Dee Moray ○ ○ ○
WEST. Solway ♀ ♀ ○ ○

BIGUTTATUS Fab. Abundant. Highland, lowland, alpine.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

SUBSTRIATUS Wat. Local. Lowland.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ Moray ○ ○ ○
WEST. Solway ♀ ○ ○ ○

ELAPHRUS Schaum.

RIPARIUS L. Abundant. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

CUPREUS Duft. Abundant. Lowland, highland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

ULIGINOSUS Fab. Scarce. Lowland, highland.

DISTRIBUTION—EAST. ○ ○ Tay Dee ○ ○ ○ ○
WEST. Solway ○ ○ ○ ○

LAPPONICUS Gyll. Local. Highland.

DISTRIBUTION—EAST. ○ ○ Tay Dee ○ ○ ○ ○
WEST. ○ ○ ○ ○ Hebrides.

BLETHISA Schaum.

MULTIPUNCTATA L, Local. Lowland.

DISTRIBUTION—EAST. ♀ Forth ♀ Dee Moray ○ ○ ○
WEST. ♀ Clyde ○ ○ ○

CYCHRUS Schaum.

ROSTRATUS L. Not common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ○ ○ ○
WEST. Solway Clyde ○ ○ ○

CARABUS Schaum.

NITENS L. Local. Highland.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray ♀ ○ ○
WEST. Solway Clyde ♀ ○ ○

CLATHRATUS Fab. Rare. Lowland, highland.

DISTRIBUTION—EAST. ○ ○ ○ Dee ○ Sutherland ○ ○
WEST. ○ Clyde Argyle ♀ Hebrides.

GRANULATUS L. Not common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray ○ ○ ○
WEST. Solway Clyde ○ ○ ○

[**MONILIS** Fab. Doubtful as Scottish.

DISTRIBUTION. "Near Edinburgh, Granton." Murray.

ARVENSIS Herbst. Common. Highland.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee Moray ♀ ○ ○
WEST. Solway Clyde ○ ○ ○

CATENULATUS Scop. Abundant. Lowland, highland, alpine.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ○ ○
WEST. Solway Clyde ○ ○ ○

A small variety, without the purple margins of the thorax and elytra, occurs in the Highlands.

NEMORALIS Müll. Abundant. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ○ ○
WEST. Solway Clyde ○ ○ ○

GLABRATUS Payk. Scarce. Highland.

DISTRIBUTION—EAST. ○ ○ Tay Dee Moray ♀ ○ ○
WEST. ○ ○ ○ ○ ○

VIOLACEUS L. Common. Lowland, highland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ○
WEST. Solway Clyde ○ ○ ○

NEBRIA Schaum.

BREVICOLLIS Fab. Abundant. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

GYLLENHALLI Sch. Abundant. Highland, riparial.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

PELOPHILA Schaum.

BOREALIS Payk. Rare.

DISTRIBUTION—EAST. o o o o o o Orkney o
WEST. o o o o o

LEISTUS Schaum.

MONTANUS Steph. Rare. Highland.

DISTRIBUTION—EAST. Tweed Forth Tay o Moray o o o
WEST. o o o o o

FULVIBARBIS Dej. Local. Lowland.

DISTRIBUTION—EAST. Tweed Forth ♀ ♀ ♀ o o o
WEST. Solway Clyde o o o

FERRUGINEUS L. Rare. Lowland.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. o o o o o

"Not uncommon at Pressmenan, Lammermuir Hills"—Murray. I know of no other record of this species as Scottish.

RUFESCENS Fab. Scarce. Lowland.
DISTRIBUTION—EAST. Tweed Forth ♀ Dee Moray o o o
WEST. Solway Clyde o o o

CLIVINA Schaum.

FOSSOR L. Abundant. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray ♀ o o
WEST. Solway Clyde o o o

COLLARIS Herbst. Common. Lowland.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ ♀ o o o
WEST. Solway Clyde o o o

DYSCHIRIUS Schaum.

THORACICUS Rossi. Only from one locality. Maritime.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

Common on the coast near Aberlady. D. S.

IMPUNCTIPENNIS Daws. Very local. Maritime.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. Solway o o o o

NITIDUS Dej. Very local. Maritime.

DISTRIBUTION—EAST. o Forth? o o Moray o o o
WEST. Solway o o o o

POLITUS Dej. Very local. Maritime.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

Mouth of the Nith, below Dumfrie, scarce. D. S.

SALINUS Schaum. Local. Maritime.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. Solway o o o o

[ÆNEUS Dej. Doubtful as Scottish.

DISTRIBUTION—"Occasional" (Murray).

GLOBOSUS Herbst. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. Solway Clyde o o o

DROMIUS Schaum.

LINEARIS Ol. Not common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♂ Moray o o o
WEST. Solway ♂ o o o

AGILIS Fab. Common. Under bark. Lowland.

DISTRIBUTION—EAST. o o Tay Dee ♂ o o o
WEST. Solway Clyde o o o

(To be continued.)

ZOOLOGY.

MEMOIRS ON SCOTTISH DIPTERA.

By JAMES HARDY.

Secretary of the Berwickshire Naturalists' Club, &c.

No. II.—ANTHOMYIA SONCHI *sp. nov.* (The Sow-thistle Fly).

ON the 22d of August I collected from the flowering heads of the sow-thistle, *Sonchus oleraceus*, several examples of maggots, one or two being found in each flower. They were feeding on the young seeds, which being still tender and juicy, were rapidly destroyed by them. I had previously noticed the same attack made upon those of the common sow-thistle (*Sonchus arvensis*), and had found similar maggots in the heads of the long-rooted cat's-ear (*Hypochæris radicata*). They entered the pupa state shortly after being confined, and became flies the following year, about the beginning of July.

The *maggot* is white, shining, rather narrowish, spindle-shaped, the segments distinct; a series of foveæ along each side; a clear dorsal internal line on the posterior part of the back; oral hooks large, black; fore-stigmata, one on each side near the hinder edge of the second segment, pale whitish; hinder end slightly narrowing, the apex sub-truncate; the two stigmata testaceous, not far apart, and not raised, their tips composed of three united portions; behind these a quadrituberculate ridge, which is interrupted in the middle; after which there is a roundish slope to the anus, which is situated beneath, in a wrinkle behind a slight ridge; the ventral segments rather raised in the centre. Length 2½ lines, breadth ¾ths of a line. The *pupa-rium* is pale yellowish-brown, shining, darker at the tips, somewhat elliptic-oval, and rather narrow; gradually narrowed pos-

teriorly; somewhat conic anteriorly, and slightly compressed at the edges of the three first segments, where there is a sharp keel; the fore-tip is roughish and truncate, and has at each angle a small projecting flattened scale; the anterior segments rather rugose, the rest finely cross-threaded; the division lines of the segments occasionally marked with granules; a row of foveæ along each side of the under surface; the hinder end blunt, conic, slightly roughish beneath, with two considerably projecting spiracular processes, each of which consists at the tip of three united divisions; a shallow lunate depression behind these, followed by a blunt ridge, on which there are four very minute raised points; behind the ridge slightly sloped; the anus-mark in a slight hollow on the level of the under surface. Length 2¼ lines, breadth ¾ths of a line.

I do not find the *fly* described in either Meigen or Macquart's systematic works. It may be named *Anthomyia sonchi.* It will probably stand near the *A. sylvestris* and *A. cinerea* of Fallén. The *male* is rather narrowish; the face white, with ferrugineo-testaceous reflections, the under side of the cheeks and lower part of the head pale grey; a few black stiff hairs along each side of the mouth, of which three stout bent ones stand uppermost; frontal band ferruginous, sometimes brown posteriorly; border of the eyes white, as is also a minute spot above the antennæ; sides of the eyes and hinder part of the head with a fringe of black stiff hairs; eyelet triangle, dark grey; trunk and palpi black, the latter very thin, very slightly thickened towards the tip; antennæ black, the third joint rather short, oblong, the tip with a fine white down; the seta black, naked, or, if a high microscopic power is used, bristled to near the tip; eyes brown, naked. Thorax palish-grey, the sides lighter; the cross suture very distinct; a large blackish shining patch on each side from before the wings to the shoulder, a narrow dusky line in the middle of the anterior division, cut off by the suture; behind the suture two obsolete short linear patches one on each side of the middle; sometimes the back of the thorax is greyer, and there are three dusky lines, of which that in the middle is the most distinct; the back and sides with stiff black pubescence, arising from black points; scutellum grey, the extreme edges and the base black; the tip with long black hairs; metathorax pale grey. Abdomen strap-

shaped, narrow, pale grey, occasionally with a slightly yellower tinge, of a silken lustre; and a distinct narrow black dorsal line, which is interrupted at the the tip of each segment; thickish black pubescent; the apex beneath without distinct appendages. Legs black, thighs scarcely slaty; the hinder and fore thighs with a considerable longish black stiff pubescence; the middle ones with only a few hairs, and two longish curved ones near the tips; hinder tibiæ with several bristles, the others with only one or two exclusive of those at the tips; foot-pads dusky above, white beneath. Poisers and the small wing-scales tawny yellow; wings clearish, scarcely slightly obscured, iridescent, tawny yellow at the base, as is the basal portion of the nervures, the remainder becoming gradually browner; the costa with a short fine fringe, and without a spine; the first cross nervure slightly oblique; the second upright, and slightly bent. Length 2¼ lines; expanse of the wings 4¾-5 lines. The *female* is rather smaller, narrow, entirely pale grey, shining; face white, with ferruginous reflection; under part of the face, hinder part of the head, and the vertical triangle, grey; frontal band wide, ferruginous; eyes with a widish white border which is greyish posteriorly; two bent very indistinct white specks above the antennæ; palpi and antennæ black. Thorax without any traces of dusky dorsal lines. Abdomen concolorous, narrow, elliptical ovate. Legs black, thighs slaty or pale grey; trochanters piceous; thighs less pubescent than in the male; foot-pads nearly black. Poisers, wing scales, and the base of the wings tawny yellow; wings clearish, the bristles on the costa rather more distinct than in the male, one very slightly longer before the coming out of the first short nervure; transverse nervures as in the male. Length 2; breadth 4¼ lines.

Bouché ("*Naturg. Gart. Ins.*" 132.) mentions a fly (*Anthomyia lactucarum*) with similar habits, whose maggot destroys the seeds of lettuces and other allied plants. The characters given are extremely imperfect, but it does not appear to be identical with the species whose history is related above. It is, he says, blackish brown; the face and the sides of the abdominal segments with grey reflections. In the male the wings are brown, with broad stripes of iridescence. The female is entirely obscure grey, and has pale wings. Length 2½ lines It flies in July.

Another small maggot of an *Anthomyia* makes similar depredations upon the seeds and receptacle of *Hieracium sylvaticum*, and *H. boreale*. It occurs in autumn.

Capture of Trechus longicornis Sturm.—I took in the neighbourhood of Kelso, the other day, a single specimen of this beetle, not found before, I believe, in Scotland, and very rare in England. Along with it I found a specimen of *Lathrobrium angusticolle*, several of a *Ptenidium* not yet examined, and *Philonthus rubripennis* not uncommonly.—ROBERT HISLOP, Blair Bank, Falkirk, June, 1872.

Scottish locality for Dyschirius æneus.—Some years ago, when at Tain, Ross-shire, in September, I found, in *rejectamenta* on the banks of the river, two examples of a *Dyschirius*, which I referred somewhat doubtingly to *æneus* Dej. These I afterwards submitted for opinion to Mr. G. R. Crotch, who informed me that they were correctly determined.—THOMAS JNO. BOLD, Long Benton, Newcastle-on-Tyne, 8th April, 1872.

Rare cause of Deafness.—In April of this year I removed from the left ear of a young gentleman aged 14, a common house-fly (*Musca sp.*) The deafness, of two years' duration, was very complete, but is now entirely removed. Toynbee and other authors of works on the ear, ascribe the use of the wax or ceramen in the external auditory meatus to be to prevent insects from entering. Insects do occasionally get into the external meatus, but, from the irritation they cause, means are speedily adopted for their removal. I can find no record of a case of deafness of so long duration caused solely by a fly blocking up the external auditory meatus to the vibrations of sound. I am inclined to think from its position, &c., that it must have entered the cavity alive. Could it have entered in a semi-dormant state in autumn?—J. J. KIRK DUNCANSON, 2 Coates Place, Edinburgh, May, 1872.

On Light as an attraction for Moths.—In the following note I purpose to give my experience of light as a means of capturing Lepidoptera, as compared especially with sugar, at Old Aberdeen.

Sugaring has here been eminently unsuccessful, even on apparently very favourable nights, nothing turning up except *X. polyodon*, and other equally common species, and even they were but scantily represented usually.

Light, on the contrary, on several nights, especially during August, has been very productive both in species and in individuals, and among them various good insects.

My whole apparatus is simply an ordinary gas light near the window, while the window itself commands but a narrow prospect, owing to trees and buildings which obstruct the view, yet on one or two evenings moths have come to the window in swarms, showing how great an attraction the light must be; and that were the window more favourably situated, and a more elaborate apparatus employed, the number of species attracted would probably be much increased. I may also state that though I have tried light from nine p.m. till three a.m. I have rarely found that anything makes its appearance before ten p.m., or after half-past one a.m., while the most crowded time is from half-past ten till twelve.

The first species to appear is usually *A. tritici*, or *L. testacea*, while a tremendous thump on the window caused by *A. Caja* may usually be taken as the signal to go to bed, as nothing more will appear for that night, at least I have found it to be so.

The greatest number of species for any one night is twenty-five, of which sixteen were Noctuæ, no great number certainly, but good as compared with the results of sugaring, besides being so easily obtained.

During the month of August, from the 5th to the 17th, there came to light the following species of moths :—*A. Caja*, *S. menthastri*, *B. perla* scarce, *L. pallens* and *L. impura* common, *L. conigera* scarce, *H. micacea* swarming and variable, *X. rurea*, *X. polyodon*, *L. testacea* in swarms, *M. brassicæ* scarce, *A. oculea* common, *M. fasciuncula* ; *C. alsines*, or *C. blanda*, several specimens of one of these species came, but I am not certain which they belong to ; *C. cubicularis*, *Agrotis valligera* common, *A. segetum*, *A. exclamationis*, both these species were scarce, though a month or two previously they were very numerous ; *A. cursoria* common, *A. nigricans*, *A. tritici* in swarms, *A. præcox* twice, *A. pyrophila* once, *T. orbona*, *T. pronuba*, *N. augur* common, but rubbed, *N. festiva*, *N. baja*, *P. iota* scarcer, and *P. gamma*. Of Geometræ there came,—*C. elinguaria*, *H. wavaria*, *H. elutata*, *M. fluctuata*, *C. prunata*, and *C. pyraliata*.

In addition to the species enumerated above, I have previously taken at the same window, *N. fulva*, *A. basilinea*, *A. gemina*, *M. literosa*, *C. morpheus*, *T. ianthina*, *N. C-nigrum*, *N. brunnea*, *N. umbrosa*, *N. xanthographa*, *T. instabilis*, *T. gothica*, *T. rubricosa*, *A. litura*, *E. nigra*, *D. templi*, *Ph. meticulosa*, *H. adusta*, *H. dentina*, *H. oleracea*, and *A. urticæ* ; as well as *R. cratægata*, *O. bidentata*, *A. aversata*, *C. pusaria*, *E. vulgata*, *M. ocellate*, *M. subtristata*, *M. montanata*, *C. munitata*, *C. populata*, *C. fulvata*, and *C. spartiata*,—making up the list of Noctuæ to forty-nine, and of Geometræ to eighteen species.

Of other moths but few species come, chiefly *Scoparia muralis* and *S. ambigualis*, *Crambus pratellus* and *C. tristellus* in swarms, *Aphomia sociella*, and a few species of Tortrices and Tineina.

My success was greatest as a rule, of course, on dark warm cloudy, or even misty, evenings ; but on various occasions I have found that moths swarmed to the light even when rain was falling in torrents, when the evening was warm and calm. Sometimes, also, a few moths have put in an appearance on moonlight nights, but this is very exceptional.—J. W. H. Traill, Aberdeen.

Note on the sound made by Hylophila prasinana.—In the "Entomologist's Annual" for 1871, Dr. Knaggs mentions (with evident incredulity) that it had been recorded during the past year (where, is not stated, but I imagine in "Newman's Entomologist,") that *Hylophila prasinana* had been observed "uttering a shrill and peculiar sound at quick intervals." Subsequently Mr. A. H. Swinton, in the "Ent. Monthly Mag." for March, 1871, states his belief that the moth in question produced a "strange twittering" noise, but the editors of the Magazine urge the advisability of further observations and dissections before the question could be set at rest. Another note from Mr. Swinton appears in the August (1871) number of the same periodical, in which he gives the result of his observations on *H. quercana*, the other British species of the genus. In this note he states that the moth produces a "membranous sound," which he thinks is caused by the inner margin of the fore-wing catching a little horny lateral thoracic plate when in the act of expanding.

The editors remark :—"It will be remembered that last year (see E. M. M. vol. vii. p. 231.) Mr. Swinton asserted his belief that *H. prasinana* produced an audible noise. This year he has followed up the enquiry and very kindly sent us living specimens of *H. prasinana* (as did also Mr. Hellins), which he believed to have heard produce a sound. We were not fortunate enough to detect it ourselves. There is much that is singular in the formation of the parts of the body intermediate between the thorax and abdomen in the genus *Halias* [*Hylophila*], and we are willing to accept Mr. Swinton's testimony that they are connected with sound-producing powers. In answer to our query as to whether the frenum or spur of the hind-wing might not be connected with the sound, Mr. Swinton informs us that, according to experiments he made, the spur has nothing to do with it."

On the evening of 28th May, when mothing in the oak-wood surrounding my house, I noticed what I thought was a beetle, flying round a small oak, and giving vent all the time to a sharp, quick sound, very similar to that produced by the Longicorn beetle *Astinomus* when held betwen the fingers. Though I failed to catch this individual, I was more successful with another which was behaving in the same manner. When in the net the sound ceased, and I saw to my astonishment that the insect was a moth. It then occurred to me that *Hylophila prasinana* was said to produce a sound, and on examining my captive I was therefore not surprised, though much pleased, to find that it belonged to this species.

The following morning I tried some experiments with my captive, moving his wings and making him fly, but was not able to elicit any sound from him. I conclude, therefore, that the noise is not produced by the mere mechanical action of the wings, but is dependent on the will of the animal. I then killed the creature, which was a male, and dissected him. On removing the patagia and hairs from the thorax, several small projecting horny plates, both frontal and lateral, were apparent, but I could not discover that the wings produced any sound in connection with them.

I then directed my attention to the structures between the thorax and hind-body and from them I believe the sound proceeds. On examining the under-side of the animal, a large semi-lunar opening immediately behind the meta-sternum will be perceived. On dissection this opening will be found to communicate with a large membranous plate, not flat, but folded at its posterior and inferior edge, and elevated and depressed in other parts, and somewhat semi-lunar in outline. To this plate numerous strong muscles are attached, and by action of these muscles on the plate, I think the insect produces the noise in question. This sound-producing structure (if such indeed be its function) is analogous to the "drum" of the male *Cicada*, and occupies a similar position.

The same evening I again went out to the wood and captured another specimen of the *Hylophila* in the act of "squeaking." The sound was quite distinct at a distance of ten feet or more. Next morning I treated him (it was a male) in the same manner as I had the first specimen, and with a similar result. I found that a good imitation of the sound may be made by rubbing the point of a knitting-needle on the closed blade of a clasp-knife. I have since taken another specimen (also a male) flying round an oak, but *not* producing any noise.

Several other moths are known to produce sounds, but apparently the noise is caused in a different manner in each of the sound-producing genera. The most celebrated of these sound-producing moths is, of course, *Acherontia atropos*, but the *modus operandi* in this species seems still not to be clearly under-

stood. Both sexes of *Acherontia* can produce the sound, I believe. In the genus *Setina*, "two large tympaniform vesicles, situated in the pectoral region,' have been noticed by A. Guenée (*vide* the translation—in the Ent. Mon. Mag., i. 223,—of a paper by this author in the *Annales de la Société Entomologique de France*, 4*me série*, 4*me tome*, 1864, 3*me trimestre*). These are much more developed in the male than in the female, and give rise to a sound like the ticking of a watch. M. Guenée having shown that there are no external organs that can act upon the vesicles, proceeds to say, "it is evidently in the interior of the drum that the bow, or rather the clapper, which produces the sound must work; for, if we may judge from its nature, it will be produced by percussion, rather than by friction. If we open the vesicle, we see that it is separated into two parts by a membranous division; the right cavity is absolutely empty; the left, deeper, it is true, and more difficult to explore, appears to me, however, to contain no particular organ, and, in any case, no body that is able to be used as a hammer. One must then renounce the supposition of a percussive body. There remains the action of the air; and for my part, without asserting anything, this is the mechanism which appears to me the most probable. The membrane which covers the apparatus is thin and flexible, and at the same time, of the consistence of talc or parchment; one is able to bend it at pleasure, and as soon as the pressure placed upon it ceases, it resumes its original position with elasticity. It is then, I think, by rumpling *(froissement)* that the sound is produced. It may be that the insect, contracting its pectoral organs, bends and unbends the membrane alternately; it may be, which appears to me the most probable, that it is endowed with the means of causing momentary emptiness—at any rate, partially—in the cavity of the apparatus, by inhaling a portion of the air that it contains, which being made to re-enter the membrane, has the effect of inflating it anew by a sudden expiration. Every one is able, as we know, to cause with the mouth these two opposite movements in a dry bladder, and to produce, by this means, a dry and piercing noise, quite analogous to that of the *Setina*. I leave these suppositions to the reflection of entomologists."

I may note that the green colour of *Hylophila* appears to be soluble in alcohol.—F. BUCHANAN WHITE. May, 1872.

A second Scottish locality for Anticlea sinuata.—I captured last year, in this neighbourhood, a specimen of *Anticlea sinuata*. This, I suppose, is the second Scottish specimen that has been taken of this pretty little moth, the first having been found (*Sc. Nat.* i. 42) in Forfarshire.—T. MARSHALL, Stanley. May, 1872.

Capture of Ophiodes lunaris.—On the 16th of May I had sent me a specimen of *Ophiodes lunaris*, which was taken at rest on the shop window of Miss Oswald, fruiterer, St. John Street. It appeared to have newly emerged from the pupa, and, with the exception of being slightly crippled in one of the hind-wings, was otherwise in pretty fair condition. There is a probability of its having been brought into this country along with some fruits or vegetables, as at this season of the year a great many young vegetables are imported. As far as I am aware, this is the first time this species has been taken in Perthshire; so I thought it worth recording in your journal.—JOHN STEWART, St. John Street, Perth. [We fear that Mr. Stewart's suggestion of the importation of this specimen is rendered too probable by the place where it was found. Though common in central and southern Europe, but very few British specimens are known—one taken in Hampshire, and one or two at Killarney. It has not been reported from Scotland before.—EDITOR.]

THE NEST OF *FORMICA RUFA* AND ITS INHABITANTS.

By F. BUCHANAN WHITE, M.D.

FROM the earliest times ants have attracted the attention of all observers of nature.

> "——— parcum genus est, patiensque laboris,
> Quæsitique tenax, et quod quæsita reservet,"

sings Virgil. Aristotle, the learned Greek, has recorded his observations of their habits; and the mighty king whose wisdom "excelled the wisdom of all the children of the east country, and all the wisdom of Egypt," who "spake of beasts, and of fowl, and of creeping things, and of fishes," not only shows his intimate acquaintance with the doings of the ants, but deduces therefrom a profound moral lesson: "Go to the ant, thou sluggard; consider her ways, and be wise."

Following, then, the advice of Solomon, let us devote a few lines to a consideration of the hill-ant *(Formica rufa)*, the habitation that it constructs, and the guests, invited or uninvited, that take shelter therein.

In the first place we will take a look at the nest. If we were to go to some of the wooded highland districts of Scotland, such as the neighbourhood of Loch Tummel or Loch Rannoch, our attention as naturalists would certainly be attracted by heaped-up masses of dead leaves, twigs, and straws, resembling in shape large mole-hills or small haycocks, and varying in size from one to four feet in height, and from three to twenty-five feet or so in circumference. A closer examination would show us that these heaps were tenanted by an immense number of brownish ants, and were provided near the top with a number of apertures, through which the inhabitants were going in and out. These structures are known as ant-hills, and the ant which constructs and inhabits them is consequently known by the name of the hill-ant, which name was given to it by an intelligent observer, Gould, who published an "Account of English Ants" in 1747, long before either Linnè or De Geer had written upon the subject.

The hills are constructed of various substances,—leaves, twigs, dried grass, small stones, &c., all entering into their composition. Often, however, they are made for most part of

one material only,—that which happens to be abundant in the vicinity of the nest. Thus, amongst heather, the dried leaves and twigs; amongst birch, short dead twigs; in a fir wood, the dead fir-needles; or, near a juniper bush, the dead juniper leaves will be found to constitute the substance of the nest. On one occasion I noticed a nest composed chiefly of dried grass, as the situation was among the big hassocks of *Sesleria cærulea*.

The situation of the nest is generally in some sheltered dry spot; often against the base of a tree or beside a big stone. In one wood where the ant-hills were very numerous, and where the trees were chiefly birch, with a few pines, I noticed that the nests were generally placed under a pine—the object of this being, I have no doubt, not only to obtain a certain amount of shelter from the thick evergreen foliage overhead, but because the dead pine-needles afforded an inexhaustible quarry of material for the construction of the nest.

The twigs, or leaves, or whatever the nest may be made of, are put together with a good deal of skill, and arranged in such a manner that the nest is to a great extent waterproof. Along the upper sides and top are a number of doors from which galleries lead into the interior of the hill. The inside of the nest is composed of a great number of irregular chambers, some low down near the bottom, or even in a small and new nest excavated in the ground; others high up and near the top of the nest. The lower part in an old nest is chiefly composed of half-decomposed vegetable matter, tough, and matted together, and the galleries by which it is perforated do not seem to be used. Often the base of an old nest is thickly overgrown with grass and other plants for a foot or more up, and only the upper part of the hill is inhabited and added to.

The ant-hills vary considerably in size. A newly-formed one contains but a few handfuls of material, while some that I have measured were four feet high and twenty-five feet in circumference at the base. Perhaps, however, the most usual size is from one to two feet high, and ten to fifteen feet in circumference. As to the age of a nest, I have not been able to arrive at any conclusion. The great size and thickly overgrown base of some hills indicate that their foundations must have been laid many years ago.

From many nests well-marked roads extend in different directions, and may be traced for a considerable distance. These roads vary from one to six inches in breadth, and are kept tolerably clear of vegetation. They sometimes extend to a considerable distance from the nest—considerable, that is to say, in regard to the makers thereof; gradually diminishing in breadth till they disappear altogether. In one case I was able to trace easily a road for 76 paces from the ant-hill. From this nest five main roads led in different directions, the main roads being joined by side roads, which in some cases led from one main road to another. The longest, as mentioned above, was 76 paces in length, and several of the others were nearly as long. In several instances the roads led to other nests, which I am inclined to think were made by colonies sent out from the main nest. A small nest of recent origin was situated about 22 paces from the principal nest, on one of the principal roads, the road passing beside it.

For the purpose of ascertaining the amount of traffic on the road, I devoted five minutes to counting the number of ants passing along one of the principal roads towards the nest, and at about 11 paces from it; and in that space of time 204 ants passed towards the nest, and about as many from it. At this rate, on a summer's day, when the ants are in motion the whole twenty-four hours, somewhere about 117,000 ants would pass this point of the road; and supposing that all the five principal roads have the same amount of traffic on them, the number would reach 600,000. It is no wonder, then, that the ants' paths are well marked; for, as Virgil says,

> "They crowd the peopled path in thick array,
> Glow at the work and darken all the way."

We will now pass on to a consideration of the ant itself.

To those who wish to learn what has been observed regarding ants, the works of Huber, De Geer, Kirby and Spence, &c., will afford more extended information than the space at our disposal will allow us to give. I shall therefore only briefly sketch the outline of the life history of the ant we have under consideration.

The hill-ant, then, commences life, as most other insects do, in the form of an egg. These are minute and are laid by the female ants inside the nest. They are then

immediately taken possession of by the workers, who collect them into small heaps, moisten them with their mouths, and move them about from one part of the nest to another, according to the temperature they require. According to the observations of De Geer * the workers even at times brood over the eggs as if to impart additional heat. The eggs of ants are said to increase in size between the time when they are laid, and the time when they hatch. The eggs which are to produce males, females, or workers, are supposed to be laid at three different periods. After a few days the eggs hatch, and the labours of the workers are considerably increased. Not only have the larvæ to be moved † from one part of the nest to another, according to the time of day and temperature, but they have to be constantly fed. The larvæ are footless white grubs, and are fed from the mouths of the workers with a viscid, half-digested fluid. At different ages the larvæ seem to require different strengths of food, the younger larvæ requiring a less substantial diet than the older ones. In addition to feeding them, the workers have to keep the larvæ clean, which they do by passing their tongues and mandibles over them.‡ After attaining its full size, the larva spins a silken cocoon, in which it becomes a pupa, which is carried about by the worker in the same manner as the egg and larva were. After remaining a pupa for some time, the period at last comes when the young ant is to arrive at the perfect state; and it is stated that the workers, becoming aware of this interesting fact by some sense unknown to us, open the cocoon and extricate with great tenderness the enclosed pupa. They then remove the thin pellicle which covers the ant, assist in stretching the legs, and wings when present, feed their nursling, and show it all the paths and galleries of the nest.§ I have reason to believe, however, that, in some species, at least, the ant, on arriving at the perfect state, is able to liberate itself from the cocoon.

Ants in the perfect state may belong to one of three groups of individuals. They may be either males, females, or workers. Individuals of the two first groups are furnished with two pair of wings, and their sole use is to insure the continuance of

* ii. 1099. † Huber 74. ‡ Huber 78. § Huber 83.

their species. After remaining in the nest for a longer or shorter period, varying, I fancy, according to the state of the weather, the males and females fly into the air, and pair there; after which the males perish, and probably many of the females. The survivors are either taken possession of by some worker-ants of the same species, and brought into the nest, which they are never again allowed to leave, or else they make small nests for themselves, where they lay their eggs and attend to the young in the same manner as the workers do.* The swarms of males and females flying in the air are sometimes exceedingly great. They often frequent high places, such as church spires; and it has happened more than once that the great swarms of ants flying about a spire have been mistaken for smoke, and led to the supposition that the building was on fire.

After the female ant has been impregnated, and either been taken into a nest, or made a nest for herself, she has, of course, no further use for her wings; she therefore takes an early opportunity of getting rid of them. Huber† and others have witnessed this proceeding, and seen how the ants worked their wings about till they fell off. Sometimes, too, the worker ants are said to assist them in this extraordinary procedure.

The worker or neuter ants (of which there are two sizes, the larger much less numerous than the smaller) are never provided with wings. It has not, I believe, been clearly ascertained how these worker ants are produced,—that is to say, how they are prevented from developing into perfect males or females. Worker bees, we know, are produced by the female larvæ being fed upon a less nutritious food than that with which the larvæ destined to become queens are nourished; but the difference between a worker and a female ant is much greater than that between a worker and a queen bee. For not only, in the ant, are the organs of sex totally obliterated, but the shape of the thorax is quite different, not to mention the absence of wings. Upon the worker ants falls all the labour connected with the nest—it is they who construct it, who tend the eggs, larvæ, and pupæ, and who have to collect food for themselves and their nurslings.

* Huber 110. † 109. Gould, 59, &c.

The food consists of a great variety of animal and vegetable substances—other insects, carrion, snails, dew, honey from flowers, honey-dew from leaves, and the sweet honey-like fluid discharged by the aphides, all compose the bill of fare of the ant.

Then, when necessity arises, they have to fight for their nest, and courageous fighters they are—nothing seems to daunt them. Their weapons of defence and offence are their strong jaws, and their supply of formic acid. Some species of ant have stings, but the ant we have under consideration—*Formica rufa*—is not provided with a sting. The formic acid is secreted in a special poison-bag, and is ejected with great force from the tail of the ant. When challenged or irritated, a hill-ant stands upon its hind-legs, jerks its tail forwards, and squirts out the acid. The acid has rather a pleasant smell, and a decidedly pleasant taste. (Should any of our readers be anxious to taste it, the following is the best recipe I can give, and is one which I have often put in practice,—"Catch 8 or 10 ants together, put them on to the middle of your tongue, and keep them there for a few seconds—you may then eject them." The advantage of having several ants at a time is, that they catch hold of one another, and not of one's tongue. Another plan of eating formic acid is to take a lot of ants and pound them up with snow: this plan I have not tried—it has been used in Spain.) On disturbing a nest of the hill-ant, there arises a tremendous discharge of the acid, thousands of tiny jets rising to the height of about six or eight inches above the nest; and, on plunging the hand into the recesses of the hill—a proceeding which is sometimes necessary—the smell of the formic acid that clings to the hand is so strong as to catch the breath. One word of advice to those who meditate the investigation of an ant-hill,—Do not let any of the formic acid get into your eyes.

The inhabitants of one nest of *Formica rufa* are said sometimes to wage war against the inhabitants of another nest. This proceeding I have not witnessed, but Huber has given an account of a battle he saw, and a translation of his account may be found in "Kirby & Spence." *

* Introd. to Entomology, 7th ed., p. 327.

I must, now however, pass on to the next part of our subject, though much more might be said of the doings of the hill-ant,—the colonies it founds, the aphides it milks, and the recreations and amusements it indulges in, are they not all chronicled by Kirby and Spence; and to these authors' works I refer those who may feel inclined to learn more.

Formica rufa (or *F. congerens*, or both) is not uncommon in many places in wooded parts of the north of Scotland. It does not appear to occur (in Scotland) south of a line beginning at Arran in the south-west, and thence passing in a north-easterly direction along the line of the Grampians, through Ben Lomond, Dunkeld, and Deeside, and reaching the east-coast probably somewhere in Aberdeenshire. *F. congerens* is closely allied to *F. rufa*, and is a species of northern Europe. It constructs similar nests, and has been noticed in Rannoch and elsewhere.

(To be continued).

Megachile centuncularis.—This bee is not uncommon in many parts of Scotland, and is met with not unfrequently in and about St. Andrews. It appears to vary considerably in number: some years it is plentiful, in others rather scarce. When these leaf-cutting bees are numerous, they soon make their presence known, by the peculiar and unmistakeable way in which they cut semicircular pieces of different sizes out of the leaves, chiefly of rose bushes, which they carry off to line their nests with. To these leaves it has generally been considered that they manifested a decided partiality, although not at all times confining themselves too closely to any particular plant, adopting their habits in this respect to their surroundings. Still it has been the leaves of plants and not the flowers they have been in the practice of using for this purpose. Last autumn, however some of the bees in this quarter seem to have abandoned their usual custom in this matter. My brother, Mr. T Walker, who has a small garden and a greenhouse with a southern exposure, was somewhat surprised and not a little annoyed to see that a number of semicircular pieces had been cut out of the petals of some of his best geraniums. A little watching soon discovered the depredators at work, when a few of them were caught in the act of making off with their spoil. The bees began the attack, at first, by cutting the petals of some plain-coloured plants standing outside; some of these seem not to have pleased their fancy, for after cutting some pieces out they were sometimes left hanging by the extreme edge. After this they found their way inside the greenhouse, where there was a considerable variety of plants with flowers of many shades of colour to choose from; they nevertheless invariably selected those of the brightest kind, preferring the scarlet petals, mainly, of geraniums to all others. Out of these they cut very neat semicircular pieces, and carried them off to line their nests with. So quickly was this operation performed, that a bee could be seen to alight on the edge of a flower, and have the piece cut out and taken away before a person standing a few yards distant could be in

time to prevent it. Two or three of the nests were placed in holes in the gable of a house immediately adjacent; the others were apparently at some distance. Reamur *(Mémoires pour servir à l'Histoire des Insectes, tome vi.)* gives an excellent account of a bee which he called *Abeille tapissière (Meg. papaveris* of Latrelle), which used the petals of the field-poppy to ornament its cells with. This is the earliest account we have of any of these bees selecting coloured material for this purpose. Unfortunately, this species is not found in Britain. More recently, Mr. Newman, in the 3d vol. of the *Entomologist*, states that some species of *Megachile* line their nest with the scarlet petals of pelargoniums. Mr. F. Smith, in recording his observations on this subject in the same volume, says that he was astonished to observe *M. centuncularis* cutting the scarlet petals of geraniums to line its tunnels, at an old house in Deal. The above is the first notice, so far as I am aware, of this curious practice of any species of *Megachile* as observed in Scotland.—ROBT. WALKER, St. Andrews, May, 1872.

NOTES ON SCOTTISH HEMIPTERA.

By F. BUCHANAN WHITE, M.D.

DIPSOCORIS ALIENUM H.S.

THIS curious little bug is usually considered to be rare in Britain, but in Scotland at least, I am convinced that it is universally distributed, and may be found in appropriate localities throughout the country by any one conversant with its habits. The celebrated Haliday, who constituted the genus, thus writes of *Dipsocoris* (Nat. Hist. Rev. ii. 61) :—"Inhabits the banks of rivers throughout the summer, gliding among the wet gravel, its silky down protecting it from the wet. It takes flight readily, even off the surface of the water. The yellowish larvæ and pupæ are found in the same situation, leaping like the perfect insect. In its habits it most resembles the *Saldæ*, but shuns the light more than they do."

The favourite haunts of the *Dipsocoris* are the large banks of shingle that are to be met with here and there beside most of our Scottish rivers. In such places, on turning over stones near the edge of the water, one is almost certain to see the little creature gliding swiftly along among the damp gravel, and hiding itself in some crevice. As far as I have seen, it does not appear to like too much wet, and I have never noticed it, as Haliday seems to have done, on the water, nor flying. When alive, the wing-cases are purplish-brown, with a whitish bloom-like gloss, produced by the fine appressed hairs with which they are covered. The larvæ and pupæ may be frequently seen along

with the perfect insect, but are not quite so active. They are brownish-yellow in colour, and not unlike some species of mites often seen in damp situations among decaying vegetable matter. In the first volume of "British Hemiptera" by Messrs. Douglas and Scott, only one locality in Scotland is mentioned for this insect—the banks of the Almond, near Edinburgh, where it was found by Dr. Sharp. I have seen it on the banks of the Nith, near Thornhill, in Dumfries-shire, where Dr. Sharp showed me its habits, as well as beside the Tay and the Dee. Dr. Sharp has also noticed it beside Loch Rannoch. Larvæ, pupæ, and imagos can be found at any time from April to September, and, I think, probably during the rest of the year. What the insect does when the rivers are "in spate," and the banks of shingle are under water, I do not know. The highest altitude at which I have seen the *Dipsocoris* is 1,100 feet.

IDOLOCORIS PALLICORNIS Fieb.

Wherever the common foxglove, *Digitalis purpurea*, grows throughout Scotland this species appears to be found. I have taken it in Kirkcudbrightshire, Perthshire, Aberdeenshire, Inverness-shire, and Ross-shire, and have noticed it at an elevation of 1,100 feet. It may be found from May to October, and larvæ have been noticed at various periods from June to September. This insect seems to be never found on any plant but the *Digitalis*, though I have some reason to suspect that it may occasionally be found on Mullein (*Verbascum Thapsus*).

ÆTORHINUS BILINEATUS Fall.

As the last-mentioned species is attached exclusively to foxgloves, so is this species to aspen (*Populus tremula*). It was not known as British when "British Hemiptera" was published (1865); but about that time the Rev. T. A. Marshall captured three specimens in Leicestershire. I am not aware whether it has been again met with in England; but in Scotland I have seen it wherever I have looked for it, namely, in the same counties as the last-mentioned species. It is usually abundant where it occurs, and seems to be in the perfect state from the end of June till the beginning of August. It attains an elevation of nearly 1,500 feet above sea-level.

BRYOCORIS PTERIDIS Fall.

This species is said to be attached to the common bracken, but I have never seen it upon that fern. It is, however, common in many places upon *Athyrium filix-fœmina*, *Lastrea filix-mas*, and *L. dilatata*. It may be found from July to September. The majority of examples are undeveloped, the wings-cases having neither cuneus nor membrane. Developed individuals are very rare, but I found three in Kirkcudbrightshire, which are the only developed specimens that I have seen.

AGALLIASTES WILKINSONI D. & S.

This species was described for the first time in 1866, and named in honour of its discoverer, who found it by searching among moss at the roots of *Maianthemum bifolium*, near Scarborough. It was supposed to be attached to this plant, which is rare in a native state in Britain, but it seems to have no particular connection with it or any allied plant. I do not remember seeing any record of its having been found elsewhere in England, but in Scotland it seems widely distributed, though local. Sandy, dry ground, covered with very short grass, thyme, and other plants, seem the especial haunts of the species; and in such places, in June and the beginning of July, I have taken it in Inverness-shire, Aberdeenshire, and Kirkcudbrightshire. It is somewhat difficult to catch, from its active leaping habits, but by sweeping with a net a series may be easily obtained. It attains an elevation of 1,100 feet.

TERATOCORIS VIRIDIS D. & S.

This species was first taken near Loch Rannoch, and was described from a single specimen (male) in 1867. I do not think that the female has been described, I therefore proceed to describe it now.

Developed form: shape as in the male, but larger and stouter. Colour green, with a fine black central line extending from the front of the head to the apex of the scutellum. The two last joints of the antennæ pale piceous. Inner margin of the clavus narrowly black. Membrane with two cells, of which the lesser is very small and narrowly triangular. Apical half of the third joint of the tarsi blackish.

Undeveloped form: similar to the developed form, but without

the central black line on the head, pronotum, and scutellum. The membrane scarcely developed, and the elytra consequently shorter than the abdomen. Length 2½-lines.

The developed form is rare, the undeveloped common—and to it, I think, should be referred the supposed undeveloped form of the female of *T. Saundersi*, taken near Aberdeen, and described by Messrs. Douglas & Scott, in the *Ent. Mon. Mag*, v. 261.

Teratocoris viridis frequents rough, rushy ground, near lakes and rivers, and is probably not uncommon in such situations. It appears in the perfect state about the end of June, and in July. Besides Loch Rannoch, where the first specimen was found, it has been taken in Ross-shire and Aberdeenshire by myself, and in Dumfries-shire by Dr. Sharp. I have found it at an elevation of 1,700 feet (Glen Callater).

(To be continued.)

Rare Birds in Fyvie.—BLACKCAP WARBLER *(Sylvia atricapilla)*. A specimen of this warbler was seen near Fyvie Castle on 27th April last. This is the second specimen of the bird seen in this locality. WOOD WARBLER *(Sylvia sibilatrix)*. Two specimens of this bird were seen here, and one of them shot, in the beginning of May. WATER RAIL *(Rallus aquaticus)*. A fine specimen of this bird was captured alive at Mill of Tifty in January last year, and another was seen here a few days ago.—G. SIM, Gourdas Fyvie, 16th May, 1872.

Bohemian Waxwing in Fife.—When at Kinghorn, Fifeshire, lately, I saw a fine specimen of the Bohemian Waxwing *(Bombycilla garrula)* that had been shot in that neighbourhood last autumn.—A. T. SCOTT, Perth, May, 1872.

Rare Birds at Aberdeen.—On the morning of Thursday, 16th May, a fine male specimen of the BLUE-THROATED REDSTART *(Sylvia suecica*, Temm.*)* flew, in company with a Common Redstart, on board a fisherman's boat while he was drawing his lines, but died about an hour after. evidently from exhaustion. The bird was brought to me the same morning, and is now in my possession. This is the first recorded instance of the occurrence of this species in Scotland. PIED FLY-CATCHER (*Musicapa atricapilla* Linn.). Five specimens of this species were shot in the month of May last, three of which were killed on Old Aberdeen Links by Mr. Alexander Mitchell, one at Manar, Donside, and another at Peterhead. Two were also previously recorded for Aberdeenshire: viz., one at Hazelhead in 1842, and one at Bruckley Castle, 1849.—GEORGE SIM, Aberdeen.

Early arrival of the Swallow.—A pair of swallows appeared on the 31st of March, and the cuckoo was heard the first week of April, at Kirkennan—early arrivals of these summer visitors.—W. DOUGLAS ROBINSON, Kirkennan, Dalbeattie, Kirkcudbrightshire, 12th April, 1872.

ON THE "YELLOW FINS" OF THE ALLAN-WATER.

By W. C. M'INTOSH, M.D., F.R.S.E., F.L.S.

SO little notice has been taken in the Tay of any species of fish but the salmon, that public attention has been somewhat removed from the question of the young of the salmon-trout and other migratory forms. Especially has this been the case in the Allan-water, where many anglers seem to have captured the "yellow fins" as legitimate fish, confounding them with the common river- or "yellow" trout. So sure were certain experienced anglers of the correctness of this opinion, that they viewed the silvery coating assumed by the "yellow fins" as only a temporary garb, which was afterwards thrown off, the fish becoming very like the common trout, and being present in the Allan-water at all seasons,—a conclusion, as we shall afterwards see, not without some foundation.

Before entering into the special case of the Allan-water, it may be mentioned that the obscurity, in certain respects, which still envelops the history of the salmonoids, is not confined only to the public; for Widegren, after an examination of Scandinavian types, and Malmgren of those of Finland, have asserted that the migratory, lacustrine, and fluviatile forms of Europe are mere varieties of the same species, capable of inter-breeding and producing fertile hybrids; an opinion which has been recently supported by Rasch. Dr. Albert Günther, however, than whom no living man has greater experience in the structure and arrangement of fishes, inclines to an opposite view, and, in the present state of science, his judgement is most to be relied on.

In the Allan-water salmon are comparatively rare, whereas salmon-trout are not uncommon; and the Fishery Board of the district, knowing that the "yellow fins" are really migratory fishes (the young of sea-trout), and, of course, wishing to carry out the intention of the Act for the preservation of fishes of the salmon-kind, found it necessary that the public should understand that the capture of the so-called "yellow fins" was really an infringement thereof; as, indeed, the Tweed Commissioners had done before them. The legal aspects of this question do not concern us, and we shall therefore proceed to glance at the relations of the "yellow fins" (a term synonymous with "orange fins") to the salmon-trout and other migratory fishes.

In regard to the early history of the salmon-trout, little appears to have been done in this country since the experiments of Mr. Shaw, of Drumlanrig, so well known in connection with the development of the salmon, who, in a paper read before the Royal Society of Edinburgh in 1843, detailed the various phases in the growth of this fish. He procured the ova and milt by shooting a pair of adult salmon-trout in the act of spawning in the river Nith, and after fertilization placed the eggs in an apparatus and hatched them. The young fish he afterwards reared to the parr-stage (first year), and then to that of the "orange" or "yellow fins" (second year). As in the salmon, he found the young males at the age of 18 months and upwards with the milt fully developed. The young salmon-trout at this stage bear a close resemblance to the common river-trout. At the age of two years, and when about 7½-inches long, many assume the migratory dress of silvery scales. Mr. Shaw observes that their characters in this condition are :—"Dark brown on the back, passing gradually into a white silvery appearance on the sides and belly; the pectoral fins are white, with the extremities (⅓) orange; ventral fins pure white; anal fin white, with a faint dusky mark on each side; dorsal fin light-brown, inclining to black at the extreme points of the anterior rays, which are tipped with a very little white; posterior rays have a faint tinge of orange, and the whole fin is much spotted; adipose fin dark-brown margined with red; caudal rays of a light colour near the base, running into a dark orange, terminated by a faintly-marked double margin of black. The spots on the back and sides vary much, prevailing principally along the back, with a few below the lateral line. Each spot is surrounded by a circle of a lighter colour than the general surface of the body, and this appears to be a prevailing character of the trout-species, and one which the sea-trout fry exhibits even after having assumed the migratory dress, when every other feature of resemblance to the common trout has disappeared." One of the most important points noticed by this careful observer was that "a certain number of the individuals of both sexes (probably about one-fourth of each brood) never assume the silvery exterior, or migratory dress; and even if those which have assumed that appearance be detained in fresh water for a month or two, they will re-assume the dusky coating; and the ensuing autumn both sexes have

their re-productive organs fully developed." Mr. Shaw, indeed, reared young from these specimens, at the age of 2½ years. He adds—"it is by no means improbable that portions of each brood are permanent residents in fresh water, as they are never observed to migrate in a dusky state, along with the shoals of silvery fry. In support of such views we have the authority of Dr. M'Culloch, who states that sea-trout are now permanent inhabitants of a fresh-water loch in the island of Lismore."

He now marked certain young salmon-trout on their way to the sea, as in the experiments subsequently performed in the Tweed, the conclusions he arrived at being that the "orange" or "yellow fins" became *hirlings* of six or seven ounces, after a sojourn of about ten weeks in the sea the first season, and ascend their native rivers to spawn; and that they return the next and each subsequent season as salmon-trout, with an increase of about 1½ lb. per annum.

On examining the "yellow fins" of the Allan-water one naturally places them in two series, viz., those which group themselves round the *Salmo brachypoma* of Dr Günther, and those which may be ranged under *Salmo trutta*. All the examples I have seen are of larger size than the ordinary salmon-smolts, but show quite as distinctly the loose scales of the migratory fish.

The former, perhaps, appear to be less common than the latter, but their close resemblance to salmon-smolts may have prevented their capture, or else they had gone to sea earlier. The examples of this form (falling under *S. brachypoma*) generally extend from 7 to 7½ inches in length; and each weighs rather less than two ounces. It possesses the characteristic dull bluish or greenish black dorsum, so different from the aspect of a common or "yellow" trout, and in its migratory condition is silvery throughout; the cheeks, which possess only two or three dark spots, especially appearing in strong contrast with the same parts in the trout. There is a faint reddish hue on the edge of the adipose fin, and a tinge of the same colour along the dorsal and ventral edges of the caudal. Numerous dark spots exist on the sides above the lateral line, and some in front below it; while a few very faint reddish spots occur on the sides, occasionally visible only on one side. The pectoral fins are pale lemon, with a little black pigment towards the tip. The ventral and anal are quite pale. The tail has a blackish border

posteriorly, then a pale belt--bounded by another dark pigment-band, but this feature is less marked than in the other form. The head is shorter than in the latter of the same size, and the snout less acute. The shortness of the præoperculum in the young fish is seldom of great diagnostic value, at least it is not so in our specimens. The maxillary is perhaps somewhat shorter and smaller than in the next group. The vomerine teeth form a double series, but in a zigzag line, differing in this respect both from the young of the common or "yellow" trout, and the young salmon-trout. The number of the pyloric appendages, again, in our specimens ranges from 43 to 44. In its migratory condition this fish cannot be mistaken for a common or "yellow" trout; indeed, a well-known angler in the Tay and other rivers in Perthshire at once said it was a salmon-smolt, and held to this opinion. Dr. Young does not appear to have seen this fish, though it is equally a "yellow fin" with the others, and his diagnostic characters—especially those of the vomerine teeth and pyloric cæca—are inapplicable in this case.

In its fully-developed migratory condition the other "yellow fin" (of the *Salmo trutta* series) has the same dark-bluish or greenish back—as in the salmon-smolt, bright silvery sides, and numerous distinct red spots along as well as above and below the lateral line. There are also many black spots on the sides, and a few on the opercula. The tail has a distinct border of blackish pigment, and then a pale band, bounded by an inner belt of black. The fatty fin, and the dorsal and ventral edges of the caudal are generally bordered with red, the former edge of the tail frequently showing a deeper hue than the latter. The maxillary is comparatively slender. The vomerine teeth form a single series, the points, however, being sometimes inclined alternately right and left. The pyloric cæca in our examples ranged from 49 to 57, the latter number only once, and the next highest being 54. The number given by Dr. Young (59) may be considered above the average; just as his computation (35) of the pyloric appendages in the common trout is certainly below the mark.

On contrasting a small "yellow fin" with a salmon-smolt and a common or "yellow" trout of the same size, we find a very interesting gradation in the various characters. The general shape of the salmon-smolt is the most elegant—that of the

trout least so; the distance between the fatty fin and the origin of the caudal rays, moreover, is shortest in the common trout, and longest in the salmon. The dark back of the "yellow fin," its silvery sides and cheeks, and the silvery and whitish belly, stand in strong contrast with the young river-trout. The red spots on the sides are much more developed in the latter than in the "yellow fin;" while in the smolt they are only faintly seen after rubbing off the scales.

The pectorals of the "yellow fin" are dull or brownish orange, often closely resembling those of the common trout in colour, though they sometimes possess a little more blackish pigment. In the salmon-smolt they are occasionally darker with a tinge of green (Stormontfield specimen). There is likewise a regular gradation as to the shape of the fin, which is largest in the trout and most pointed in the salmon; the "yellow-fin" holding an intermediate position.

The dorsal of the "yellow fin" presents a few red spots amongst the dark, as in the common trout, and there is the same gradation in regard to size, being largest in the trout, least in the smolt. In a "yellow" trout and a "yellow fin" of the same length there is a very appreciable difference in the position of this fin, which is decidedly further forward in the latter,—the same variation occurring in the fatty, ventral, and anal, as noticed in the first glance at the fish. Dr. Günther observes that "the interneural spine of the first long dorsal ray is attached to the seventeenth vertebra," and in the "yellow fin" this is found to be the average, the first ray in the "yellow" trout being a few vertebræ further back.

The reddish edge of the fatty fin is most marked in the common trout, is present in a less degree in the "yellow fin" (though in some scarcely noticeable), and is absent in the smolt. The blackish pigment at the base of this organ is more developed in the "yellow fin" than in the trout. It is needless to add that no scientific naturalist would base his distinctions of such species on colours alone, far less on the colour of a fin.

The tail of the "yellow fin" is more deeply cleft than in the common trout, and the rays longer,—the smolt, however, surpassing it in both characters. The border of blackish pigment is more evident in the "yellow fin" than in the trout. The

reddish coloration of the dorsal and ventral edges of the tail is less developed in the former than in the latter.

In regard to the maxillaries the same progressive series occurs. The smolt has the shortest bone, the "yellow fin" having a decidedly larger structure, extending behind the middle of the eye, while in the trout a still further increase in size is apparent. Moreover, the maxillary is less ossified in the two former, though this is a character on which too much reliance should not be placed in the discrimination of young specimens.

The pyloric appendages show the same peculiarities. In the salmon they range from 53 to 77 (Günther). Most of the Stormontfield smolts had 60. In the adult fish these cæca are the favourite haunts of tapeworms and gregariniform parasites. The "yellow fins," again, present a number varying from 49 to 57 in our specimens: while in the common trout of the Tay, Ericht, Allan-water, and the mill-stream at Stormontfield, the appendages ranged from 38 to 56. There is thus a gradation, though the highest number given by Dr. Günther in the case of the common trout is below our reckoning.

The peculiarities as to the fin-rays, rows of scales, vertebræ and pyloric cæca, will be best explained by the following table from Dr. Günther's Catalogue of the Salmonoids.

	Dor.	An.	Pect.	Ven.	L. lat.	L. trans.	Vert.	Cæ. Pyl.
S. salar, - -	14	11	14	9	120	$\frac{22\text{-}26}{19\text{-}22}$	59-60	53-77
S. trutta, - -	13	11	15	9	120	$\frac{24\text{-}26}{36\text{-}34}$	59-60	49-61
S. fario (Scotch),	13-14	11-12	14	9	120	27-30	59-60	33-46
S. brachypoma, -	13	10-11	14	9	118-128	27-30	59	45-47

The sexes in the "yellow fins" could be made out in all cases with ease. In a small specimen (about 5 inches) from Stormontfield mill-stream the ova were quite visible to the naked eye as minute grains; while in the larger specimens from the Allan-water, some showed considerable activity in the ovaries, so that it is possible they might spawn in autumn. Most of the specimens were females.

Dr. Young asserted that he did not find a silvery coat in other than sea-going fish, but doubtless he meant the loose scales of the young migratory fishes, since the Loch Leven trout, amongst others, is an example to the contrary; and Dr. Günther

observes that "specimens of *S. fario* frequently descend to the sea, and assume a bright coloration, with numerous x-shaped spots." The fishermen state that the common trout is sometimes caught in the salmon-nets on the beach at St. Andrews, especially after a flood in the rivers. There is a parr also in the Museum of the Literary and Antiquarian Society of Perth, stated to have been taken from the stomach of a skate ten miles beyond the Bell Rock.

The question of hybrids need not be discussed at present, as all assuming the migratory dress and going to the sea ought certainly to be included in the operation of the Act.

There can be no question, therefore, as to the propriety of preserving the "yellow fins," both in regard to existing legal provisions, the welfare of the salmon fisheries, and the public. Though, perhaps, not more than 1,200 young salmon-trout are caught annually in the Allan-water, this alone is a very serious withdrawal of valuable food from the community. The "yellow fin" weighs on an average from 2 to 2½ ounces, and is of little value for culinary purposes; whereas, the next year (having in the meantime visited its native waters as a *whitling**) it returns a fine salmon-trout of 2 lbs. and upwards. When the migratory dress is assumed, there can be neither doubt nor difficulty: all such ought to be returned to the river. It is almost as easy to discriminate the migratory fish from the ordinary "yellow" trout as to distinguish a young pheasant from a partridge; and in these times, especially after the present proceedings, there is not much room for confusion. In the case of those specimens which remain in the streams and put off their silvery coating (a feature requiring further investigation), I daresay the law will not be too severe, though such fish are said to be able to propagate young which migrate, as in the parent-stock.

Since the Tay must harbour many of these young salmon-trout, it perhaps might be well to devote some attention to them by hatching ova from carefully-ascertained parents in a separate compartment at Stormontfield, and minutely comparing their development and subsequent history with the salmon.

* It is called *Lammasman* subsequently on its way to the sea, according to Dr. Parnell.

PHYTOLOGY.

SCOTTISH GALLS.

By J. W. H. TRAILL, M.A.

THE following notes are supplementary to my notes in this magazine on Scottish Galls, giving the names of the gall-makers in a few cases, and adding new localities for others.

Those on *Brassica oleracea* (Kail), are formed by *Ceuthorhynchus sulcicollis* Gyll. I have lately found them in great abundance near Aberdeen.

QUERCUS ROBUR L.—*(a)* is the gall of *Cynips divisa* H. : it is generally distributed wherever there is oak; *(b)* is the gall of *Cynips gemmæ* L. *(C. fecundatrix*, H.*)*; *(c)* of *Andricus curvator* H. In describing this gall, I omitted to mention that it contains a small inner gall, which is about the size of a whinseed, brown, and very thin, and attached to the inside of the larger gall. Inside of this inner gall the larva lives. I have found the gall in April among fallen leaves some miles north of Aberdeen. *(d)* Of this gall also I took specimens this spring with the last. *(e)* I have found in several localities near Aberdeen on fallen leaves with the last. *(f)* Of the marble galls from Kinnoull the majority prove to be the noted Devonshire galls,* formed by *Cynips lignicola* H. *(C. Kollari* Gir.*)*. They are spherical, about ¾ of an inch in diameter, smooth, or with a few small projections, and brown, usually with a tinge of green, in colour. They are monothalamous, the central cavity being very small in proportion to their size. *(g)* One of the galls, however, is of a different species from the above, being smaller, green, and polythalamous. *(h)* Among those

* At the April meeting of the Perthshire Society of Natural Science, Colonel Drummond Hay and Messrs. Herd and M'Farlane mentioned that they had observed specimens of this gall (for three or more years) at Seggieden, Moncreiffe Hill, and Methven Bog.—EDITOR.

found by me on the twigs of oaks on Kinnoull were also several specimens of "Oak-apples," but all of small size, the largest not being over 1½ inch in diameter. They form irregular masses, smooth and soft externally when unbroken, woody and hard internally, and made up of a mass of cells. Those I got were brown in colour; they are formed by *Teras terminalis* Fab.

FAGUS SYLVATICA L.—The galls occur on the upper surface of the leaves, from which they project, resembling rifle bullets, contracted at the base, in shape. On the underside of the leaf, below the gall, there is a low blister. They are about ⅛ of an inch in height, by half as much in greatest breadth. Those which I have seen are naked, somewhat wrinkled, and brown. They are monothalamous, and thin-walled. The most usual situation is in the axil of one of the chief veins, but they may be on any part of the leaf. Mr. Tait first sent me them from Inverury in April, and since that date I have found them commonly on fallen leaves of beech, at Hazelhead, near Aberdeen. Mr. Müller informs me that the gall is formed by *Hormomyia piligera*, and that, when it continues long enough on the tree, it becomes covered with erect hairs; none of those which I have found has reached this stage, however. The gall is readily knocked off the leaf; the insect emerges by a hole in the side.

ABIES COMMUNIS, L.—The galls described by me from this tree are formed by *Adelges abietis* L. (*b*) I have also found this year on this tree what I take to be galls of *Adelges strobilobius* Kalt. They are terminal, of much smaller average size, and the scales of which they consist are smaller, making them look more compact than the former.

EQUISETUM *sp.*—I must withdraw the excrescences found on *Equisetum* from my list, as Mr. Hardy informs me that they are merely vegetable excrescences, as he has found them in the young stage, while full of sap.

Flowering of Araucaria imbricata.—An *Araucaria imbricata* which I planted in my garden upwards of twenty years ago has this year thrown out two strobiles or cones from the extremities of two of the top branches. When purchased, it might be about four or five years old. The present age of the

tree, I should think, would be some twenty-seven or twenty-eight years. It is planted at the bottom of my garden in a situation where the roots can get abundance of moisture at a depth of three or four feet. It has grown steadily without a check ever since it was planted, and has attained a height of nearly 25 feet. The intense frost of December, 1859, which killed the large *Araucarias* in the Edinburgh Botanical Gardens and all the *Araucarias* in the nurseries of this neighbourhood, did no perceptible injury to mine. This may have arisen from its being well sheltered from the east by a screen of lofty hollies. In a letter received from Mr. Fowler, gardener to the Earl of Stair, Castle Kennedy, where there is perhaps the largest collection of *Araucarias* in Scotland, he says: "If your plant proves to be a female one, the fact of its bearing cones will be interesting, as I am not aware of any other plant in Scotland, as yet, bearing cones, although several male plants have had catkins, some of which were sent to me from a plant at Bergany, near Girvan, last year. The first in England which bore cones and ripened seed was at Bicton, a good many years ago. Although none of our *Araucarias* have as yet either produced cones or catkins, many of the other newer conifers are *coning* freely, and in some cases ripening seed abundantly." In another part of his letter Mr. Fowler says: "From your description of your fine *Araucaria* I cannot say whether it is a male or a female plant. The male catkins are ovate-cylindrical, and grow in clusters at the ends of the branches; whereas the cones are solitary and erect, growing from six to eight inches in height, and about the same in breadth, and are of a dark-brown colour, with the scales regularly and closely imbricated." From this description I am satisfied that mine is *A. imbricata fœm.* If you can find space for this in the *Scottish Naturalist* it may interest some of your numerous readers. Since writing the above, the following note by Mr. Andrew Murray, F.L.S., a great authority on *Coniferæ*, has been communicated to me: "As to Mr. Fraser's inquiry about the *Araucaria*, I forget whether it has ever coned in Scotland before. It is long since it has done so, abundantly, in England. Until within the last twelve or eighteen months we used to consider it a dicœcious tree, that is, one with the male and female flowers on different individuals, and in the great majority of cases it certainly is so; but last year, or the year before, some of the trees at Bicton began to have both male and female flowers on the same tree. We also used to think the close-growing, strong, pushing plants the females, and the more sparse and slighter-branched ones the males; but Mr. Barnes, who was gardener at Bicton, where the largest and finest collection is, says that he could never find any character by which to predicate whether a tree would bear the one kind of flowers or the other. This, I believe, Mr. Fraser may accept; but I would still regard the tree as dicœcious, notwithstanding the aberrant peculiarity of last year. I have seen the largest tree at Dropmere covered with hundreds of male catkins, and not a single female catkin among them; and, generally speaking, the same has been the case everywhere else."—JAMES FRASER, Colvend Manse, 23d May, 1872.

VARIOUS NOTES.

Mr. C. P. Hobkirk, of Huddersfield, announces his intention, should be receive sufficient encouragement, of publishing a "Synopsis of British Mosses" containing descriptions of all the species known as natives of Britain. The price to subscribers is 5s., and we hope that Mr. Hobkirk will not be obliged to relinquish his scheme for want of support. Such a work is much needed.

PLATE VI.

In the last number (January and April, 1872) of the Journal of the Scottish Meteorological Society, Mr. Buchan continues his valuable papers on the rainfall of Scotland. He treats this time of the average monthly rainfall. The paper is illustrated by numerous tables and diagrams, and should be in the hands of everyone interested in the climatology of Scotland. The rest of the Journal is occupied by the usual reports.

In the "*Journal of Botany*," (which is now edited by Dr. Trimen), for June among several articles of general interest is a note upon *Carex Davalliana*, by Professor Babington, and a suggestion (which we hope our friends in Aberdeenshire will not lose sight of) by the editor that Scottish botanists who have the opportunity should look after this plant.

Persons interested in transatlantic microscopy will perhaps be glad to hear of the "*Lens*," a quarterly journal published in Chicago, and edited by Mr. S. A. Briggs, the second number of which has recently appeared.

We had marked several passages for transcription in our interesting contemporaries the "*American Naturalist*" and the "*Canadian Entomologist*," but the pressure on our space has prevented them appearing in this number.

From the same cause we cannot do more at present than merely allude to several recent publications interesting to Scottish naturalists. A Catalogue of the *Hemiptera Heteroptera* of Northumberland and Durham by T. J. Bold (Nat. Hist. Trans. of Northumberland and Durham, vol. iv. 1872) contains a list of 151 species. This list should be useful to collectors in the south of Scotland. Mr. J. Hardy, the active secretary of the Berwickshire Naturalists' Club, contributes to the transactions of his club a second paper on the Entomology of the Cheviots, recording 500 species. Dr. Angus Smith, F.R.S., in the first part of a "Descriptive List of Antiquities near Loch Etive" (Proceedings Soc. Antiq. Scotland, vol. ix.), makes some suggestions as to growth of peat. Dr. Smith thinks that "we may have from 10 to 30 inches of open fibrous peat in a century, according to the nature of the water supplying the moss."

We must not, however, omit to notice the "Tineina of North America," being the collected writings on that subject of the lamented American micro-lepidopterist, Clemens, edited by our great authority on Tineina, Mr. H. T. Stainton, F.R.S. This work, though treating only of transatlantic species, will no doubt be of use to workers in this country.

Microscopical Puzzles.—The correct and exact interpretation of phenomena—the determination of the true character of the structures—observed under the microscope is a matter frequently of much greater difficulty than may be supposed by the uninitiated. We have thought it worth while to illustrate this statement by means of a plate (Plate vi.) exhibiting certain curious looking bodies, regarding whose nature the most opposite opinions would probably be given by zoologists, botanists, mineralogists, histologists, and pathologists. If told that the bodies in question occurred in pond-water, the zoologist would probably declare them to be *Infusoria;* and the reader may find bodies precisely similar in appearance figured in the "Quarterly Journal of Microscopical Science" (for January, 1872, p. 74) as fresh-water *Radiolariæ*. It happens, however, that the bodies figured in our own plate were contained in the ejecta from the stomach and intestines of hospital patients, and are simply some of the forms under which the *fatty* matters of our food appear while in process of digestion. Their true nature is proved by the action of heat and ether, under which they rapidly disappear. An argument this in favour of the use of chemical *reagents* in microscopical research.

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 202.)

EDITED BY F. BUCHANAN WHITE, M.D.

EREBIA Boisd.

EPIPHRON Kn. Very local. Alpine. From 1600-3000 feet.

DISTRIBUTION—EAST. o ♀ ♀ Tay ♀ ♀ ♀ o o
WEST. o Clyde Argyle ♀ o

LAT. 56°10″-56°50″. RANGE IN EUROPE. Hercynian and Silesian Mountains. TYPE. Alpine. TYPE IN BRITAIN. Alpine. DERIVATION. Central Europe.

TIME OF APPEARANCE—IMAGO. June-August. LARVA. ——? FOOD-PLANT. ——?

NOTE.—The form found in the north of England is the var. *Cassiope* F. (the red spots less distinct, and the eye-spots without white pupils), whose range in Europe is more extensive than that of the type. *Epiphron* Kn.—the Scottish form—is larger, has a more distinct band of red spots, and the black eye-spots have white pupils in the female. The specimens before me from Perthshire belong to the type. Does the var. *Cassiope* occur in Scotland?

ÆTHIOPS Esp. (1777); *Blandina* F. (1793); [*Medea* S.V. was another butterfly—*teste* Staudinger.] Local. Nemoral. Ascends to 1500 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde Argyle ♀ o

LAT. 55°-57°40″. RANGE IN EUROPE. Central; to the north, Livonia; to the south and east, Caucasus. TYPE. Centro-oriental. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. September-June. FOOD-PLANT. Grasses.

The poverty of the Scottish mountains in species of this genus is remarkable. Twenty-three species occur on the Alps of Central Europe, and six in Scandinavia, while four are both boreal and alpine. Perhaps the most likely to occur in Scotland is *Lappona* Esp. (found in July and August), and next to that,

Medusa S.V. (in mountain woods in May and June), *Ligea* L. (July, August, in less elevated districts), or *Euryale* Esp. (on mountains in July and August). *Ligea*, as is well known, is *said* to have been taken in Arran. The evidence to that effect is, however, so unsatisfactory that we cannot in the meantime include it in the list of Scottish insects. Mr. A. G Butler has shewn (Ent. Monthly Mag., iv. 151) that Stephens has figured (Ill. Brit. Ent.) *Euryale* Esp. as the male of his *Ligea*, said to have been taken in Arran.

The other genera of this family are not so alpine, but still there are several Central European and Scandinavian species, which might have been expected to occur in Britain.

ERYCINIDÆ Leach.

NEMEOBIUS Stph.

LUCINA L. Rare. Nemoral.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

LAT. 55°. RANGE IN EUROPE. Central (except the east); to the north—south Sweden; to the south—central Spain; to the east—north Turkey. TYPE. Centro-occidental. TYPE IN BRITAIN. English.

TIME OF APPEARANCE - IMAGO. May. LARVA. June-August. FOOD-PLANT. Primrose and cowslip.

PIERIDÆ Leach.

PIERIS Schrk.

BRASSICÆ L. Abundant. Agrestal. Ascends to 1700 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♀
Orkney ♀
WEST. Solway Clyde Argyle West-Ross Hebrides

LAT. 54°40″-59°20″. RANGE IN EUROPE. Nearly throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. April-August. LARVA. May September. FOOD-PLANT. Cultivated *Cruciferæ*, *Tropæolum*, and *Reseda*.

RAPÆ L. Abundant. Agrestal. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♀
Orkney ♀
WEST. Solway Clyde ♀ West-Ross ♀

LAT. 54°40″-59°20″. RANGE IN EUROPE. Nearly throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. April-August. LARVA. May-September. FOOD-PLANT. *Cruciferæ*, *Tropæolum*, and *Reseda*.

There seems some reason to doubt whether this species and *P. Brassicæ* are not introductions in the north, since they are probably never found at any distance from cultivation, nor the larva upon any but cultivated plants.

NAPI L. Abundant. Agrestal. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde Argyle West-Ross ♀

LAT. 54°50″-57°50″ RANGE IN EUROPE. Throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. April-August. LARVA. May September. FOOD-PLANT. Water Cress and other *Cruciferæ*. The absence from Scotland of *Aporia crataegi* L., a species that is British and goes far north in Europe (even to southern Lapland), is curious.

ANTHOCHARIS Boisd.

CARDAMINES L. Common in the south; less so in the north. Pascual and nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde ♀ o o

LAT. 54°50″-57°40″ RANGE IN EUROPE. Throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. April-June. LARVA. June, July. FOOD-PLANT. *Cruciferæ*.

COLIAS Fab.

EDUSA F. Not common. Maritime. Agrestal.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway Clyde o o o

LAT. 55°-56°20″ RANGE IN EUROPE. Central and South. TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. August-October. LARVA. June, July. FOOD-PLANT. Trefoil.

The authority for the occurrence of this species in "Tay" is Mr. J. P. Duncan, who informs me that he took a specimen in the parish of Monimail, Fifeshire, on August, 29th 1842.

C. Palæno L. may perhaps occur on some of the unexplored mountains.

Parnassius Apollo L. is said to have been seen and captured in Scotland, but we fear that we cannot yet include this fine species in our list The food-plant of the larva is said to be some of the alpine or subalpine species of *Sempervivum*. There are no indigenous species of this genus in Britain, but the Rose-root (*Sedum Rhodiola* L.), another plant belonging to the same natural order

and which is not uncommon on many of the mountains, would no doubt be readily eaten by the larva, and possibly some of the species of *Saxifraga*, so abundant on our mountains, might also supply a food-plant, *P. Apollo* occurs (on hills and mountains) throughout Europe, except Britain and the polar regions.

LYCÆNIDÆ Leach.

LYCÆNA Fab.

MINIMA Fuessl. (1775); *Alsus* S.V. (1776). Local. Pascual Ascends to 1400 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde Argyle o o

LAT. 54°50″-57°40″. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May-July. LARVA. June-May. FOOD-PLANT. Kidney-vetch, *(Anthyllis vulneraria.)*

ICARUS Rott. (1775); [*Alexis* F. (1775) was another species.] Common. Pascual and ericetal. Ascends to 2000 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀
Orkney ♀
WEST. Solway Clyde Argyle West-Ross Hebrides.

LAT. 54°50″-59°. RANGE IN EUROPE. Throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July; August, September. LARVA April, May, July. FOOD-PLANT. Bird's-foot trefoil, *(Lotus corniculatus)*, and rest-harrow *(Ononis)*.

ASTRARCHE Bgstr. (1779); *Medon* Esp. (1777), [but *Medon* Cl., L. was another species]; *Agestis* (S.V. *pro parte*) Hb. (1793).

Var. *Artaxerxes* F. Local. Rupestral. Ascends to upwards of 1500 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee o o o o
WEST. Solway Clyde o o o

LAT. 54°50″-57°20″. RANGE IN EUROPE. Scotland, and north of England. TYPE. Scottish. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. June-August. LARVA. July-May. FOOD-PLANT. Rock-rose (*Helianthemum vulgare*). *Astrarche* ranges throughout the countries of the European Fauna, except the northern regions.

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from p. 208.)

EDITED BY D. SHARP, M.B.

QUADRIMACULATUS L. Common. Under bark. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde o o o

QUADRINOTATUS Panz. Not common. Under bark. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. ♀ Clyde o o o

NIGRIVENTRIS Th. Scarce. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray o o o
WEST. o o o o o

MELANOCEPHALUS Dej. Rare. Lowland.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway o o o o

METABLETUS Schaum.

[**TRUNCATELLUS** L. Doubtful as Scottish.

DISTRIBUTION. "Cramond." Murray.

FOVEOLA Gyll. Local. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray o o o
WEST. ♀ Clyde o o o

LEBIA Schaum.

CRUX-MINOR L. Very rare. Lowland.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway Clyde o o o

CHLOROCEPHALA Ent. Heft. Rare. About broom. Lowland.

DISTRIBUTION—EAST. Tweed Forth o o o Sutherland o o
WEST. Solway Clyde o o o

CYMINDIS Schaum.

VAPORARIORUM L. Local. Highland, alpine.

DISTRIBUTION—EAST. Tweed Forth ♂ Dee ♂ ○ ○ ○
WEST. ○ Clyde ○ ○ ○

LORICERA Schaum.

PILICORNIS Fab. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♂ Moray ♂ ○ ○
WEST. Solway Clyde ♂ ○ ○

CHLÆNIUS Schaum.

NIGRICORNIS Fab. Rare. Lowland.

DISTRIBUTION—EAST. ♂ Forth Tay ○ ○ ○ ○ ○
WEST. Solway Clyde ○ ○ ○

BADISTER Schaum.

BIPUSTULATUS Fab. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♂ Moray ○ ○ ○
WEST. Solway Clyde ○ ○ ○

[**SODALIS** Duft. Doubtful as Scottish.
"Loch Awe, Dr. Leach," Ent. Edin. I am nearly certain this is an error.

BROSCUS Schaum.

CEPHALOTES L. Common. Maritime.

DISTRIBUTION—EAST. ♂ Forth ♂ ♂ Moray ○ ○ ○
WEST. Solway Clyde ○ ○ ○

MISCODERA Schaum.

ARCTICA Payk. Local. Alpine.

DISTRIBUTION—EAST. Tweed ○ Tay Dee ○ ○ ○ ○
WEST. ○ Clyde ○ ○ ○

SPHODRUS Dej.

LEUCOPHTHALMUS L. Very rare. In cellars and outhouses.

DISTRIBUTION—EAST. ○ ○ ○ ○ ○ ○ ○ ○
WEST. Solway ○ ○ ○ ○

PRISTONYCHUS Dej.

SUBCYANEUS Ill. Scarce. In outhouses.

DISTRIBUTION—EAST. Tweed Forth ♂ ♂ Moray Sutherland ○ ○
WEST. Solway Clyde ○ ○ ○

CALATHUS Schaum.

CISTELOIDES Panz. Abundant. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ ○ ○
WEST. Solway Clyde ♂ ○ ○

FLAVIPES Fourc. Local. Maritime.

DISTRIBUTION—EAST. ○ Forth ○ ○ Moray ○ ○ ○
WEST. ♂ Clyde ○ ○ ○

FUSCUS Fab. Local. Lowland.

DISTRIBUTION—EAST. ♂ Forth ♂ ♂ Moray ○ ○ ○
WEST. ○ ○ ○ ○ ○

MOLLIS Marsh. Local. Maritime.

DISTRIBUTION—EAST. ♂ Forth ♂ ♂ Moray ○ ○ ○
WEST. Solway Clyde ○ ○ ○

MELANOCEPHALUS L. Abundant. Lowland, highland, alpine.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ ♂ ♂
WEST. Solway Clyde ♂ ♂ ♂

Var. *nubigena* Haliday. Not uncommon on the higher hills.

MICROPTERUS Duft. Common. Lowland, highland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ○ ○ ○
WEST. ♂ ♂ ○ ○ ○

PICEUS Marsh. Scarce. Lowland.

DISTRIBUTION—EAST. Tweed Forth ♂ Dee Moray ○ ○ ○
WEST. Solway ♂ ○ ○ ○

TAPHRIA Schaum.

NIVALIS Panz. Scarce. Lowland.

DISTRIBUTION—EAST. ♂ Forth Tay Dee ♂ ○ ○ ○
WEST. Solway ♂ ○ ○ ○

ANCHOMENUS Schaum.

JUNCEUS Scop. Common. Lowland.

DISTRIBUTION—EAST. ♂ ♂ ♂ Dee ♂ o o o
WEST. Solway Clyde ♂ o o

PRASINUS Thunb. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♂ Moray ♂ o o
WEST. Solway Clyde ♂ o o

ALBIPES Fab. Abundant. Riparial.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ o o
WEST. Solway Clyde ♂ o o

MARGINATUS L. Local. Lowland.

DISTRIBUTION—EAST. ♂ Forth ♂ o o o o o
WEST. Solway Clyde o o o

ERICETI Panz. Local. Lowland, highland. Mosses.

DISTRIBUTION—EAST. ♂ Forth Tay o o o o o
WEST. Solway Clyde o o o

PARUMPUNCTATUS Fab. Abundant. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ ♂ ♂
WEST. ♂ Solway Clyde ♂ ♂ ♂

VIDUUS Panz. Not common. Lowland.

DISTRIBUTION—EAST. ♂ ♂ ♂ ♂ Moray o o o
WEST. ♂ Clyde ♂ o o

Var. *mœstus* Duft. Not common. Lowland.

DISTRIBUTION—EAST. ♂ Forth ♂ ♂ ♂ o o o
WEST. Solway Clyde o o o

This is considered a distinct species by many, but it appears to differ from *viduus* only by its entirely black colour.

ATRATUS Duft. Very local. Lowland. Near the mouths of tidal rivers.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway ♂ o o o

Abundant on the banks of the Nith, below Dumfries.

MICANS Nic. Very local. Riparial.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway o o o o

PICEUS L. Local. Lowland.

DISTRIBUTION—EAST. ♂ Forth ♂ o o o o o
WEST. Solway Clyde o o o

GRACILIS Gyll. Common. Lowland, highland.

DISTRIBUTION—EAST. Tweed Forth Tay ♂ Moray o o o
WEST. Solway ♂ o o o

FULIGINOSUS Panz. Abundant. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♂ Moray o o o
WEST. Solway Clyde o o o

PUELLUS Dej. Very local. Lowland.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

Abundant about Duddingstone Loch.

OLISTHOPUS Schaum.

ROTUNDATUS Payk. Not uncommon. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde. o o o

STOMIS Schaum.

PUMICATUS Panz. Not common. Lowland.

DISTRIBUTION—EAST. ♂ Forth Tay ♂ Moray o o o
WEST. Solway Clyde o o o

PTEROSTICHUS Schaum.

CUPREUS L. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♂ Moray o o o
WEST. Solway Clyde o o o

VERSICOLOR Sturm. Abundant. Lowland, highland.

DISTRIBUTION—EAST. ♂ Forth Tay Dee Moray ♂ ♂ ♂
WEST. Solway Clyde ♂ ♂ ♂

LEPIDUS Fab. Very local. Lowland.

DISTRIBUTION—EAST. o o Tay o Moray o o o
WEST. o Clyde o o o

VERNALIS Panz. Rare. Lowland.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway Clyde o o o

NIGER Schall. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ o o
WEST. Solway Clyde o o o

VULGARIS L. Abundant. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ o o
WEST. Solway Clyde o o o

NIGRITA Fab. Abundant. Lowland. Highland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ ♂ ♂
WEST. Solway Clyde ♂ ♂ ♂

MINOR Gyll. Local. Lowland.

DISTRIBUTION—EAST. Tweed ♂ Tay o o o o o
WEST. Solway o o o o

STRENUUS Panz. Not common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay ♂ o o o o
WEST. Solway Clyde o o o

DILIGENS Sturm. Not common. Lowland.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway Clyde o o o

OBLONGO-PUNCTATUS Fab. Very local. Highland. In fir-woods.

DISTRIBUTION—EAST. o o Tay Dee o o o o
WEST. o o o o o

VITREUS Dej. Not common. Highland.

DISTRIBUTION—EAST. Tweed ♂ Tay Dee Moray ♂ o o
WEST. Solway Clyde Argyle ♂ ♂

MADIDUS Fab. Abundant. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

A variety with the legs black *(concinnus* Sturm.*)* occurs commonly.

ÆTHIOPS Panz. Not common. Highland.

DISTRIBUTION—EAST. ○ ○ ○ ○ ○ ○ ○ ○
WEST. Solway Clyde ♀ ○ ○

STRIOLA Fab. Rare. Lowland.

DISTRIBUTION—EAST. ♀ Forth Tay Dee ♀ ○ ○ ○
WEST. Solway Clyde ○ ○ ○

AMARA Schaum.

FULVA De Geer. Common. Lowland.

DISTRIBUTION—EAST. Tweed ♀ Tay Dee Moray ○ ○ ○
WEST. Solway Clyde ○ ○ ○

APRICARIA Payk. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ○ ○ ○
WEST. ♀ Clyde ○ ○ ○

CONSULARIS Duft. Rare. Lowland.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee ○ ○ ○ ○
WEST. Solway Clyde ○ ○ ○

ALPINA Payk. Very rare. Alpine.

DISTRIBUTION—EAST. ○ ○ Tay Dee ○ ○ ○ ○
WEST. ○ ○ ○ ○ ○

Only two individuals have yet been found: one in Rannoch, the other in Braemar.

SPINIPES L. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ○ ○ ○
WEST. Solway Clyde ○ ○ ○

CONVEXIUSCULA Marsh. Rare. Lowland.

DISTRIBUTION—EAST. ○ Forth ○ Dee ○ ○ ○ ○
WEST. ○ ○ ○ ○ ○

Frequents the banks of tidal rivers. "Near Edinburgh," Murray; Aberdeen *teste* MacGillivray.

(To be continued.)

ZOOLOGY.

THE STUDY OF ENTOMOLOGY.

By J. ALLEN HARKER.

SINCE the time when Kirby and Spence, in the hope of popularising the study of Entomology, presented it to the public in its most attractive form, from being merely the hobby or pastime of a few country clergymen and men of leisure, it has become the ardent pursuit of thousands of enthusiasts of every rank of life, and has attained no inconsiderable position as a branch of learning. Within a much shorter period of time the increase in the number of entomological students has been still more marked. The country naturalist who, twenty or thirty years ago, was obliged to plod on his uphill path alone and without guidance in the shape of periodical or text-book, is now overwhelmed by a superabundance of magazines, guides, and manuals; and the appearance of a butterfly-net in the public streets or highways, which then excited almost as much curiosity as did the first umbrella in the streets of Bath, is now no longer an object of wonder. This is in every way satisfactory, but when on the other hand we look for an amount of progress in our knowledge of the Insect Fauna of the country commensurate with this increase in the number of professed investigators of the subject, the prospect is by no means so gratifying, and the disagreeable truth is forced upon us, that the work has not advanced in an equal ratio with the increase of workers. A slight acquaintance with the entomological literature of other countries may further suggest to us that we are in this respect perhaps a little behind the rest of the world. It is true that much work of the very highest order has been

and is being done by British entomologists; such labours as Mr. Stainton's "Tineina," Mr. Smith's "Catalogue of Bees," Dr. Blackwall's "Spiders," &c., speak for themselves, and the journals and transactions which have from time to time been devoted to the study have had a fair proportion of their space occupied by what are truly contributions to our knowledge. That much is still undone which ought to have been done, seeing what an army of workers profess the study, I think no one who has examined the question will dispute. What, for example, do we know of the life-histories of the greater portion of British Coleoptera or Hymenoptera? And how much of our knowledge of them is borrowed from Reáumur and his successors? What, further, do we know of the Diptera or Hemiptera of the country, beyond bare lists of species that have, in many instances, by the merest accident found a place in our collections? I would by no means be thought to disparage such important and necessary labour as the collecting and registering in proper catalogues of insects of all kinds, but I would most emphatically distinguish between such accessory work and the study of entomology.

If we briefly consider our methods of pursuing the study of entomology, we may discover some of the causes which have apparently hindered that progress of the science which, as we have asserted, is to be desired, and the enquiry may suggest some slight modifications in our systems of working, and point out the true way to study entomology.

Imagine a schoolboy, who, from reading such books as the "Introduction to Entomology" and the "World of Insects," from seeing a collection of insects, or from having accompanied a friend on a collecting excursion, feels a desire to take up the subject for himself; what mode of procedure will be suggested to him? At the very outset he will in all probability be led to misunderstand entirely what it is he is about to do; whether he consult a collecting friend or a book of "hints to collectors," he will run away with the idea, that it must be his first and principal object to get together as many species as he can, either by his own exertions or by a system of barter with his fellows, for a large collection is a *sine qua non.* He will be recommended to procure this or that style of net, setting board, and store-box; will be advised to try this and that

method of collecting and preserving. His love of purposelessly amassing entomological wealth will grow upon him little by little, and the spirit of rivalry will foster the *cacöethes colligendi* (the name by which this particular form of madness is distinguished), till the mere desire of possessing will alone remain. So he will go on from year to year adding largely to his collection, infinitesimally to his knowledge, till he has succeeded in possessing a cabinet to be proud of, full of things of which he knows nothing but the name, fondly imagining that he is devoting himself to the study of entomology, but contributing in no wise to the satisfaction of that

> "—desire that tends to know
> The works of God, thereby to glorify
> The great workmaster,"*

which first induced him to devote his attention to this matter.

That such a spirit too often actuates collectors of insects is to be deplored, but cannot be denied. I cannot better illustrate the truth of it, than by relating an incident which occurred in my own experience some years ago. I was returning one evening, accompanied by a friend, from a visit to a favourite locality for plants, and on passing a small plantation, we saw two or three Lepidopterists among the trees netting moths. Though they were strangers, we ventured to ask if they were taking any interesting specimens; the reply was characteristic, "Nothing new, but some good things for *exchange*"! "Shades of Kirby and Spence" we exclaimed, shedding copious tears (in the spirit) "did ye labour for this?"

Three-fourths of our entomologists devote themselves entirely to the butterflies and larger moths. "Entomology" indeed has come almost to signify "Lepidopterology," and we could have no stronger proof than this of the mistaken ideas that prevail as to what the study really is, for it is evident that the Macro-Lepidoptera, really the least interesting of groups, because least varied in their habits and structure, are chosen as subjects for attention from their attractive colours, the comparative ease with which they are to be obtained and the 'show' which a few of them make.

If I might be permitted to offer advice to the student entering

* Paradise Lost.

on this most engaging study, it would be embodied in this proposition, for which I would claim the position of an axiom, *that the most attractive insect to him is the one of which the least is known.* I would recommend him first to acquaint himself with all that has already been accomplished in that particular branch of enquiry to which he is disposed to incline, and then instead of procuring store-boxes and cabinet, to provide himself with a note book and a microscope, and lastly—to parody the advice Demosthenes gave to the aspirant to oratoric fame—I would bid him in the first place, Observe ! in the second place, Observe ! and in the third, Observe !

Thus, instead of amusing himself by gathering together so many different objects, and verifying (if he took so much trouble) what others have found out for him concerning them, he would pursue the far nobler task of finding out for himself and for others what was previously unknown, and so, by adding, in however small a degree, to the sum of human knowledge would have made successfully the highest effort of which human energy is capable.

The study of insects presents to the beginner many varied fields of research almost all equally replete with interest, and the natural taste of the student will for the most part lead him to that one for which his capabilities and opportunities best fit him. As a country field-naturalist, I am disposed to give pre-eminence to a painstaking investigation of the life-histories of insects. It is on this, as Dr. Laboulbène insists in his admirable address to the Entomological Society of France, that all entomology is based, and to one whose lines are cast in the pleasant places of a country life, it is at the same time the one most suited.

Tastes differ, however, and the allurements of microscopic research will induce many to turn rather to the no less important subjects of Insect Anatomy, Embryology, and Morphology. A microscope of more than sufficient power, is now within the means of almost every one, and the student cannot fail to find it of infinite use to him, let his leanings be what they may. It is, by its means, too, that the philosophic enquirer must make those observations which enable him to trace the relationship of one being to another and to the whole, and to read those secrets of Nature which are hid in these lowly organisms.

The description of new species, the correct classification of

insects, and last, but not least, the unravelling of the mysteries of synonymy are tasks which belong rather to the matured student than to the beginner. To the field naturalist whose entomological library is perhaps small, and whose opportunities of visiting well-arranged museums or more complete libraries are few, these are labours which are impossible, and he must be contented to owe his knowledge of this department to fellow-students whose opportunities or whose abilities are greater.

The question of nomenclature is one which has of late engaged considerable attention. Had entomology had its rise in days of penny post and cheap printing we should have been spared the laborious task of discovering what the proper name of an insect is, and the somewhat unseemly wranglings that take place over the subject. There can be no doubt that we owe to our successors to sift this question once for all, and hereby save them a repetition of the labours we have found so tedious, and it is equally certain that this can only be done by agreeing to admit the claims of strict priority of nomenclature; the absurdity of a name, however much to be deplored, in no way influencing the decision.

There is yet another sphere of usefulness in which the thoughtful student of entomology will feel himself called on to labour, and this is the elucidation of facts in the œconomy of those insects that are beneficial or injurious to man, with a view of aiding the farmer, the nurseryman, and the arboriculturist in ridding themselves of the noxious, and encouraging the increase of the useful. In this branch of enquiry, we are undoubtedly much behind our neighbours. I am not disposed to advocate the cause of that pseudo-utilitarian policy which would lead us to despise all research that does not bear on the face of it the probability of a return in actual pounds sterling, but think that scientific investigation has higher aims and nobler ends than putting pence into pockets. But the modern bug-bear utilitarianism surely means neither more nor less than this, that we should employ our talents to the best of our ability for our truest interests; and so far from entomology derogating from its dignity as a pure science, it is rather ennobling itself by ministering to man's endeavours to add to his power over, and to subdue to himself, the inexorable laws by which he is encompassed. Having indicated in general terms a course of pro-

cedure, I shall take a future occasion to point out the methods to be employed in working at special groups.

The Breck, Poulton-le-Fylde, Lancashire.

MEMOIRS ON SCOTTISH DIPTERA.

By JAMES HARDY,

Secretary of the Berwickshire Naturalists' Club, &c.

No. III.—ANTHOMYIA JACOBÆÆ *sp. nov.* (The Ragwort-seed Fly.)

I HAVE recently noticed a fly which, on three separate occasions, deposited her ova on the flowers of the ragwort (*Senecio Jacobæa*), both in the expanded and the half-opened stages. Its œconomy corresponds with that of *A. sonchi*, to which it bears a considerable resemblance. The white eggs are elongate, subelliptical. The shining black apical joint of the abdomen is rendered very conspicuous during oviposition; and the female is easily captured while thus engaged. I am unacquainted with the male; the female I obtained on the 7th of August.

The *fly* is considerably larger than *A. sonchi*, although closely related to it. It is of a pale grey; the face satiny white, with yellowish testaceous reflection, which is browner on the lower part of the cheeks; the space under the antennæ very light grey, with white reflections; edges of the mouth pale testaceous, and furnished with several stiff black bristles; lower part of the face not prominent; frontal band wide, ferruginous, the hinder portion brown; a white shining spot above the base of the antennæ; the eye-margin wideish, white anteriorly, posteriorly pale grey, with about five strong curved bristles (lying in opposite directions, and rising from black points,) on each side, and two on each side of the vertex; the eyelet triangle, hinder part of the head, and lower part of the face, pale grey; two narrow faint fuscous lines on the hinder head, in a line with the margins of the eyes; trunk rather pitchy at the apex; palpi black, slightly thickened outwardly; antennæ black, third joint subcylindric, seta distinctly short-feathered; eyes brown, naked. Thorax stoutish, pale grey, the sides scarcely lighter; a pale brown short line near the middle of the back; a darker patch

not always seen, above the shoulders, which are themselves paler; some largish fuscous or black points at the base of the black bristles, which are rather stout; scutellum and metathorax unicolorous. Abdomen not much narrower than the thorax, longish ovate, very convex, tapered to the apex, pale grey, with some rubbed darker specks, and a distinct black dorsal line, seen in certain aspects as far as the tip, but more conspicuous on the first and second segments; the anal segment small, shining black; the segments with a considerable scattered stiff pubescence, and a row of long curved bristles before the hinder margin of each. Legs black, slaty on the femora above; the fore and hinder femora subpectinated above and beneath with longish black bristly hair; the middle with few only, and two curved ones near the apex; hinder tibiæ with about twelve spines, placed in different directions; the middle with about ten, mostly encircling the apex; the fore ones with five or six; the foot-pads small, whitish beneath, duskier above. Poisers yellowish; wing-scales moderate, tawny; wing rather yellowed, particularly towards the base; the nervures tawny towards the base, outwardly brown, the costal one darker, fringed with wideish short bristles, and bearing a longish spine; the first cross nervure slanted; the second almost erect and nearly straight. Length 2¾-3 lines; expansion of the wings 6 lines.

The fly is very common on the flowers of the ragwort during the first and second weeks of August.

In September the maggot is prevalent everywhere in the ragwort flowers, and also in those of the marsh ragwort (*Senecio aquaticus*). It destroys the seeds and the receptacle, blackening where it does not devour, and matting the florets together round it as a safeguard from parasites, and sometimes piercing through the receptacle into the stalk. Those flowers that hold them are distinguished by a brown spot on the disk, and the premature fading of the central flosculi.

The *maggot* is dirty white, subopaque, with a testaceous clearer stain along the back posteriorly; very minutely roughened or wrinkled, as if shagreened; thickish, spindle-shaped, tapered anteriorly, and narrowed slightly behind; the segments pretty distinct; a series of foveæ along the sides; the two oral hooks short, the tips only appearing; each above overlapped with a slight pointed fleshy peak; the tracheæ pretty distinct; the an-

terior stigmatic plates at the sides of the posterior part of the second segment, pale testaceous, neatly and closely fringed; the hinder end truncate; the two stigmata situated below the level of the back, only slightly prominent, ferruginous at the tip, which is triply divided; the truncation minutely subgranulose; a slightly depressed area round the stigmata, surrounded by prominent tubercles, of which there is one on each margin in a line with the stigmata, then three in succession downwards, of which the lowermost is at the end of a raised transverse ridge, which, exclusive of these two lateral ones, bears six tubercles, of which there are four in a row, the two in the middle having behind them two others placed more inwardly; this ridge is followed by a transverse hollow, and this again by a ridge, which has a tubercle at each end; the anus is a fissure in a hollow lying behind the second ridge; the belly is less curved than the upper surface, and is considerably ridged across. Length, 2½ lines.

The *puparium* occurs in the centre of the flowers. As usual, it is a contracted cast of the maggot.

No. IV.—**LEUCOPIS OBSCURA** Haliday (Dipterous parasite of *Adelges piceæ* and *A. corticalis.*)

IN the "Entomological Magazine" (i. 173) Mr. Haliday characterized a small agromyzideous fly, under the name of *Leucopis obscura*, which he elsewhere (*lib. cit.* iv. 148) informs us occurred on larch and fir trees, in the month of August, near Holywood in the north of Ireland. More recently Ratzeburg ("*Forst-Ins.*," iii. 170) reared the same fly from the puparia found among the woolly envelope of *Chermes (Adelges) piceæ*, and named it *Leucopis atratula*. ("*Ray Soc. Rep. on Zool. for* 1844," p. 393); and it is probably to the same species that Kaltenbach ("*Monograph. der Pflanzenläuse*, i. 200) refers uuder the name of *Agromyza chermivora*, as proving very destructive to *Ch. (Adelges) corticalis*. On the 4th of February, I first met with the remains of the empty pupa-cases adhering in profusion to the bark of the trunks of silver firs, in spots that had been previously much infested with *Adelges piceæ*, where they had probably remained suspended for years. The *Adelges* having deserted these places, there were no maggots

present, but two specimens were obtained higher up on the branches where their prey was still rife and active. Afterwards on the 6th of May, I found numbers of them on the Scotch pine, particularily in the axils of the leaves, concealed by the white cottony covering of *Adelges corticalis*, which adhered so closly to them, that they were only to be detected by the projection of the hinder apex.

The *maggot* is narrowish, white, shining, nearly spindle-shaped, fore-end much tapered; hinder somewhat again contracted and slightly rounded; segments well defined, each annulated with ridged rings, very thickly be-set with short hirsuties; whitest anteriorly, yellower towards the middle, with black or brownish specks below and above from the nature of the food; mouth provided with two black hooks; the tracheæ wind very much; the fore-stigmata imperceptible, probably opening close behind the head; the hinder stigmata two dusky slightly projecting, not widely placed processes; not far below them, making with them an isosceles triangle, the apex projects somewhat; at its tip is the anus, which appears like a shining brown plate or valve, with a brown irregular edge. Length 1-1¼ line. It uses its oral hooks to facilitate progression by dragging itself onwards; its excrement is black and adhesive like pitch, and previously to entering into the pupa state it discharges a quantity, which glues it to the object on which it is lying, to which it is closely applied, and on which the pupa-case is partially moulded. Both maggots and puparia are dusted over with the flakes of the cottony exudation from the *Adelges*.

I obtained the *pupa-case* at the same time as I did the maggot. It is somewhat oblong, the segments scarcely indicated, the pubescence still visible, light brown, sometimes darker, the fore tip and the under side paler, or chestnut; only slightly shining; the underside flattened; contracted at the fore-tip, where the upper surface is rather depressed; the cast-off oral hooks visible under the skin to which they adhere; hinder apex emarginate; 1 line long. A portion of the case often comes away on attempting to detach it from its support; this is at the fore end, from which a portion is detached to admit of the fly obtaining its freedom.

The *fly* appeared on the 20th of May, and for some time

afterwards. It is black, with a slight slaty tint, obscure or but slightly shining; head transverse, semicircular, almost wider than the thorax; front wide in both sexes; eyelet triangle, a narrow line next the eyes, and a minute arch above the base of the antennæ, slaty; a few very minute black bristles on the crown, and down the sides of the eyes, with a few longer on the hinder margin of the head; face black or greyish, short, obliquely descending, slightly keeled in the middle, mouth-rim high; trunk white; autennæ with the third joint lenticular, moderate-sized, clothed with white down, seta naked. Thorax short subquad rate, convex, blackish, with a slaty shade, but slightly shining, with scattered minute punctures, some, however, of which are in lines, with short hairs on the back and long ones on the sides and near the base; sides and scutellum concolorous, the last with two long hairs at the tip. Abdomen in the female short ovate, blackish, a little more shining; hinder edges sometimes narrowly white, the sides more cinereous, thickish dark grey, pubescent; beneath with two yellow lateral stripes, between which the segments form a series of shining black and yellow cross-bands, the latter being at the hinder margins and narrower; the apex itself shining black; in the male the tip obtuse, the belly obscure, Legs short in the females, black or pitchy, the basal joint of the fore and hinder tarsi at the base only, but in the middle ones entirely pale; in the males almost concolorous. Poisers yellow, the club round; the wings very short, clearish, scarcely darkened, green, brown, and purplish iridescent; nervures distinct; mediustine nervure double, in addition to it there are four longitudinal nervures of which the upper three are subparallel; the two cross nervures lie near the middle of the wing, and of these the upper is slightly oblique. Length not quite 1 line; expansion of the wines 1½ line.

THE NEST OF *FORMICA RUFA* AND ITS INHABITANTS.

(Concluded from p. 222.)

By F. BUCHANAN WHITE, M.D.

IN addition to the rightful owners, the ant-hill is often inhabited by other species of insects which not only manage to hold their own in a place where, one would imagine, any in-

trusion on the part of a stranger would be immediately followed by the violent death of the intruder, but which are not to be found anywhere else.

The relation which these bear to the ants has not yet, in some cases at least, been satisfactorily explained. Some species, however, seem evidently to be encouraged by the ants, who derive from them the benefit of a constant supply of the same sweet honey-like fluid that they obtain by milking the aphides, while others seem to find a suitable home and food in the nest, and to depend on various contrivances for protection against their involuntary (and possibly enraged) hosts.

These sojourners in the cities of *Formica rufa* comprise not only insects of various orders, but also spiders and mites. One of the most interesting is a small moth, *Myrmecocela ochraceella* Tgstr., whose connection with ant-hills has been long known but whose life-history has not yet I believe been published. About the end of June and in July, if we examine the blades of grass in the vicinity of a nest of the hill-ant in Perthshire or other parts of the north of Scotland, we shall probably see several specimens of a small yellowish-ochreous moth perched upon them. These moths are not very active and rather prefer to crawl about than to fly. Sometimes when disturbed they get on to the nest and enter some of the doors, the ants appearing, strange to say, to be generally rather frightened for them. The eggs are laid in or on the nest, and the caterpillars, which are white with brown heads and with a few scattered hairs, feed upon the decaying vegetable matter of which the nest is composed. As, however, a fat soft juicy larva would be a morsel too tempting to escape the jaws of the ants, the caterpillar constructs long galleries of small twigs, leaves, &c., fastened together with silk, and thereby protects itself from its hosts. The caterpillar lives during the autumn, winter, and spring, and about the beginning of June assumes the pupa state inside the gallery. The puparium is about the third of an inch in length, slender, and yellowish-brown in colour. The legs have separate covers, those for the first two pairs lying between the wing-covers, and at the extremity of the wing-covers appear the coverings (nearly free) of the extremities of the third pair of legs. On the dorsal aspect of the covering of the segments of the hind body (except the three penultimate) are two rows of

short spines directed towards the anal extremity. The first of these rows (on each segment) is the largest, and is situated near the front margin of the segment; the second row has spines of about half the size of those composing the first row, and is situated about the centre of the segment. On the three penultimate segments there is no centre row of spines. The last segment is obtuse, and furnished with a somewhat irregular circlet of short broad triangular spines. The use of the spines is of course, I imagine, to enable the pupa to travel through the galleries.

Some nests quite swarm with the larvæ of this moth, while others are entirely free from them. One nest had rather a peculiar appearance from the number of galleries protruding from it.

In Britain *M. ochraceella* has only been found in Scotland; on the Continent it occurs in Finland and Switzerland. There is another species of the same genus (and, I suppose, with the same habits) in south-eastern Europe.

Though several species of *Hemiptera* are supposed to be associated with ants, yet none have been hitherto recorded as having been found in the nests of the hill-ant in Britain. In northern Europe one of the *Anthocoridæ*, *Piezostethus formicetorum* Boh. occurs in the ant-hills, and to that species I, with some doubt, refer a bug that I found commonly in Braemar. The first specimen that I saw was a pupa found in a nest in Glen Lui, by my friend Mr. Hislop. Subsequently Dr. Sharp and I found the perfect insect not uncommonly in many ant-hills. It is a very small creature and seems to live deep down in the nests. The pupæ were seen in May and June, and the perfect insects in June and July. What its food is I cannot say, but judging from the tastes of allied species, the *Piezostethus* (if such it be) is carnivorous, and preys upon smaller or weaker insects. It runs with great activity, but though furnished with wings, I never saw one flying.

Of all the orders of insects, the Coleoptera or beetles have most representatives in the ant hill. Some of these are carnivorous species, others find a means of subsistence in the dead vegetable matter composing the nest. We will briefly notice the species that have been found in Scotland.*

* I have to thank my friends Mr Hislop and Dr Sharp, for supplementing my information on this subject.

Myrmedonia canaliculata and *humeralis.*—These are generally near, but not in the nest, especially *canaliculata.*

Thiasophila angulata, Dinarda Märkeli, Homalota flavipes, talpa and *anceps, Oxypoda hæmorrhoa* and *formiceticola, Quedius brevis* and *Leptacinus formicetorum* are all inhabitants of the hill and connected in some mysterious way with the ants. The ants would have no difficulty in demolishing some of these, but for reasons as yet unexplained not only refrain from doing so, but are said to treat their guests with great hospitality and kindness. *Quedius brevis* (first taken in Scotland in 1869, by Mr Hislop and subsequently found by Dr Sharp and myself) and *Dinarda Märkeli* (found by Mr Hislop) have not, I think, been recorded as Scottish.

Ptilium myrmecophilum. — This little creature sometimes abounds in the nests.

Monotoma conicicollis is found deep down in the hill. This is a very slowly moving animal, and greatly resembles a very small piece of wood.

Dendrophilus pygmæus and *Myrmetes piceus.*—These are found near the bottom of the nest, and are like round black seeds. The former is not uncommon, but of the latter I have only seen a single individual, which, I believe, is the only known Scottish example.

Cetonia floricola is the largest beetle that inhabits the Scottish ant-hills and is perhaps the handsomest. The larva lives in the nest, where it is said to feed on the "ant eggs," but more probably, in my opinion, on the substance of the hill. The perfect insect is sometimes found in the nest, but more often at the old "sugar" placed on trees as a bait for moths by collectors of Lepidoptera, and sometimes at the fermenting sap of trees, such as that which exudes from the burrows of the goat-moth caterpillar.

Clythra 4-punctata.—This, from its habits, is one of the most interesting species found in the ant hill. It generally inhabits an old and partly forsaken nest, though I have seen it in a thickly populated hill. The perfect insect may be often found outside the nest upon trees or flowers, but sometimes in the nest. It is, however, the habits of the larva that give to this beetle its interest. The larva is soft and fat, so to protect itself from the jaws of the ants it constructs for itself a movable

house or case. This case is made of black excrementitious matter, and is somewhat pear-shaped with the narrow end bent slightly downwards. The door or mouth is at the narrow end, and on the upper side from it run back several ridges to strengthen the case. Two of these run divergently for about half the length of the case, and below these there are sometimes two shorter ridges. Between the two first-mentioned ridges three other pairs run parallel to them, and meeting, form a series of three V's, one within the other, on the back of the case. Occasionally one side of a V runs past its own apex and joins the opposite side of the enclosing V. The rest of the surface of the case is comparatively smooth. The length of the case is from 5-6-lines, and the breadth at the hinder or broad end 1½-2 lines.

The larva, as mentioned above, is fat and soft, and not unlike a small cockchafer larva in shape. The hinder part is the largest, whence the reason of the shape of the case, which the larva never leaves. The head is hard and horny, and when the forehead is applied to the mouth of the case, all intrusion or interference on the part of the ants is effectually prevented. The larva feeds on the spongy material which forms the older part of the hill. When the larva is about to assume the pupa state it fastens the mouth of its case (closing it up) to a twig or other part of the nest, or sometimes to the case of one of its companions (who, if he too is not ready to become a pupa, has consequently to carry a heavy load about with him), and then turns about till the head is at the broader part of the case. This turning is necessary to allow the perfect insect to escape, as the original door of the house is not large enough for that purpose, and the beetle finds it easier to break his way through the back wall.

Among the Diptera, or two-winged flies, I believe there are some species that frequent the ant-hill, but at present I am not able to give very much information as to this.

In Scotland, then, we have representatives of at least three orders of insects—Lepidoptera, Coleoptera, and Hemiptera—associated with *Formica rufa*, and not improbably representatives of two other orders—Neuroptera and Diptera. No Orthopteron has been found inhabiting the ant-hill in this country, but in Continental Europe there is a grass-hopper that inhabits

the nests of *Formica rufa* and other ants, and possibly a careful search may result in the discovery of this or some allied species in Britain.

In conclusion, a word or two on the method of examining an ant-hill may not be out of place. Select, then, a hill that is neither too small nor of recent origin, and begin operations by examining the moss, grass, and stones round the base of the nest. These may be shaken over a large sheet of strong paper or "Waterproof." Having disposed of the outside of the nest plunge the hand into the depths of the hill and take out several handfuls of the substance of the nest, place in a wire sieve and shake over the paper—then examine the siftings. If one hill is unproductive, try another; and don't, if you can, be frightened for the ants, nor be surprised if you should even find a few in your bed after a day "among the hills." In examining a hill, it is humane, not to say politic, not to disturb the nest, especially the upper and outer parts, more than necessary. A piece of wood, or a rough stone or two, placed on or beside the hill, and examined early in the morning will often be found to have beetles adhering to the underside.

NOTES ON SCOTTISH HEMIPTERA.

(Continued from p. 226.)

By F. BUCHANAN WHITE, M.D.

ULOPA OBTECTA Fall.

One of the characters of the genus *Ulopa* Fall. is that the species have no wings. It was therefore with some surprise that I captured a winged form of the common *U. obtecta* on a hill in Braemar at about an altitude of 1900 or 2000 feet. This winged form only differs from the common apterous form in the possession of wings. It frequented, however, a rather damper locality than the common form, which prefers dry ground under heather, the dead leaves of which it very greatly resembles. *U. obtecta* is a very sluggish animal and can leap but feebly. It seems to be common throughout the country in heathy places.

PIEZODORUS PURPUREIPENNIS De G.

Of this handsome species Messrs. Douglas and Scott say, "common on furze and broom bushes in the autumn." It occurs, however, in spring and early summer also, and though most partial to broom and furze, yet sometimes frequents trees, and where *Genista tinctoria* abounds does, as might be expected, not unaffect that plant. I have noticed larvæ, both large and small, abundant in September. *P. purpureipennis* is not an uncommon species in the lowland part of Scotland. The most northerly locality from which I have specimens is Forres, whence they were sent me by Mr. Norman.

MIRIS HOLSATUS Fab.

This species, which when "British Hemiptera" was published, was considered "apparently a scarce species," abounds throughout Scotland up to at least 1200 feet above sea-level. It frequents grasses and other low plants especially in or near woods. In early spring hibernated specimens are not unfrequent, in June larvæ are common and imagos still not scarce; in July, August, September, and October imagos abound. The spring and early summer specimens are frequently green, but in August, when the grass among which this species occurs is becoming yellowish, the majority of specimens are ochreous. If, as is probable, the spring individuals are hibernated autumn ones, how is it that they change from green to ochreous? By the direct action of the food-plant? Be the cause what it may, we have here a good example of protective mimicry.

MIRIS LÆVIGATUS L.

This is not such a common species as the last, in Scotland. I have taken it in Perthshire and Kirkcudbrightshire. It, too, like the last, appears to hibernate, and early summer specimens are green, whilst autumnal ones are ochreous. It frequents grasses and low plants, but seems to prefer more open situations than *M. holsatus*. I have seen it in May, June, July, September, and October.

MIRIS CALCARATUS Fall.

A tolerably common and widely distributed species in Scotland. Among grass on dry banks throughout the whole year,

probably specimens may be found. Like the two preceding species, this has a green form when the grass is green and juicy, and an ochreous form when its food-plant is getting dry and yellowish.

MIRIS RUFICORNIS Fall.

This, too, is a common Scottish species, attaining an elevation of 1200 feet. In the beginning of June larvæ may be found among grass in woods, and along the edges of fields. At the end of June, and thence to September, the perfect insect is common. I have also seen larvæ in August. *M. ruficornis* does not appear to have an ochreous autumnal form, nor does it seem to hibernate in the perfect state. These four species are all of the genus *Miris* that, I think, have been as yet found in Scotland.

MONANTHIA HUMULI Fab.

Seems to be scarce in Scotland. The larva is said, according to Burmeister, to *mine* the leaves of the common Forget-me-not, *Myosotis palustris*. I found a single specimen in a damp place where some of the marsh species of *Myosotis* grow, near Perth.

MONANTHIA CARDUI L.

A common species throughout Scotland. It frequents thistles, chiefly *Carduus lanceolatus*, of whose involucres it is especially fond. There appear to be two broods in the course of the summer, one in June, the other in August. According to Douglas and Scott, some individuals hibernate, but I have no recollection of meeting with any specimens in winter.

(To be continued.)

Note on Acilius fasciatus.—During early spring, and when the sun is shining brightly, *Acilius fasciatus* has a curious habit of climbing out of the water to the top of aquatic plants, where it remains suspended for a considerable time, evidently enjoying the warmth. Frequently a dozen of the beetles may be seen close to each other in this, one would think, uncomfortable position, the plants bending over with the weight of their bodies, and swaying to and fro with the breeze. I suspect this is a common habit with most of the larger Hydradephaga, as I have frequently captured them by sweeping herbage close to, and even at a distance from, water.—P. CAMERON, Jr., Glasgow.

Note on Leaf Galls.—During the past summer I found specimens of the round pellucid leaf galls of *Spathegaster baccarum*—the well-known "Currant" gall-fly of the oak—placed on the *upper-side* of the leaf. This appears to be a very rare occurence, the rule with those *Cynipidæ*, who make their galls on leaves, being to have them on the under-side, where no doubt they will be better protected from the attacks of their enemies. *Cynips lignicola* is abundant in all the woods surrounding Glasgow. It also occurs near Hamilton. The birds appear to destroy a good many of the larvæ.—*Id.*

Popular Entomology.—I really think you ought to give to the enclosed scrap a corner in your journal, as it serves to show how rife "popular" entomology is in the land. Of course the insect is some *Sirex*, but the article shows that the *Scot. Nat.* has not appeared a day too early:—

INSECT LIFE IN A COAL PIT.—"Of late the miners employed at Muiredge coal pit, a little to the north of Buckhaven, and on the Wemyss estate, have felt considerable annoyance in consequence of large winged insects fluttering around the flames of their lamps, and often extinguishing them. A miner named William Semple had his attention directed to several gimlet-like holes in the wooden props that support the workings, and on closely examining the same, discovered live moth-like insects in the cavities. They are evidently foreigners. The wood of which the props were made came from abroad, and they have been in the pit between three and four years. The insects are in many cases just emerging from their birthplaces into active life underground, and resemble wasps, but are not altogether like those in this country."—*Edinburgh Courant.* ALBERT MULLER, F.L.S., Eaton Cottage, South Norwood, S.E., 13th August, 1872.

Note on the Habits of Crymodis exulis.—I took a few specimens of *Crymodis exulis* during a visit to Iceland, in the month of July, and perhaps a note or two thereon may assist in helping on the discovery of this "rara avis" in Scotland.

As I was always travelling all day, my only time for looking after insects was in the evening, and all my specimens were taken at rest at that period of the "undying day," for night there was none. I found them in sheltered grassy slopes, and *always* in those lying to the east or southeast. They were in pairs, resting on the tops of long blades of stiff grass, and so pretty conspicuous. When boxed they tumbled to the bottom, and save one turn to right themselves on their legs, made no movement whatever. My specimens vary somewhat; one being almost black.—W. DOUGLAS ROBINSON, Christ Church, Oxford, September, 1872.

Vanessa Antiopa in Perthshire.—The unusual number of specimens of this beautiful, and hitherto in Scotland, very rare butterfly, is astonishing most collectors of Lepidoptera. I am able to report two Perthshire examples, one seen near Dunkeld on August 22nd, by Colonel Drummond Hay and myself, and another on the same day at Moncreiffe, by Sir Thomas Moncreiffe. Neither of them were captured. It will be seen from the reports below, that (for this species) many others have been seen in Scotland. I shall be glad to record any others that may have been seen.—F. BUCHANAN WHITE.

Vanessa Antiopa in Berwickshire.—I have to report the following recent occurrences of the "Camberwell Beauty" near Eyemouth. One caught by a

boat-builder; one by the head-gardener at Netherbyres garden; one seen and nearly caught by my father, and one seen by my friend Mr. Kelly. Another was taken by Mr. Cairns at Clarabad Mill, some ten or twelve miles from Eyemouth. I have two in my possession, and the fineness of one of them would go against its having travelled far.—W. SHAW, Gunsgreenhill, Ayton, Eyemouth.

Vanessa Antiopa in Morayshire.—Two specimens were taken here by me on the 26th August. They were on a "Cossus" birch.—G. NORMAN, Forres.

Vanessa Antiopa in Forfarshire.—I saw a specimen near the Loch of Lintrathen on 16th September.—*Id.*

Vanessa Antiopa in Aberdeenshire.—One was seen near Aberdeen at the end of August by several people.—J. W. H. TRAILL, Aberdeen.

Id.—On 22d August a very fine specimen of *Vanessa Antiopa* was taken near this, but it unfortunately escaped from the captor's hat before he could get it boxed. Another was seen the same day and a few days after in another quarter, and a third some miles off.—J. GARROW, Inverurie.

Occurrence of Vanessa polychloros in Scotland.—On 22d August a specimen of *Vanessa polychloros* was taken in the neighbourhood. Two or three had been seen flying about during the week previous, but were thought to be only large specimens of *urticæ*, and no effort was made to take them.—*Id.*

Capture of Noctua ditrapezium in Scotland.—Amongst some moths recently forwarded to me for names by Mr. W. Herd is a specimen of *Noctua ditrapezium*, a species not before recorded for Scotland nor very far north in England. It was taken near Perth.—F. BUCHANAN WHITE.

Pararge Megæra.—I notice that in your list of Scottish Lepidoptera now coming out in the *Scottish Naturalist*, you say this butterfly has of late years disappeared from the "Tay" district. I captured one near Newport in May, 1870. —W. B. SIMSON, Dundee, 1st July, 1872.

Capture of Xylophasia Zollikoferi Frr. — I have to announce a very interesting addition to the list of Scottish Lepidoptera. Some months ago, Mr. J. W. H. Traill brought me a moth to name which had been captured at Inverurie by Mr. Tait. This, I found, I was unable to do, and had almost determined to describe the moth as a new species, but before doing so, thought it better to submit the specimen to Mr. Doubleday's inspection. Mr. Doubleday, with his wonted kindness, at once informed me that the insect was *Xylophasia Zollikoferi* Frr., and that hitherto it has been unique as British in his own cabinet. Mr Doubleday writes—"This is a very pale variety. My specimen is thickly irrorated with black along the nervures, and very closely resembles in appearance a female *Nonagria typhæ*. I sent my specimen to Dr. Staudinger, and he said it agreed exactly with a specimen in his cabinet, which was captured in Hungary. He added that it was one of the rarest of the European noctuæ, and he only knew of the existence of a few specimens, two of which were taken near Berlin, and the others in Hungary and Russia. Although so rare it is very widely distributed." The Aberdeenshire specimen may be thus described. Front wings shining, greyish-ochreous, more grey beyond the subterminal line, and the nervures faintly marked out in grey. The only

markings are the orbicular stigmata, the edges of which are pale ochreous, but very indistinct; the claviform stigmata, also edged with ochreous but almost imperceptible; the reniform stigmata, which are more apparent, outlined with ochreous, and the lower end filled in with pale grey; the elbowed line, which consists of a row (in some places double) of small blackish spots on the nervures, and a faint ochreous line near the inner margin; and the subterminal line, which is pale ochreous and serrated, especially in the middle, where it is like a W; the serrations looking towards the base are tipped with grey. The hind margin is undulated, and between the tips of the nervures is a grey line; the fringes are ochreous, intersected by a darker line; the inner margin is narrowly greyish black. The hind-wings are ochreous white, with the nervures, and the hind margin irregularly, ochreous grey. The expansion of the wings is about 2¼ inches. Herrich-Schäffer (Schmetterlinge von Europa, Supp. *Noctuides* Tab. 21) gives two figures of this species. Fig. 103 is most like the Inverurie specimen, but differs in being much darker in colour, in having no trace of the orbicular and claviform stigmata, the elbowed line distinctly formed of two rows of dots, and no ochreous line on the inner margin, and the subterminal line more distinctly marked with grey. The hind-wings are much darker, and the expanse of the wings barely 2 inches. Fig. 104 is very different, and lookes almost like a different species. The Inverurie example was, I believe, taken at sugar in September.—F. BUCHANAN WHITE, September, 1872.

Deilphila livornica at Bridge of Allan.—I captured a very perfect specimen of *Deilephila livornica* flying at the flowers of *Lilium auratum*, in the greenhouse, at dusk on September 7th. Last night I got a good specimen of *Sphinx convolvuli* in the same way.—W. D. PATERSON, Fernfield, Bridge of Allan, 11th September, 1872.

Helix lapicida near Hawick.—One wet day last week, I saw a number of this snail on a lichen-covered "dry-stone dyke" near Hawick. There were three or four shells to every square foot for a distance of thirty or forty yards. I understand that *Helix lapicida* has not been recorded as Scottish before.—W. GRANT GUTHRIE, Hawick, 20th July, 1872.

Domesticated Robins.—The following may be interesting to some of your readers. A pair of robins which during last winter had made a practice of coming into the room occupied by my children, and being always welcomed with a plentiful supply of bread-crumbs, eventually became so tame as to take up their quarters regularly during the cold winter nights above the window curtains. As the spring wore on they seemed to have disappeared, but in one of the sleeping rooms, not occupied during the day, but which always had the window open, at that time there was observed to be continually a lot of moss and stuff scattered about, which was carefully swept away every morning by the housemaid; this went on for two or three weeks, till at last one of the children in the room stated that he was sure the robins were building in the window curtains in spite of their work being always pulled down by the housemaid. Orders were immediately given that the birds should not be again molested. In a short time a nest composed of moss and leaves was completed on the valance of the window curtains. When the hen began to lay, she would come every morning to the window, about four o'clock, giving a tap with her bill, and on being admitted, would at once fly up to her nest and give a twitter, as much as to say to Cock Robin, who was sitting on the sill outside, "I am all

right"; he in return would strike up a cheery song, which completed, another twitter would be given by way of thanks for his little attention, and he would then retire. In a few days the hen began to sit, became shy, and was very little seen; she would, however, come down in the morning to be let out, and and would return in a few minutes, but instead of flying direct to her nest, she would settle on the curtains at the end furthest from it, and when she thought she was not observed would slyly slide along the top of the curtains and suddenly pop in. Cock Robin was most assiduous in his attentions, coming every morning at an early hour with a grub for her breakfast, always perching first on the wardrobe opposite the window, and after remaining a second or so, dart across the room to the nest and out again, this he would do two or three times during the morning. In about three weeks six little fledgelings occupied the nest. About this time my family left home, and strict orders were given that the window should always be left slightly open, and I had the satisfaction of learning that in due course the six young robins were fledged and took their departure; and occasionally Cock Robin may now be heard on the window sill cheering us with his autumn song.—H. M. DRUMMOND HAY, Seggieden.

Note on the record in Gray's "Birds of the West of Scotland" of the occurrence of the Little Crake.—The *Scottish Naturalist* seems a fitting organ for correcting a mistake for which I am in a measure responsible in Gray's "Birds of the West of Scotland." The Little Crake mentioned in the appendix is the same as the one recorded in the body of the work, p. 334, being at present the only Scottish specimen. It is an adult male bird, but not in very good condition. It was picked up by a girl tending cattle.—J. H. GURNEY, jr., Northrepps, Norwich, 23d July, 1872.

The Wood Warbler.—In looking over the "*Scottish Naturalist*" for July, I was surprised to see the Wood Warbler *(Sylvia sibilatrix)* mentioned as a rare bird in Fyvie. It may interest some of your readers to know that in the neighbourhood of Loch Lomond it is far from uncommon. Between twenty and thirty of these birds were counted by Mr. Gray (author of the "Birds of the West of Scotland") and myself, during an afternoon's walk in the woods at the south end of the loch, on the 26th of June last.—JAMES LUMSDEN, jr., Arden House, Alexandria, 12th July, 1872.

Albino Wild Duck (Anas Boschas).—For a sight of this rare and interesting variety I am indebted to Mr. W. Robb, Marischal College, Aberdeen. The bird, which is a fine female, was shot this summer in the parish of Kildrummy in Aberdeenshire. The plumage is entirely white, with a slight buffy tinge on the abdomen; the legs and bill are orange. Albinism of even a partial kind seems very rare amongst the true wild ducks, though common among the domestic breeds descended from them. While on the subject of albinos, I may also mention that Mr. Robb showed me during the summer, an albino blackbird *(Turdus merula)* which was shot at Careston Castle, near Brechin. Its plumage was pure white, with the exception of the following parts, which were dark grey or brown mixed with white, viz., two or three primaries of each wing, six of the tail feathers, a patch in front of the vent, and two patches on the right thigh. The irides were dark brown; the bill and legs as usual.—JAMES W. H. TRAILL, Aberdeen.

PHYTOLOGY.

AN IMPROVED METHOD OF PREPARING PLANTS FOR THE HERBARIUM.

By Colonel DRUMMOND HAY.

HAVING frequently noticed how long a flower that has been cut and suddenly dried in the sun during hay-making time will retain its colour, I was led to turn my attention to my repeated failures in the drying of plants for the herbarium, which on investigation appeared to arise chiefly from three causes. 1st, the plants not being dried quickly enough, so as to prevent fermentation; 2nd, the sap-vessels being often bruised by pressure, and so causing a loss of colour; and 3rd, from want of care and attention in laying out the plants, so as to keep each leaf and flower, or even petal in some of the larger flowers, separate during the drying process.

To obviate the above the following plan was tried and found to be so great an improvement on the old one of merely using several sheets of paper between each two specimens, though ever so often changed, that I have no hesitation in recommending it to any one who may wish to give it a trial. Of course it must be borne in mind that plants, like birds, or other subjects of natural history, to be well done, require much time, care, and attention with a constant eye to nature, without which they can never be satisfactory to the general observer, though perhaps perfectly sufficient for all purposes to the practical botanist.

To commence at the beginning: should a screw-press not be used, procure two well seasoned boards an inch or so thick of beech, or any other hard wood, 18 inches by 11, for the outsides. (If lightness is required deal may be used, but is better of a cross piece at each end to prevent warping.) Also, a number of thin light boards should be procured of the same size as the outer ones, but only of about ⅛th inch thick. The best are of common bee mahogany used for linings, which may be

obtained at a reasonable price from any cabinetmaker. Get several sheets of unbleached wadding cotton and cut them to the size of the boards, one sheet should supply four pieces, and two pieces will be required for each board; also, a quire or two of thin whitey-brown paper, which, together with the cotton, I have found far superior to any other drying paper. A dozen or so of leaden weights, about the size of a penny-piece, and four times as thick, should be provided ; a sharp pen-knife, a pair of scissors, a pair of forceps, and some small bits of paper from an inch to three or four inches square should be lying handy. To proceed, place a piece of the wadding with the gummed side downwards on one of the boards, with a sheet of paper between to prevent its sticking to the board, (the paper will adhere to the cotton, and can always be left attached to it.) Then a sheet of paper over the wadding, laying the plant upon it, opening the petals, place a small piece of paper over them with a weight, and where any leaves overlap put paper between and a weight to keep them down, and so on, always keeping the plant in a natural position ; should the leaves or branches be too numerous some may be cut out with the scissors, taking care to leave sufficient of the stalks to shew where they were cut; in case of very woody or thick-rooted plants the pen-knife may be brought into use, and the reverse side neatly sliced off. When the plant is in position, place a sheet of paper over it, then a piece of wadding, after which carefully abstract the weights from underneath, taking care not to alter the position of the plant, then another sheet of paper over the gummed part of the wadding (to remain), and then a board, and so on with each specimen where they require a whole sheet to themselves. The boards with the plants between them should then be submitted to a heavy weight for twelve or twenty-four hours, according to the nature of the plants. Supposing the plants to have been laid out at night, they should be gone over every morning, the upper boards and the top waddings taken off, leaving the papers over the specimens, as well as the under papers and under wadding ; they should then be left in a warm dry room all day, and would incur no harm if put in the sun, but must be watched, and if there is any tendency to curl up or shrivel, they should immediately be restored to the press. In the evening, after having gone over the plants to see that

everything is in its place, the top waddings, which should have been hung up and will have become quite dry, should be put on again, the plants returned to the press, and the same operation every day until perfectly dry. By this means the plants will be found to retain their colours wonderfully; care, however, must be taken to ensure their being perfectly dry before being placed in the herbarium; and for this purpose it is as well to leave them in their drying papers without the waddings for a few days before doing so. As rapidity in drying is the great object, a chamber with a glazed roof, such as used by photographers, would facilitate matters greatly; it is hardly necessary to say that the herbarium itself cannot be kept in too dry a place, as many plants are very evanescent in their colours even years afterwards, should they come in contact with any damp. I may add that the drying papers after use should be placed themselves under a heavy weight, being slightly damped before doing so, when they will be as good as new; and the same paper and the same cotton will last for many years, and after the first outlay there will be no further expense.

Seggieden, by Perth.

Conyza squarrosa near Perth.—A specimen of this plant, found near Perth in an apparently wild state was recently brought to me to name by Mr. J. M'Millan.—JOHN SIM, Bridgend, Perth, August, 1872.

Recent additions to the Flora of the North-East of Scotland.—The following notice of a few of the plants recently found in this district may be interesting to some of the readers of the "*Scottish Naturalist*":—*Ranunculus heterophyllus* Sibth.; *R. circinatus* Sibth.; *R. fluitans* Lam.; *Draba brachycarpa* Jordan; *Viola Reichenbachiana* Boreau; *Sagina ciliata* Fr.; *Cerastium triviale* var. *alpinum* Koch.; *Ulex Gallii* Planch; *Lathyrus maritimus* Big.; *Torilis nodosa* Gaert.; *Senecio viscosus* L.; *Thrincia hirta* DC.; *Hieracium dubium* Fr.; *Centunculus minimus* L.; *Orchis incarnata* L.; *Neottia Nidus-avis* Rich.; *Corallorrhiza innata* R. Br.; *Potamogeton nitens* Weber; *Carex Watsoni* Syme; *C. Kochiana* DC.; *Setaria verticillata* Beauv. (introduced); *Aira uliginosa* Weihe; *Polypodium Robertianum* Hoffm.; *Asplenium obtusum* Willd.; *Lycopodium inundatum* L. The additions to mosses, &c., are too numerous for a short notice.—JOHN ROY, Aberdeen.

Occurrence of Anacalypta latifolia Furnr. in Perthshire.—Perthshire muscologists will be glad to know that Professor Barker gathered this rare and beautiful moss in Glen Tilt, in July last. It was previously known in Braemar and Clova; this is, therefore, its third British station.—*Id.*

Double Flowers.—During the summer I observed the following plants with *double flowers (flore pleno)*:—*Cardamine pratensis* L.; *Lepidium smithii* Hook; and *Veronica saxatilis* L. Possibly this state may not be uncommon, but I have not seen it in these plants before.—*Id.*

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 241.)

EDITED BY F. BUCHANAN WHITE, M.D.

ÆGON Schiff. Rare. Ericetal.

DISTRIBUTION—EAST. o o Tay o o o o o o
WEST. o o o o o

LAT. 56°40″ RANGE IN EUROPE. Throughout, except the east. TYPE. European. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. April-June. FOOD-PLANT. Bird's-foot *(Ornithopus perpusillus)* and ——?

L. argiolus will probably yet be found in Scotland.

POLYOMMATUS Latr.

PHLÆAS L. Common. Pascual. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ ♂ ♂
WEST. Solway Clyde Argyle ♂ ♂

LAT. 54°50″-57°40″. RANGE IN EUROPE. Throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. April-May, August-September. LARVA. June, July, September-April. FOOD-PLANT. Sorrel *(Rumex acetosa* and *acetosella)*.

THECLA Fab.

RUBI L. Common. Nemoral and ericetal.

DISTRIBUTION—EAST. o Forth Tay Dee Moray ♂ o o
WEST. Solway Clyde Argyle West-Ross o

LAT. 54°50″-57°50″. RANGE IN EUROPE. Throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. July, August. FOOD-PLANT. Broom, bramble, (and ? blaeberry, *Vaccinium myrtillus*).

There seems to but one brood in the north; are there two in the south of Scotland?

QUERCUS L. Local. Nemoral.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ o o o o
WEST. Solway Clyde ♀ West Ross o

LAT. 55°-57°50″ RANGE IN EUROPE. Throughout, except the north. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. July-August. LARVA. May, June. FOOD-PLANT. Oak.

HESPERIIDÆ Leach.

SYRICHTHUS Boisd.

MALVÆ L. (1758); *Alveolus* H. (1793). Not common. Nemoral.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. Solway Clyde o o o

LAT. 54°50″-58° RANGE IN EUROPE. Throughout. TYPE. European. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. May. LARVA. ——? FOOD-PLANT. ——? The occurrence of *S. malvæ* in Moray rests on the authority of Mr. Buxton, who informs me that he took specimens at Inveran in Sutherlandshire.

THANAOS Boisd.

TAGES L. Not common, except in the south. Pascual and ericetal.

DISTRIBUTION—EAST. o o o [Dee] Moray ♀ o o
WEST. Solway Clyde ♀ ♀ o

LAT. 54°50″-57°50″ RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May, June, (and August). LARVA. June-April. FOOD-PLANT. Bird's-foot Trefoil *(Lotus corniculatus)*.

HESPERIA Boisd.

[THAUMAS Hufn. (1766); *linea* F. (1787). Rare. Pascual.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

LAT. 56°. RANGE IN EUROPE. Central and South; Scandinavia. TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. July. LARVA. ——? FOOD-PLANT. Grasses.

Further evidence as to the occurrence of this species in Scotland is desirable.

The absence from Britain of *lineola* O. (which may be distinguished from *Thaumas* by the unicolorous underside of the hind-wings—the inner margin is fulvous in *Thaumas*,) is curious.

SYLVANUS Esp. Not common, or local. Pascual.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. Solway ♀ o o o

LAT. 54°50″-56° RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August-May. FOOD-PLANT. Grasses and *Luzula*. *H. comma* should occur in Scotland.

HETEROCERA.

HEPIALIDÆ H.S.

HEPIALUS Fab.

HUMULI L. Common. Pascual. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ Orkney Zetland.
WEST. Solway Clyde Argyle West-Ross ♀

LAT. 54°40″-60°50″. RANGE IN EUROPE. Central and northern, except the polar regions. TYPE. Septentrionocentral. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June-July. LARVA. Feeds for two years. FOOD-PLANT. Roots of various low plants (dock, nettle, &c.)

Var. *Hethlandica* Stgr. Front-wings of the male more or less yellowish, and more or less marked with fulvous as in the female.

This form (in Dr. Staudinger's opinion perhaps a distinct species) has occured in Zetland only. I am not aware whether the typical form is found there. The Orcadian *humuli*—Mr. Traill informs me—is the typical form.

SYLVINUS L. Not very common. Ericetal and nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°40″-57°50″. RANGE IN EUROPE. Central and northern (except the boreal regions). TYPE. Septentrionocentral. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. ———
FOOD-PLANT. ———?

VELLEDA H. Locally abundant. Amongst bracken (but not always). Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray Sutherland Orkney ♀
WEST. Solway Clyde Argyle West-Ross ♀

LAT. 54°40″-59°10″. RANGE. Northern; central in part; Alps and Pyrenees. TYPE. Septentriono-central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. Feeds for two years. FOOD-PLANT. Rhizome of Bracken *(Pteris aquilina)*, and ———?

Ab. *gallicus* Ld. Front-wings dull reddish-brown with a central white spot.

With the type but scarce. Sometimes called *carnus* in Britain, but *carna* Esp. is a different species.

LUPULINUS L. Local, and not common; scarce in the north. Pascual.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray o o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°40″-57°50″. RANGE IN EUROPE. Central; South Sweden, Alps, Dalmatia. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. July-April. FOOD-PLANT. Roots of low plants.

H. ganna H. (like *lupulinus*, but brown, with silvery white spots), an alpine and boreal species, should be looked for in July.

HECTA L. Local and not very common. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray Sutherland o o
WEST. Solway Clyde Argyle West-Ross o

LAT. 54°40″-58°20″. RANGE IN EUROPE. Central and northern (except the boreal regions). TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June. LARVA. July-May. FOOD-PLANT. Roots of low-plants.

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from p. 248.)

EDITED BY D. SHARP, M.B.

PATRICIA Duft. Very rare. Lowland.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. o o o o o

[**INGENUA** Duft. Doubtful as Scottish; but recorded from Scotland by Dawson in *Geodephaga Britannica.*

BIFRONS Gyll. Local. Lowland.

DISTRIBUTION—EAST. Tweed ♂ Tay Dee ♂ o o o
WEST. ♂ Clyde o o o

RUFOCINCTA Sahl. Very rare. Lowland.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. ♂ Clyde o o o

QUENSELI Schön. Extremely local. Alpine.

DISTRIBUTION—EAST. o o o Dee o o o o
WEST. o o o o o

LUCIDA Duft. Very rare. Lowland. (? Maritime.)

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. o o o o o

TIBIALIS Payk. Local. Lowland.

DISTRIBUTION—EAST. ♂ Forth o o o o o o
WEST. Solway Clyde o o o

FAMILIARIS Duft. Abundant. Lowland.

DISTRIBUTION—EAST. ♂ Forth Tay Dee Moray ♂ o o
WEST. Solway Clyde ♂ o o

ACUMINATA Payk. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde o o o

TRIVIALIS Gyll. Common. Lowland.

DISTRIBUTION—EAST. ♂ Forth ♂ ♂ Moray o o o
WEST. ♂ Clyde o o o

SPRETA Zimm. Very rare. Maritime.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

"Fifeshire," Murray.

CURTA Dej. Very local. Lowland.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

Common about an old wall on Corstorphine Hill.—D. S.

LUNICOLLIS Schiod. Not common. Lowland.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. 8 8 o o o

COMMUNIS Panz. Not common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay 8 Moray o o o
WEST. Solway 8 o o o

OVATA Fab. Not common. Maritime.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway Clyde o o o

PLEBEIA Gyll. Common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay 8 Moray o o o
WEST. Solway Clyde o o o

DICHIROTRICHUS Schaum.

PUBESCENS Payk. Local. Maritime.

DISTRIBUTION—EAST. 8 Forth 8 8 Moray o o o
WEST. Solway 8 o o o

ANISODACTYLUS Schaum.

BINOTATUS Fab. Local. Lowland.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway Clyde o o o

A variety with the legs red occurs.

HARPALUS Schaum.

[**OBSCURUS** Fab. Very rare. Lowland.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

"Rachills, Rev. W. Little."—Murray.

PUNCTICOLLIS Payk. Rare. Lowland.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. o o o o o

RUFICORNIS Fab. Common. Lowland.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ Moray o o o
WEST. Solway Clyde o o o

PROTEUS Payk. Abundant. Lowland, highland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

This species varies much in size and colour.

RUBRIPES Duft. Rare. Lowland.

DISTRIBUTION—EAST. o Forth Tay o Moray o o o
WEST. o Clyde o o o

LATUS L. Common. Lowland.

DISTRIBUTION—EAST. ♀ Forth ♀ ♀ ♀ o o o
WEST. Solway Clyde o o o

TARDUS Panz. Rare. Lowland.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. ♀ Clyde o o o

ACUPALPUS Schaum.

GYLLENHALLI Th. Rare. Lowland.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway Clyde o o o

BRUNNIPES Sturm. Rare. Lowland.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. o Clyde o o o

"Near Paisley, Mr. Young; East Lothian, Mr. Hardy,"—Murray. Perhaps this refers only to a variety of the *A. Gyllenhalli*.

LURIDUS Dej. Very local. Lowland.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

BRADYCELLUS Schaum.

PLACIDUS Gyll. Local. Lowland, highland.

DISTRIBUTION—EAST. Tweed o Tay Dee Moray o o o
WEST. o o o o o

COGNATUS Gyll. Common. Highland, alpine.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde o o o

DISTINCTUS Dej. Very rare. Lowland.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

Occurs very rarely, near Dumfries and Thornhill.—D.S.

VERBASCI Duft. Common. Lowland.

DISTRIBUTION—EAST. ♂ ♂ Tay ♂ ♂ o o o
WEST. Solway Clyde o o o

HARPALINUS Dej. Not common. Lowland.

DISTRIBUTION—EAST. o Forth o o Moray o o o
WEST. Solway o o o o

COLLARIS Payk. Not common. Lowland, highland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway ♂ o o o

SIMILIS Dej. Common. Lowland, highland.

DISTRIBUTION—EAST. ♂ Forth Tay Dee Moray o o o
WEST. Solway Clyde o o o

PATROBUS Schaum.

EXCAVATUS Payk. Not common. Lowland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde o o o

ASSIMILIS Chaud. Common. Highland.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ ♂ ♂
WEST. Solway Clyde ♂ ♂ ♂

SEPTENTRIONIS Dej. Not common. Highland.

DISTRIBUTION—EAST. o o Tay Dee Moray o o o
WEST. Solway Clyde ♂ ♂ ♂

POGONUS Schaum.

CHALCEUS Marsh. Very local. Maritime.

DISTRIBUTION—EAST. ♂ Forth Tay o o o o o
WEST. Solway o o o o

(To be continued.)