



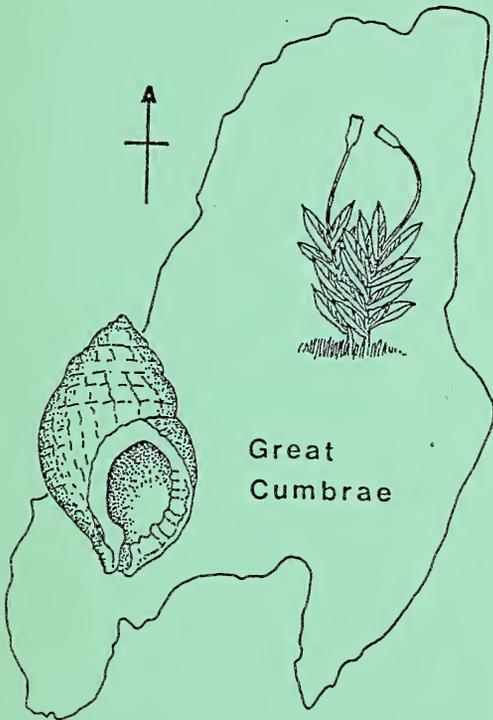






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# The Glasgow Naturalist



Volume 21

Part 1  
1985



## **The Glasgow Natural History Society (formerly The Andersonian Naturalists of Glasgow)**

The object of the Society is the encouragement of the study of natural history in all its branches, by meetings for reading and discussing papers and exhibiting specimens, and by excursions for field work. The Glasgow Natural History Society meet at least once a month except during July and August, in the University of Glasgow, the University of Strathclyde or the Glasgow Art Gallery and Museum.

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### **The Glasgow Naturalist**

Published by the Glasgow Natural History Society  
ISSN 0373-241X

December 1985  
Price £4.00

Edited by R. M. Dobson

with the assistance of J. H. Dickson, A. McG. Stirling and I. C. Wilkie.

Contributions are invited, especially when they bear on the natural history of Scotland. A note of information for contributors is available from *The Editor*.

Smaller items are also welcome from members and others. These may cover, for example, new stations for a species, rediscoveries of old records, additions to records in the *Atlas of the British Flora*, unusual dates of flowering, unusual colour forms, ringed birds recovered, weather notes, occurrences known to be rare, interesting localities not usually visited by naturalists. (The nomenclature of vascular plants should be as in Clapham, A. R., Tutin, T. G. & Warburg, E. F. 1981. *Excursion Flora of the British Isles*, Ed. 3. Cambridge.

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A limited number of advertisements can be accepted and enquiries should be sent to *The Editor*.

Back numbers available are listed on the inside back cover.

## · Additions to *The Flora of Kintyre*

A. G. KENNETH

Stronachullin, Ardrishaig, Argyll

*Received January 1985*

Since the publication of *The Flora of Kintyre* (Cunningham and Kenneth, 1979), a good deal of investigation has taken place, resulting in the discovery of several plants new to V.C. 101 and further localities for many other species. I have previously recorded a number of these in "Kist", the organ of the local Natural History and Antiquarian Society, and these records are included in the present paper. Since then, further exploration by B. H. Thompson has provided numerous records and some remarkable discoveries – most notably perhaps *Crithmum maritimum* – while Dr E. Bignal has located *Orobanche alba* on the limestone cliff of Largybaan. Clearly that remarkable area still has something to offer.

In the following list, species names preceded by an asterisk are new to the Flora as originally published, due either to recent discovery or to changes in nomenclature of species already recorded. Nomenclature of the vascular plants follows Clapham *et al.* (1981) and of the bryophytes Corley and Hill (1981). AGK = A. G. Kenneth, BHT = B. H. Thompson and AR = A. Rennie. Because many new localities have been searched a further index of place-names has been included. (See Appendix.)

### PTERIDOPHYTES

*Lycopodium clavatum*. By forest road N. and S. of Loch MacKay; S. side of Carradale Water S. of Narachan; Quarry, Torinturk; all BHT (74, 78, 86).

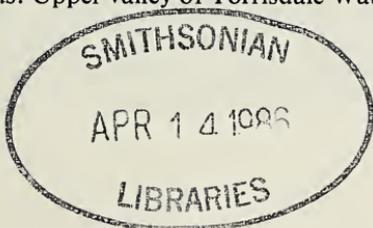
*Equisetum arvense*. Inexplicably omitted from the Flora. The plant is common and generally distributed.

*Osmunda regalis*. Shore cliff between Torrisdale and Saddell; AGK (73).

*Hymenophyllum tunbrigense*. Allt an Torra, Carradale; BHT (84).

*Asplenium viride*. Upper Eas a' Chais, Torinturk; basic outcrop, Cnoc a' Baile Shios; AGK: Upper Torrisdale Water; BHT (73, 86).

*Cystopteris fragilis*. Upper valley of Torrisdale Water N. of Beinn Tuirc - scarce; BHT (73).



*Glasg. Nat.* 21 part 1 (1985)

*Athyrium filix-femina*. Cristate form, Carsaig Island; AGK, BHT – 2 small plants observed, each pinna ending with a blunt trifold process.

\**Dryopteris carthusiana* x *expansa* (= *D. x sarvelae*). Oak woodland S. of Claonaig, where it was discovered by H. Corley in 1981. The plants look distinctive and are in fair quantity – they are stated to be sterile. The immature stipe and rachis have the colour of *Osmunda*. One of only three known British stations. (See *Watsonia* 14, 451 (1983) ).

\**D. x tavellii*, Nr. Cairnbaan, by forest road at 16 824 908; AGK and R. J. Pankhurst, det. A. C. Jermy.

*Gymnocarpium dryopteris*. Upper Eas a' Chais, Torinturk; AGK: ravine downriver from Achnabreck, Carradale; BHT (74, 86).

*Ophioglossum vulgatum*. Three colonies on Carsaig Island in rough heathy vegetation – plants typical – unlike those of most coastal habitats which are usually very small; AGK & BHT.

\**Pilularia globulifera*. Skipness; Coll. Revd. Jas Kerr, Aug. 1850 ex herbarium Dr Lauder Lindsay, comm. A. McG. Stirling, who reports that the specimen in the herbarium of the Royal Botanic Gardens, Edinburgh is correctly named.

## GYMNOSPERMAE

*Juniperus communis* subsp. *communis*. Recorded in Flora for Tayvallich area (enter square 78). Also Rudha nam Barr, N. of Carsaig, intermediate form; BHT (79).

*Juniperus communis* subsp. *nana*. Between Loch na Creige and Barr Water, a single plant; The Castles, Gartnagerach area; plateau area above Creag Raonuill, W. side, a single plant; BHT (71, 74, 78).

## ANGIOSPERMAE

### DICOTYLEDONES

*Ranunculus sceleratus*. Head of bay immediately N. of Keillbeg; BHT (68).

*Nuphar pumila*. Tiny lochan between Cruach Doire Leithe and Cruach Lagain; BHT (86). This plant needs further study – it may be *N. x spennerana*.

\**Coronopus didymus*. In strand vegetation, Torrisdale-Saddell shore; AGK (73).

*Erophila verna* subsp. *verna*. Small roadside quarry between Cour and Grogport; BHT (84).

*Cardamine amara*. Swampy ground by Crinan Canal, Craiglass; AGK (88).

*Arabidopsis thaliana*. Garden weed, Carskey; AR (60).

*Arabis hirsuta*. Largybaan ravine; C. Ferreira (61).

*Lepidium heterophyllum*. Forest road near Carradale; BHT (83).

*Nasturtium officinale*. In watercourse, Ballygrogan; mouth of watercourse, Polliwilline Bay; Kilberry Bay; all BHT (61, 70/71, 76).

\**Draba muralis*. Garden weed, Carskey; AR (60).

\**Hypericum* x *desetangii* nm. *carinthiacum* (*H. maculatum* subsp. *maculatum* x *H. perforatum*). Skipness; Somerville, 31-7-1899 – in Hb. British Museum, det. N. K. B. Robson 1979. This constitutes a new British record, although the hybrid *H. x desetangii* nm *desetangii* (*H. maculatum* subsp. *obtusiusculum* x *H. perforatum*) is well-known as a British plant. This should be sought at Skipness – no records of *H. maculatum* of either subspecies or of *H. perforatum* have been recently made in that area.

- Hypericum humifusum*. Forestry road Crossaig; forestry road, Arinafad; BHT (78, 85).
- Stellaria neglecta*. Port Bealach nan Gall; BHT (78).
- Arenaria balearica*. On dykes in Carskey garden; AR (60).
- Spergularia rubra*. Forest road, Meall Darrach nr. Tarbert – a single plant; BHT and AGK (86).
- S. rupicola*. Cliffs at N. end of The Bastard; BHT (71).
- Montia sibirica*. Carskey steading; Strone Burn; AR (60).
- Suaeda maritima*. Shore W. of Kilmory Ross; AGK (78).
- Geranium lucidum*. Old cairn near Cosandrochaid; AGK et al. (78).
- \**G. sylvaticum*. Ravine near Loch nan Torran, 5 plants; BHT (76).
- G. pratense*. Culindrach area, Skipness – shore and roadside, probably indigenous; BHT (95).
- Cochlearia danica*. Recorded in Flora for Largybaan (but enter for square 51).
- Oxalis corniculata*. Greenhouse, Carskey; AR (60).
- Vicia sylvatica*. Mentioned in Flora for Largybaan (enter square 51).
- Vicia sativa* subsp. *nigra*. Carskey beach; AR (60).
- Rubus saxatilis*. Mentioned in Flora for Beinn an Tuirc (enter square 73).
- R. hebridensis*. Lochan Luing, Rhunahaorine; AGK det. E. S. Edees (64).
- \**R. leptothyrsos*. Near Strone, Loch Sween; A. McG. Stirling (78).
- \**R. septentrionalis*. Nr. Barnluasgan; AGK det. E. S. Edees (79).
- \**R. furvicolor*. Old Saw-mill, Cairnbaan; AGK det. E. S. Edees (89).
- \**R. errabundus*. Nr. Carse; Inverlussa, Achnamara; AGK det. E. S. Edees (76, 78).
- \**R. procerus*. Stronachullin, garden ground; AGK det. A. Newton (87). (see Flora.)
- R. pistoris*. Nr. Craiglin; AGK det. A. Newton (78).
- R. ulmifolius*. Near Ellary; AGK (77).
- Rubus* sp. (see Flora p. 20). This interesting plant is more closely allied to *R. conjungens* than to *R. latifolius*. It has a more extended range than indicated and is known to occur in 60-64, 71. It is common over much of this area and tends to be coastal.
- R.* sp. cf. *macrophyllus*. An interesting and distinctive plant with large, usually ternate, leaves, pink flowers and densely long-puberulent stems and rachis. This is known to occur from Kentallen in Argyll to Knapdale and also on Gigha. What appears to be the same plant is reported from Scarba, Colonsay and Mull. The Knapdale localities are in 78, 79, 89. A good fruiter with very large sweet insipid fruits lacking the usual bramble tang, the plant is a rampant grower with exceptionally stout stems.
- Agrimonia procera*. Recorded in Flora for Largybaan (but enter for square 51).
- Sorbus aria*. E. bank of Carradale Water, Achabreck; old field boundary, South Crossaig; considered probably bird-sown, both BHT (74, 85).
- Umbilicus rupestris*. Coast north of Keillis; raised shore line north of Allt an Torra, Carradale; coast near Cour; BHT (68, 84).
- Saxifraga hypnoides*. Strone near Carskey; AR (60/61).
- Saxifraga aizoides*. Ravine at head of Allt Airidh Sheileach; BHT (76).
- Drosera anglica*. Bog. S. of Loch na Machrach Bige; NW of Creag Raonuill; flush at head of Loch na Fola feeder; all BHT (78, 86).

- Hedera colchica* (see Flora p. 24). This has been referred to var. *dentata* (A. Rutherford in litt.). This var. has leaves with dull surface, larger and a paler green than type; the leaves also have spines or little teeth where the veins protrude beyond the margin.
- Epilobium hirsutum*. Nr. S. end of Daill Loch, Cairnhaan; AGK (89).
- Eryngium maritimum*. Reported from Carskey shore, 1983; AR (60).
- Carum verticillatum*. Cour; damp pasture above Grogport Burn; both BHT (84).
- \**Crithmum maritimum*. More or less inaccessible colony broken up into 3 or more separate units, Rudha a' Mharaiche; BHT (51).
- Oenanthe lachenallii*. Coast between Keillbeg and Carsaig; BHT (68, 78).
- Euphorbia helioscopia*. Shingle, Breakerie River; AR (60).
- Polygonum oxyspermum* subsp. *raii*. Shore, Glenhervie area; BHT : shore nr. Saddell; AGK (71, 73).
- Polygonum bistorta*. Roadside, Saddell, presumed of garden origin; BHT (72).
- Polygonum campanulatum*. Roadside, Strone, Loch Sween; BHT : Head of West Loch Tarbert; AGK (78, 86).
- Urtica urens*. South shore of Kildonald Bay, abundant; BHT (72).
- Salix x sericans*. (*S. viminalis* x *S. caprea*). By ruins of house nr. Achoshin, Keills; AGK and BHT det. R. D. Meikle.
- S. herbacea*. Corr Bhan; BHT (51, 61).
- Quercus ilex*. Several presumably planted by road N. of Ellary; BHT (77).
- Gaultheria shallon*. Naturalising at Ellary; BHT (77).
- Pernettya mucronata*. Naturalising at Ellary; BHT (77).
- Arctostaphylos uva-ursi*. Crags on S. W. side of Beinn a' Theine; c. 2km. downstream from Loch nan Torran; BHT : Torr Mor; AGK (60, 77).
- Erica vagans*. Naturalising at Ellary; BHT (77).
- Vaccinium vitis-idaea*. Between Brackley (Carradale) and Braids (Killean); Cruach an Seallaidh (Carse); Allt Tarsuinn (Mealdarroch); hill ground west of Cour; Corr Bhan; all BHT : Beinn Ghuillean summit; AGK: Upper Sgreadan Hill; Meall Darroch; BHT & AGK (51, 71, 72, 74, 76, 85, 86).
- V. oxycoccus*. Wet forest ride NE of Colluska, Lussa – will disappear as trees grow; bog below Loch Caillich, Crossaig; basin mire c. 1km. SE of Cruach Talatoll; wet hollow in moorland c. 1km. S. of Loch nan Eun, Crossaig; lochan between Loch Romain and Loch nan Eun, Crossaig; Loch nan Eun and to NW on wet moorland; marsh near summit of Cnoc a' Baile Shios; lochan c. 2km. E of Cnoc Laoighscan; all BHT : Beinn Ghuillean, W. of summit; AGK (71, 73, 75, 85, 86).
- Gentianella campestris*. Near High Glenadale; AR (61).
- Calystegia sepium* subsp. *roseata*. Near Carse; AGK (76).
- Solanum dulcamara*. Shore between Torrisdale and Saddell; AGK (73).
- Verbascum thapsus*. One plant beside the Dalbuy Forestry road c. 100m. inside the plantation; BHT (61).
- Mimulus luteus*. The Ballygroggan plant is considered good *luteus* by B. H. Thompson: Glenanuilt; AR (60, 61).
- \**Veronica peregrina*. Two plants, Northlea, Tarbert per J. H. Dickson. (86).
- V. hederifolia*. Weed, Carskey; AR (60).
- V. agrestis*. Limestone nr. Chapel, Keills; AGK (68).

- \**Orobanche alba*. Two plants top of cliff, Rudha Duin Bhain; E. Bignal. (51).
- Utricularia intermedia*. Lochan w. Cruach Doire Leithe; BHT & AGK (86). (Also recorded from 64/65, 67, 78, 87, 88).
- Utricularia minor*. Bog below Loch Caillich, Crossaig Glen; small mire c. 1km. NE of Lochan Fraoich, Orasaig – “hundreds of flowers visible quivering in breeze”; BHT (75, 85).
- Stachys x ambigua*. Close ot shore in bracken between Corr Bhan and Rudha A’Mharaiche. *S. palustre* present but *S. sylvatica* not noted; BHT (51).
- Scutellaria minor*. East side of An Aird peninsula; BHT (78).
- Sherardia arvensis*. Kilberry Bay, abundant in sandy turf; AGK (76).
- Viburnum opulus*. Junction Ormsary/Ellary road; BHT (77). Planted, regenerating.
- Galium boreale*. Rocky stream-side, Meall Darroch, N. of Lagganroaig; BHT & AGK (86). (Also in squares 63, 73, 77, 78, 87).
- Senecio sylvaticus*. Scattered along shore between Borgadel Water and Signal Station; Shore below The Bastard; BHT (50, 60, 71). These occurrences cast doubt on the record for *S. vulgaris* subsp. *denticulatus* which should be omitted from the Flora.
- \**Cicerbita macrophylla*. In fair quantity, bank of Crinan Canal at Dunardry Lock; BHT (89).
- Cirsium dissectum*. Taynish Point, Dr. E. Bignal (78). The second locality known on the Scottish mainland.
- Hieracium dasythrix*. Headwaters of Allt Airidh Sheilach; AGK (76).
- H. subhirtum*. Headwaters of Allt Airidh Sheilach; AGK (76).
- H. duriceps*. Upper Eas a’ Chais ravine; AGK (86).
- Taraxacum landmarkii*. Now recorded from Loch Coille-Bharr; (79).
- T. acrifolium*. The material so named has been rejected and the species appears to be absent from V.C. 101. Delete from Flora.
- \**T. maculosum*. Plants previously referred to *T. maculigerum* are now placed under this species. Delete *T. maculigerum*. Add square 79, Loch Coille-Bharr.
- T. praestans*. Add square 79, Loch Coille-Bharr.
- T. naevosiforme*. Add square 79, Loch Coille-Bharr.
- T. stictophyllum*. Add square 79, Loch Coille-Bharr.
- \**T. berthae*. Forestry road by Loch Coille-Bharr (79).
- T. cyanolepis*. Add square 87, Meall Dubh.
- T. inane*. Add forestry road, Gariob Glen (78); near Obmore; near Loch Coille-Bharr (79).
- \**T. exacutum*. Material previously placed under *T. spilophyllum* should now be referred to this taxon. Delete *T. spilophyllum*.
- \**T. prae radians*. Near Obmore (78).
- \**T. ostenfeldii*. Plants previously named *T. duplidens* are renamed thus. Delete *T. duplidens*.
- \**T. bracteatum*. Forestry road by Loch Coille-Bharr (79).
- \**T. pseudohamatum*. Near Stronachullin (87).
- \**T. subhamatum*. Plants previously placed under *T. marklundii* are referable here. Delete *T. marklundii*.
- \**T. lamprophyllum*. Meall Dubh (87).

- \**T subbracteatum*. The plants recorded in the Flora as *T. crispifolium* refer to this newly-described species; (78, 87, 89). Add Meall Dubh, roadside. Delete *T. crispifolium*.
- T. raunkaierii*. Add Loch Coille-Bharr (79).
- Allium vineale*. Line of crags running WSW from Beinn A'Theine, Mull of Kintyre; Uamh Ropa, more or less inaccessible ledges; both BHT (50 and/or 60, 51).
- \**Juncus foliosus*. In ditch N. of Keillmore, Keills, Knapdale; AGK det. C. Stace (68). Hb. Leicester.
- \**J. ambiguus*. Dried pools on shore, Keills at chapel; similar habitats, shore, Barraormid; AGK det. C. Stace (68, 78). Hb. Leicester.
- J. maritimus*. Shore, Culindrach, Skipness; BHT (95).
- Listera cordata*. Cruach na Gaibhre and Lead of Allt Airidh Sheilach; BHT: hill W. of Carse; AGK: Carsaig Island; BHT & AGK (76, 78, 86). Meall Darroch W. of Lagganroaig; BHT & AGK.
- Dactylorhiza traunsteineri*. Despite a recent published note (Tennant & Kenneth, 1983) discounting the occurrence of this orchid in V.C. 101 recent research has established its presence represented by a small colony in the Knapdale hills near Lochan Dobhrain. Accordingly this species should be reinstated in the Kintyre flora. The position of the great majority of the plants in the hill populations previously referred to *D. traunsteineri* is accurately stated in the above-mentioned note. D. J. Tennant, M. Lowe and AGK, conf. R. H. Roberts.
- Anacamptis pyramidalis*. Four plants in fixed dunes, south of Westport; J. H. Dickson (62).
- Arum maculatum*. Carskey House green walk – “not appearing to be in any way cultivated”; Mrs A. Rennie (60).
- Eriophorum latifolium*. Between Cruach na Gaibhre and Loch nan Torran; BHT: Cnoc Reamhar near Crinan; AGK (76, 79).
- Scirpus fluitans*. Loch Caillich at head of Crossaig Glen; BHT (75).
- Scirpus setaceus*. In ditch with *Juncus foliosus*, Keillmore; AGK (68).
- Rhynchospora alba*. Bog below Loch na Caillich, Crossaig Glen; BHT (75).
- Carex acutiformis*. Swampy ground, Crinan Canal near Craiglass; moist meadow S. of Bellanoch; AGK (79, 88).
- Carex paniculata*. Swampy ground, Crinan Canal near Craiglass; AGK basin mires between Keills and Carsaig; small lochan near Carse; BHT (76 78, 88).
- Carex diandra*. Basin mire with *Phragmites*, Keills peninsula north of Cosandrochaid; E. Bignal det. A. Silverside (78).
- C. limosa*. Loch nan Geadh, Crossaig; Allt Airidh Sheilach; AGK: small mire c. 1km. NE of Lochan Fraoich, Orasaig; Loch Caillich, Crossaig; basin mire c. 1km SE of Cruach Talatoll; Lochan at 755621; Loch Nan Eun – Lochan A'Chreimh, NW of Crossaig; Loch Dirigidale; watershed NW of Creag Raonuill; bogs nr. Carsaig and at Arichonan; bog south of Loch Na Machrach Bige; Loch A'Chuirn (Allt Sunadale); all BHT (74, 75, 76, 78, 79, 85, 86).
- C. lasiocarpa*. Loch na Machrach Bige nr. Tarbert; Loch Caillich nr. Crossaig; Basin mire c. 0.6km. ESE of Cruach Talatoll; south lochan on Cnoc Laoighscan; Lochan at 755 621; Loch Dirigidale; all BHT: N. of Loch Arail; AGK (74, 75, 76, 86, 88).
- C. curta*. By Loch nan Geadh, Kintyre; AGK: Loch nan Eun; BHT: (85).
- \**C x boeninghausiana* Weike (*C. paniculata* x *C. remota*). Ditch side by forest

road S. of Craiglin, nr. Achnamara – a large clump, with the parents; AGK conf. A. C. Jermy. Hb. B.M.

*Avenula pubescens* (*Helictotrichon pubescens*). Glabrous form (see Flora p. 51). Headwaters, Allt Airidh Sheilach; AGK (76). Seems the same as the Ormsary Water plant.

*Agrostis stolonifera* var. *palustris*. Swampy ground, Crinan Canal S. of Craiglass; AGK ((88).

*A. vinealis* (*A. canina* subsp. *montana*). Fairy Isles; E. Bignal, det. A. Silverside (78).

*Catabrosa aquatica* subsp. *minor*. Ardpatrik Point; R. J. Pankhurst (75).

*Festuca gigantea*. Coastal woodland nr. Gariob; AGK (78).

## **BRYOPHYTES: HEPATICAE**

*Riccardia multifida*. Stream, Cruach Bhreac; BHT (86 and/or 96).

*R. chamedryfolia* (*R. sinuata*). Raised shore rocks between Allt an Torra and Grogport; BHT (84).

*Anthelia juretzkana*. Sliabh Gaoil; M. Corley & AGK (87).

*Blepharostoma trichophyllum*. Headwaters, Allt Airidh Sheilach; AGK (76).

*Ptilidium ciliare*. Outcrop W. of Loch Choille-Bharr; AGK (79).

*Trichocolea tomentella*. Allt Criche nr. Carradale; Allt an Torra nr. Carradale; Baranlongart ravine; Ballure woodland; all BHT (73, 77, 84).

*Bazzania tricrenata*. Artilligan Burn; BHT (87).

*Lepidozia cupressina* (*L. pinnata*). Eas a' Chais, upper ravine; AGK: above shoreline, mouth of Allt an Torra, Carradale; BHT (84, 86).

*Calypogeia sphagnicola*. Bog nr. Meall Beag; M. Corley & AGK (87).

*Barbilophozia floerkii*. Allt Tarsuinn, Mealdarroch; BHT (86).

*B. attenuata*. Outcrop N. of Clachan; AGK (75).

*Anastrepta orcadensis*. Steep slope SW of Cruach nam Fiadh; Allt Tarsuinn, Mealdarroch; both BHT (78, 86).

\**Jungermannia borealis*. Sliabh Gaoil, limestone; M. Corley & AGK (87).

\**Jungermannia subelliptica*. Sliabh Gaoil, limestone; M. Corley & AGK (87).

*Nardia compressa*. Sliabh Gaoil; M. Corley & AGK: nr. Torinturk; AGK (86, 87).

\**N. geoscyphus*. Sliabh Gaoil, limestone; M. Corley & AGK (87).

*Marsupella emarginata* var. *aquatica* (Lindenb.) Dum. Meall Donn, Rhonadale; BHT (73).

\**M. sprucei*. Sliabh Gaoil; M. Corley & AGK (87).

*Gymnomitrium concinnatum*. Creag nan Lallaig; AGK (78).

*G. crenulatum*. Cnoc A' Bharraille; boulder scree N. of Loch Arail; AGK (77, 88).

*Mylia taylori*. Hill W. of Loch an Eich, Carradale; BHT: Meall Darroch woodland; BHT & AGK (74, 86).

*M. anomala*. Diollaid Mor nr. Ormsary; AGK : Bog nr. Carsaig; BHT: Meall Beag; AGK & M. Corley (76, 79, 87).

*Odontoschisma sphagni*. Nr. Meall Beag; M. Corley & AGK (87).

*Plagiochila atlantica*. Woodland N. of Skipness; H. J. B. Birks (95).

*Chiloscyphus pallescens*. Loch an Fhir Maoil, Carsaig; BHT (78).

- Scapania umbrosa*. Allt an Torra nr. Carradale; BHT (84).
- Pleurozia purpurea*. Loch Caillich, Crossaig Glen; Meall Donn, Rhonadale; between Beinn Tuirc, Cnoc Donn, and Beinn Bhreac; hill ground, Allt an Torra, Carradale; hill 1km. W. of Loch an Eich, Carradale; south side of Cnoc nan Craobh; all BHT (73, 75, 84).
- Porella arboris-vitae* (*P. laevigata*). Limestone outcrop nr. Barnagad, Achmara; AGK: Ardnackaig nr. Carsaig; BHT (78, 79).
- Drepanolejeuna hamatifolia*. Shore cliff between Torrisdale and Saddell, growing in *Grimmia maritima*; AGK (73).
- Jubula hutchinsiae*. Ravine S. of Claonaig; P. Pitkin: ravines from Saddell to Sunadale; upper Eas A' Chais; AGK (73, 83, 85, 86).
- Frullania teneriffae* (*F. germana*). By small stream, Meall Donn; Allt Criche and Allt an Torra nr. Carradale; Allt Romain; coast N. of Dounie; all BHT (73, 79, 84, 85).
- Frullania fragilifolia*. Nr. mouth of Allt an Torra, Carradale; BHT (84).

### BRYOPHYTES: MUSCI

- Andreaea rupestris* var. *rupestris*. Large boulder W. side of An Gobhlach; BHT (77).
- Polytrichum alpestre*. N. of Low Cuilidrynoch, Ardpatrik; Cnoc A' Bhaile Shios, Mealdarroch; New Braids, Killean; all BHT (74, 76, 86).
- Oligotrichum hercynicum*. Side of Forest road, Crossaig Plantation; beside track from Carse to Airidh Chreagach; both BHT (76, 85).
- Diphyscium foliosum*. Headwaters, Allt Airidh Sheilach; AGK (76).
- Pleuridium acuminatum*. Open birch wood above Tighnahoran; BHT (77).
- \**Ditrichum zonatum*. Sliabh Gaoil; M. Corley & AGK (87).
- Rhabdoweisia crenulata*. Eas A' Chais upper ravine; AGK: crag SW. of Cruach Nam Fiadh; BHT (78, 86).
- Dicranella palustris*. Crossaig Burn; Loch nan Eilthrach; SE end of Dubh Loch; Allt Romain; head of Glen Barr; Mealdarroch; all BHT (74, 78, 85, 86).
- Dicranoweisia cirrata*. Nr. Auchinloan; north of Clachan; nr. Claonaig – all on rock; old buildings nr. Garioch; AGK (71, 75, 79, 85).
- \**D. crispula*. Stones in grassland, Balliewilline Hill nr. Campbeltown – sterile material; Det. A. J. Smith (72).
- Dicranum bonjeanii*. Lagloskin; BHT (74).
- Campylopus fragilis*. Bridge between Torrisdale and Saddell; BHT (73).
- Fissidens limbatus* (*F. herzogii*). The locality given for this at Ardnoe Point is wrong, it occurs nr. Stronefield; det. M. Corley (77).
- F. rufulus*. The material on which this record is based has been reassessed. In consequence the taxon is not known to occur in V. C. 101 and the entry should be deleted.
- F. celticus*. Allt an Torra, Carradale; BHT (84).
- F. osmundoides*. Allt Airidh Sheilach; AGK : Upper Torrisdale Water; Allt Criche and Allt an Torra, Carradale; ravine, Carse; BHT (73, 76, 84).
- F. taxifolius* subsp. *pallidicaulis*. Ravine near Castle Sween; AGK conf. E. C. Wallace (77).
- F. cristatus*. Upper Torrisdale Water; Allt Criche near Carradale; Baranlongart

- ravine; all BHT (73, 77). Bottom of Craighlass Burn; Oakfield, Cairnbaan; BHT (89).
- Ecalypta streptocarpa*. Bridge between Torrisdale and Saddell; BHT (73).
- Tortula laevipila*. On elder, Keills, Knapdale; AGK (68).
- T. papillosa*. On elder, Keills, Knapdale; AGK (68).
- Barbula convoluta*. Old quarry E. of Auchindrain; BHT (75).
- B. ferruginascens*. Headwaters Allt Airidh Sheilach; AGK (76).
- Eucladium verticillatum*. Cave of raised shore N. of Allt an Torra, Carradale; BHT (84).
- Grimmia trichophylla* var. *stirtonii*. Exposed rock, Ballygroggan; AGK det. A. J. Smith (61).
- Dryptodon (Grimmia) patens*. The Dunans plant recorded as ?*Grimmia* sp. is referred to this; also Cairnbaan ravine; both det. A. J. Smith (79, 88/89).
- \**Racomitrium ericoides*. Danna, N. end. AGK conf. M. O. Hill.: forest road nr. Loch Losguinn; AGK: Glenahanty; BHT (61, 67, 78).
- Funaria obtusa*. Growing with *Pleuridium* above Tighnahoran; BHT (77).
- Splachnum sphaericum*. Head of Allt Creag nan Gobhar c. 1250 ft; BHT (77).
- S. ampullaceum*. Bog nr. Carsaig; E. of Ballure; BHT (74, 79).
- \**Orthodontium lineare*. Base of mature larch, Stronachullin; AGK det. E. Watson: coastal woodland S. of Claonaig; E. Bignal & P. Pitkin, det. P. Pitkin (85, 87).
- Pohlia elongata*. Sliabh Gaoil; M. Corley & AGK (87).
- P. cruda*. Sliabh Gaoil; M. Corley & AGK (87).
- P. bulbifera*. Forest road nr. Barnluasgan; AGK det. E. V. Watson (79).
- \**P. camptotrachela*. Bare soil on roadside, Barnluasgan, Knapdale; M. Corley (1965).
- Plagiobryum zieri*. Headwaters, Allt Airidh Sheilach; AGK (76).
- Bryum pseudotriquetrum* var. *bimum*. Forestry road, Loch Choille-Bharr; M. Corley (79).
- \**B. caespiticium*. Nr. summit Sliabh Gaoil; M. Corley & AGK : by Ormsary Water; AGK (77, 87).
- \**B. dunense*. Dunes, Kilmory Knap; M. Corley (67).
- \**B. gemmiferum*. Gateway nr. Mill Loch, Gigha; J. Appleyard (1972) (65).
- Rhodobryum roseum*. Abhainn Mhor above Kilmory-Ellary track; BHT (77).
- Rhizomnium pseudopunctatum*. Loch an Fhir Maoil, Carsaig; BHT (78).
- Bartramia pomiformis*. Meall Donn, Rhonadale; upper Torrisdale Water; Allt Tarsuinn, Mealdarroch; crag SW of Cruach Nam Fiadh; streamside rocks, Gleann Laoigh; all BHT (73, 78, 86, 74).
- Amphidium mougeotii*. Craighlass Burn; BHT (88).
- Climacium dendroides*. Shore of Loch Lussa; BHT (72). (Glen Lussa in Flora as 62, should be 72).
- Cryphaea heteromalla*. On Elder, Keills, Knapdale; on Elder nr. Scotnish; AGK (68, 78).
- \**Leucodon sciuroides*. On rock, Dun Mhuirich nr. Tayvallich; AGK (78).
- Neckera crispa*. Limestone outcrop nr. Barnagad, Achnamara; AGK: Gleann Na Laoigh ravine; Allt Airidh Sheilach; both BHT (76, 77, 78).
- Heterocladium heteropterum* var. *heteropterum*. Rocks of raised shore-line N. of

- Allt an Torra, Carradale; BHT (84).
- Anomodon viticulosus*. Limestone outcrop nr. Barnagad, Achnamara; AGK : old quarry E. of Auchinadrain; BHT (75, 78).
- Thuidium delicatulum*. Nr. Shore line between Allt an Torra and Grogpart; open birch woodland S. of Loch Na Craige, Tighnahoran; both BHT (77, 84).
- Cratoneuron commutatum* var. *commutatum*. Allt Criche, Carradale; Cuildrynoch, Carse; between An Aird and Carsaig; all BHT (73, 76, 78).
- C. commutatum* var. *falcatum*. Flush area between the Slate and Cnoc Moy; nr. Loch an Eich, Carradale; nr. Abhainn Achahoish, Mealdarroch; all BHT (61, 74, 86).
- C. filicinum* var. *filicinum*. Old quarry E. of Auchinadrain; BHT (75).
- \**Amblystegium (Hygroamblystegium) tenax*. On stones, margin of Loch Choille-Bharr; AGK (79).
- Drepanocladus sendtneri*. Recorded in error. erase from Flora.
- D. exannulatus* var. *exannulatus*. Spring S. of Loch an Eich, Carradale; BHT (74).  
The record in Flora of Kintyre should refer to 67/77 rather than 78. Basin mires between Carsaig and Keills, not referred to variety; Loch Laoigh; BHT (76, 78).
- D. fluitans* var. *fluitans*. Single stem in *Gymnocolea inflata*, Loch Racadal; BHT conf. M. O. Hill (76).
- Drepanocladus revolvens*. North of Loch Dirigidale at head of Tayinloan Burn; Crear Burn; coast N. of Keills, nr. Loch Mhic Eanluig and Cruinn Loch; all BHT (74, 76, 77, 78).
- Scorpidium scorpioides*. Flush area between The Slate and Cnoc Moy; flush area upper Rhonadale; Loch an Eich, Carradale; all BHT (61, 73, 74).
- Calliargon stramineum*. Lochan nr. Loch Choille-Bharr; AGK : Loch nan Eun, scarce; N. of Loch Dirigidale; Lochan na Gobhar and Lochan Bharra Challtuin, Carsaig; bog nr. Arichonan; Loch A' Bharra Leathain, Carse; ditch, Cruach nam Fiadh area; Loch Laoigh; Gleanneadardacroch; all BHT (73, 74, 78, 79, 85, 86).
- C. sarmentosum*. W. slope of ridge between Dubh Chreag and Meall Buidhe – it is greenish here as on Meall Beag; watershed between The Slate and Cnoc Mor, 750 ft.; N. of Loch Dirigidale; nr. Loch Mhic Eanluig; Ellary; all BHT (61, 74, 76, 77).
- Isothecium myosuroides* var. *myosuroides*. Meall Donn, Rhonadale; BHT (73).
- I. myosuroides* var. *brachythecioides*. Creag Nan Lallaig; AGK (78).
- Brachythecium glareosum*. Limestone grassland, Lagloskin; limestone quarry S. of Ronachan; BHT – the latter conf. J. Appleyard (74, 75).
- B. rivulare*. On rock, roadside ditch, Deucheran Hill, Carradale; Glenahanty; both BHT (74, 61).
- B. plumosum*. Meall Donn, Rhonadale; BHT (73).
- Rhynchostegium murale*. Limestone quarry S. of Ranachan; BHT conf. J. Appleyard (75).
- Eurynchium striatum*. Allt Criche and Allt an Torra, Carradale; BHT (73, 84).
- E. praelongum*. Meall Donn, Rhonadale; nr. Brackley, Carradale; nr. mouth of Allt an Torra, Carradale; Loch an Fhir Maoil, Carsaig; all BHT (73, 74, 78, 84).
- \**Rhynchostegiella teesdalei*. Balnabraid Glen; E. Bignal (71).
- Plagiothecium succulentum*. Rhonadale and Torrisdale Water; Allt Criche and

Allt an Torra nr. Carradale; all BHT (73, 84).

*Isopterygium elegans*. Roadsides, Saddell; Allt Criche nr. Carradale; S. of Clachbrech; Achaglachgach; all BHT (73, 77, 76).

*I. pulchellum*. Headwaters Allt Airidh Sheilach; AGK (76).

*Ptilium crista-castrensis*. Edge of semi-natural woodland, Ellary; by stream, Cnoc Donn, Rhonadale; Baranlongart Burn; all BHT (73, 76, 77).

*Hyocomium armoricum*. Gleann na Laoigh ravine; stream, Cruach Bhreac; coast nr. Carradale; all BHT (76, 84, 96).

*Rhytidiadelphus triquetrus*. Nr. Rudha Duin Bhain; Grogport/Carradale area; Allt Romain; Crossaig Glen; Gleann na Laoigh ravine; Artilligan Burn; all BHT (51, 74, 76, 84, 85, 87).

## Appendix

### Index of place-names with National Grid References

#### Mull of Kintyre area

Auchinhoan	16	76	17	Corr Bhan	16	601	102
The Bastard	16	758	121	Gleanneadardacrock	16	621	158
Beinn Ghuillean	16	728	178	Glenadale	16	63	11
Beinn A'Theine	16	602	072	Glenahanty	16	63	14
Breackerie	16	66	10	Glenanuilt	16	64	08
Borgadel Water	16	625	070	Glenehervie	16	75	11

#### Kintyre area

Abhainn Achahoish	16	840	655	Gartnagerach	16	750	105
Allt Criche	16	79	34	Gleann Laoigh	16	785	485
Allt Romain	16	84	53	Grogport	16	81	44
Allt Tarsuinn	16	85	64	Kildonald Bay	16	78	27
Allt an Torra	16	81	40	Lagaloskin	16	728	469
Auchinadrain	16	72	51	Loch Caillich	16	795	515
Balliewilline	16	72	24	Loch Dirigidale	16	720	460
Ballure	16	71	49	Loch an Eich	16	740	438
Brackley	16	79	42	Loch nan Eun	16	808	530
Braids	16	72	45	Loch an Fraoich	16	815	552
Cnoc na Craobh	16	735	458	Lochan Luing	16	698	482
Cruach Bhreac	16	89	65	Loch na Machrach			
Cruach Doire Leithe	16	88	64	Bige	16	878	638
Cruach Lagain	16	742	660	Meall Donn	16	77	38
Cnoc Laoighscan	16	78	51	Mill Loch (Gigha)	16	645	505
Cruach Talatoll	16	79	53	Narachan	16	75	47
Culindrach	16	92	59	New Braids	16	72	45
Deucheran Hill	16	76	44	Upper Sgreadan Hill	16	74	30

**Knapdale**

Abhainn Mhor	16	72	76	Keillmore	16	689	806
Achoshin	16	705	835	Loch na Craige	16	768	748
An Aird	16	70	83	Loch Mhic Eanluig	16	752	789
Allt Airidh Sheileach	16	780	699	Loch nan Eilthrach	16	780	818
Ardpatrick	16	76	61	Loch an Fhir Maoil	16	745	891
Barnagad	16	787	870	Loch na Fola	16	799	755
Carsaig Island	16	73	89	Loch Mackay	16	799	888
Castle Sween	16	712	789	Loch Racadal	16	765	659
Cnoc A'Bharaille	16	805	725	Loch nan Torran	16	755	690
Creag Raonuill	16	775	800	Low Culdrynach	16	762	615
Cruach nan Fiadh	16	805	855	Meall Buidhe	16	785	688
Cruach na Gaibhre	16	731	689	Obmore	16	781	901
Dail Loch	16	815	900	Port Bealach nan Gall	16	712	852
Diollaid Mor	16	730	690	Tighnahoran	16	760	755
Dubh Chreag	16	790	711	Torinturk	16	813	645
Dun Mhuirich	16	725	845	Strone (Loch Sween)	16	780	890
Gariob	16	786	899	Stronefield	16	720	748

**References**

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# The Natural History of the Muck Islands, North Ebudef

## 1. Introduction and Vegetation with a List of Vascular Plants

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*Received May 1985*

### Introduction (RMD)

The Isle of Muck, with its satellites, Horse Island (Eilean nan Each), Lamb Island (Eilean Aird nan Uan) and Eagamol, lies off the west Inverness-shire coast at the southern tip of the archipelago termed the "Small Isles". Along with Skye and its neighbouring islands they form V.C. 104, the North Ebudef (Fig. 1).



Figure 1 The situation of the Muck Islands

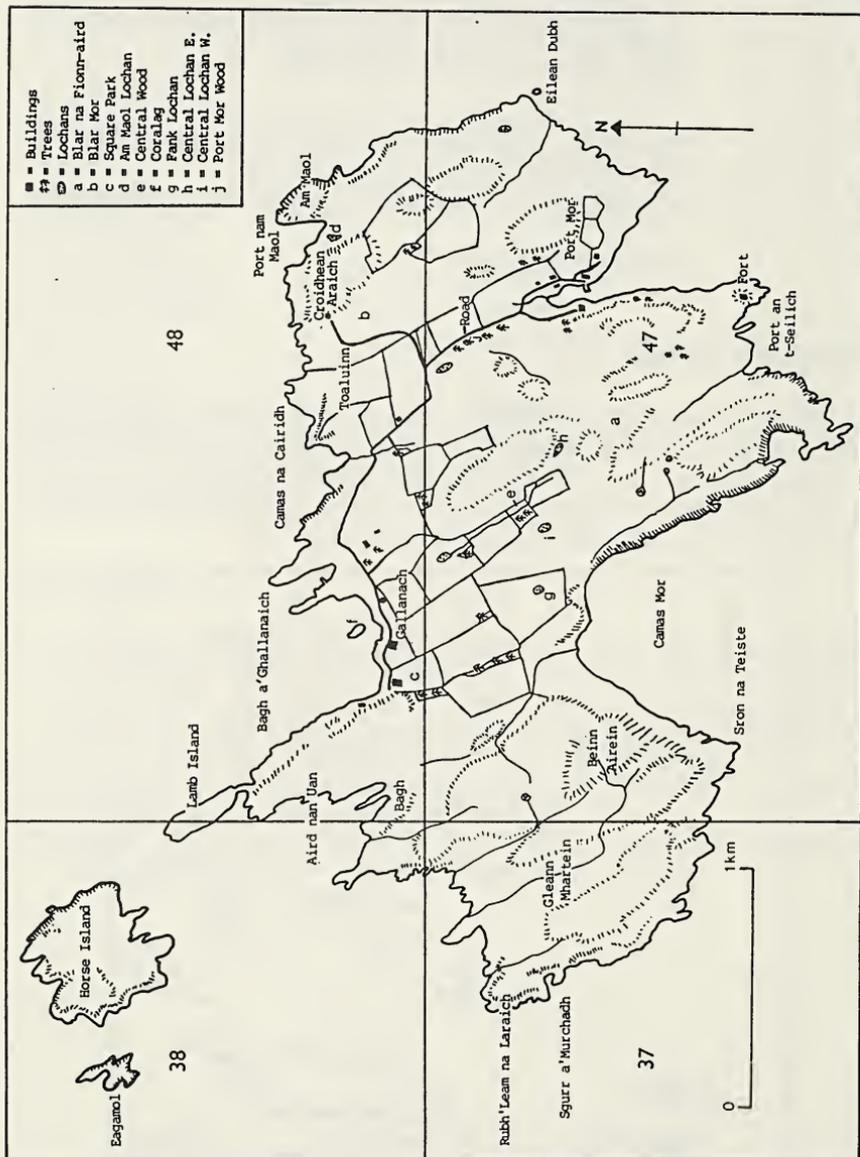


Fig. 2 Sketch map of the Muck Islands showing the location of sites mentioned in the text.  
(Some small recently enclosed areas are not shown.)

Irregularly 8-shaped with its long axis E – W, Muck is 3·8 km long and 2·3 to 0·8 km broad. With an area of some 514 ha (from M.H.W.S. line) it is much smaller than the other principal islands in the group i.e. Canna (1000 ha), Eigg (3100 ha) and Rum (10,000 ha).

Lamb Island (2·7 ha), a N.W. extension, is separated from Muck proper by a beach-boulder causeway passable at all but the highest tides. Horse Island (21 ha), lies N.W. of Lamb Island and is separated from it by a wrack-covered rocky strait which can be crossed dry-foot at low spring tides (Ordnance Survey maps give a misleading impression of this strait). As a general rule, a predicted low tide of 1·1 m O.D. (ref. port Oban) will allow about two hours on the island. Visits should, however, be timed carefully because the strait fills rapidly and currents are strong. Eagamol (1·7 ha) is a partially grass-covered rock lying 120 m W. of Horse Island. Access is by boat at all times.

The Muck Islands are intersected by two 10 km lines of the National Grid so that their total area is unequally divided between squares NM 37, 38, 47 and 48 (Fig. 2). To avoid unnecessary pedantry, however, in the following accounts, records will be referred to localities by name only. These can, of course, be attributed to grid squares by reference to maps.

Nearest neighbours are Eigg, 4·2 km N.E.; Rum, 9 km N. and the Ardnamurchan Peninsula of the mainland, 8 km S.

The first literary record of Muck is that of *Monro* c. 1549 (1884) who commented on the great fertility of the island. Since then there have been numerous references, usually to specific attributes. Much of the accumulated information has been conveniently summarised in the excellent general accounts of *Banks* (1977) and *MacEwen* (1985).

The islands have a long history of human habitation and Bronze Age relics, e.g. the fortified rock near Port Mor, still exist in a fair state of preservation. Populations have fluctuated widely; at present there are about 30 inhabitants but until comparatively recently numbers were much higher. In 1826, when a clearance was effected, 280 people were present subsisting on a crofting and kelp-gathering economy. Traces of this era can still be seen in the numerous scattered ruins of houses associated with extensive areas of former

lazy-bed cultivation on the island. Other conspicuous relics of this era are long ridges of piled stones parallel to the shore which span several glens and bays e.g. at Port nam Maol and on the south slope of Horse Island. These were originally constructed for the drying of kelp; now somewhat grassed over, they resemble old storm crests or raised beaches.

At present the islands are run as a single farm unit with three associated crofts. Much of the best land is subjected to an 8 course arable rotation and the main products are cattle, sheep and wool with some potatoes and eggs. Lobsters and hand-made wooden products, including furniture are also exported.

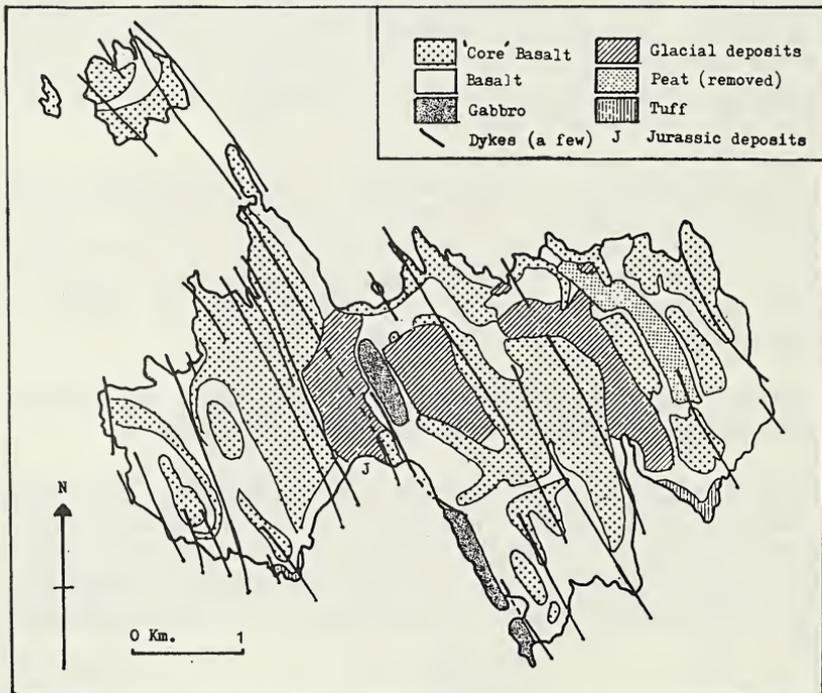
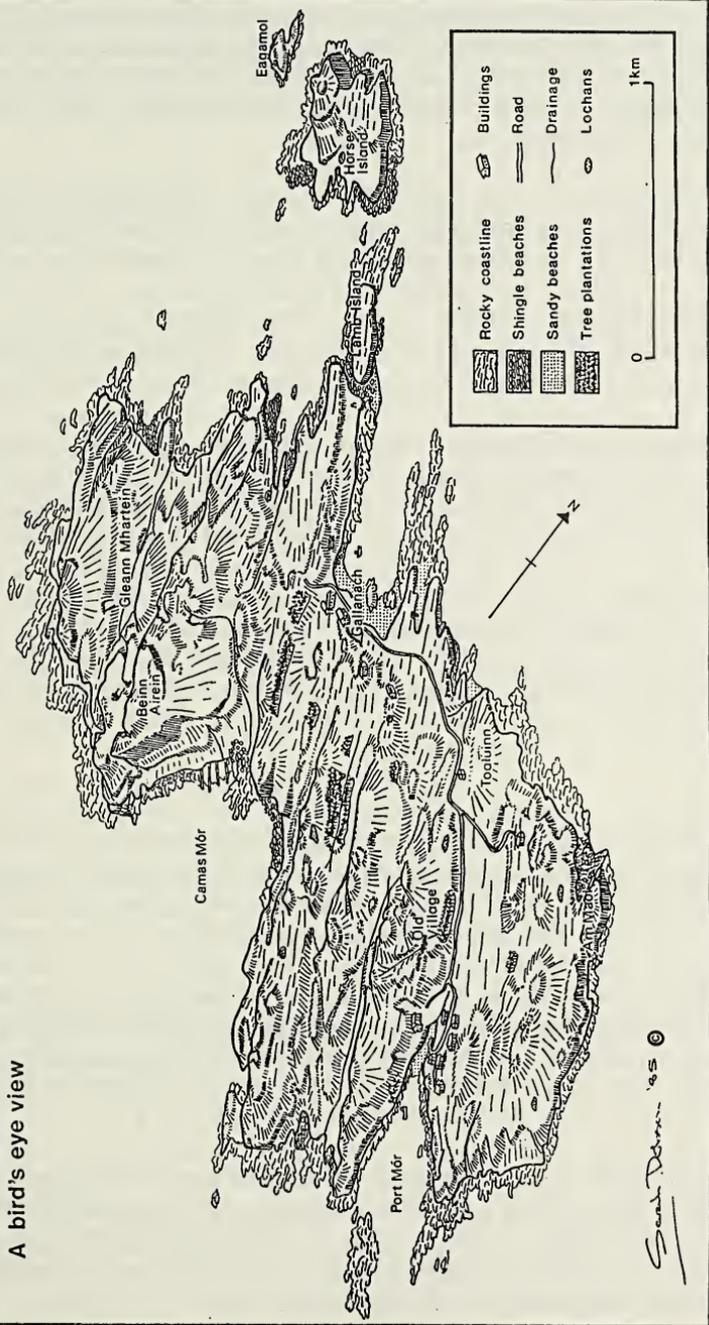


Fig. 3 Sketch map to show geology of the Muck Islands

## Geology and Topography

The topography of the Muck islands is almost entirely determined by their geological structure (Fig. 3). According to Harker and Barrow (1908) the rocks, with the exception of a small

**THE ISLE OF MUCK**  
A bird's eye view



*Seán Doherty '85 ©*

Fig. 4 Bird's eye view of the Muck Islands to show their general topography.

exposure of Jurassic sedimentaries near sea-level at Camas Mor, are entirely of Tertiary age and consist largely of superimposed layers of basaltic lavas with some bands of tuff and volcanic agglomerate. Sills of dolerite, intruded between these layers at a later date, further complicate the picture.

Viewed from the sea from east to west, the islands show the terracing characteristic of trap formation, and, from the profile of Aird nan Uan and its extension Lamb Island, a gentle dip towards the N.W. is evident. In northerly or southerly aspect, apart from the flat-topped bulk of Beinn Airein (138 m) the islands appear low and undulating with a series of low ridges or isolated hummocks alternating with broad glens running almost S.E. to N.W. (Fig. 4).

The ridges correspond to regions of relatively hard, resistant, slowly cooled, 'core' basalts and have shallow soils and numerous rocky outcrops and inland cliffs. The glens mark regions of softer basalts and their character is largely determined by surface deposits. Boulder clay and other glacial drifts fill much of the glen running from Port Mor to Camas na Cairidh and cover the hollows and gentle slopes south and south-east of Gallanach Farm. These areas have some of the most fertile soils found in the Western Isles and are regularly cultivated. Other glens, towards the east and west, are less well favoured, and, tending to be marshy or thinly overlaid with peat, support only rough grazing.

Intersecting the near-horizontal beds of lava are large numbers of vertical dykes of basic rocks orientated almost S.E. to N.W. In places these form conspicuous walls, up to 10 m high; elsewhere, where the surrounding rocks are more resistant, they are marked by deep trenches. The dykes have a mean width of 1.2 m and are separated by distances averaging from 18 to 26 m. The coast-line, already highly indented is, in many places, dissected into numerous small inlets and promontories by these dykes, further increasing its potential for colonisation by living organisms. Notwithstanding their small area, the Muck Islands have a combined shore-length (at M.H.W.S.) of some 24 km, or over 4.5 km per km<sup>2</sup>.

A spectacular feature of south Muck is a line of sheer sea cliffs which, for 0.8 km, form the eastern boundary of Camas Mor. These cliffs, over 40 m high in places, mark the line of a massive intrusive dyke of gabbro. This also dips gently to the N.W. and eventually forms a low ridge south of Gallanach.

Lesser sea cliffs on Muck are found west of Sron na Teiste in the S.W., between Rubh'Leam na Laraich and Sgurr a' Murchadh in the west, from Am Maol to Eilean Dubh in the east and west of Port an t-Seilich in the south. Much of the remaining coast is rocky but shell-sand beaches and narrow strips of machair occur along the east coasts of the Bagh inlet and of Aird nan Uan, across Bagh a' Ghallanaich and at Camas na Cairidh. There are raised beaches at Port Mor, Camas Mor, Gallanach, Camas na Cairidh and between Toaluinn and Croidhean Araich.

Horse Island differs from Muck in several respects. The south coast is rocky but there are a few low cliffs behind the raised beach above the causeway to Lamb Island. The land rises gradually northwards and then falls off in sheer cliffs along the north coast. The line of these cliffs is interrupted by several deep gulleys or geos. Both east and west coasts are bounded by spectacular cliffs along their northerly halves. As in Muck, separate lava flows are indicated by terracing.

Lamb Island is little more than a gently-sloping, grass-covered, slab-like terrace, 250 m long, which forms low cliffs at its southern extremity and dips into the sea at the north. Eagamol is entirely cliff-bound with the greatest development to the south.

### **Soils and Surface Waters**

Unimproved soils tend to be rather acid (ph 4 - 5) but in areas influenced by blown shell-sand they are much less so and range from ph 6 on the promontory north of Gleann Mhartein to ph 8 on the machair of the east coast of Aird nan Uan.

Muck is drained by several natural burns, most of which run N.W. or S.E., and, in places, these are supplemented by artificial drains. There are, however, numerous areas of marsh and a few weedy, small and shallow but permanent lochans (Figs. 2 and 4).

Surface samples of water from nine of these lochans were taken for analysis during November 1980 and may, with caution, be compared with samples taken from lochs in Rum on unspecified dates in 1958 (Maitland and Holden, 1983). The Muck samples seemed more acid than those from Rum (ph range: Muck 5.1 - 5.5, Rum 6.9 - 7.5) and had lower calcium content (Muck 1.0 -

2.9, Rum 1.5 – 4.6 ppm). Sodium content was higher (Muck 54.0 – 78.0, Rum 7.9 – 26.5 ppm) and so was chloride (Muck 28.3 – 66.2, Rum 13.8 – 49.2 ppm). This was, no doubt, an effect of the sea-spray on Muck. Only one fast-moving burn was sampled and this showed analytical values within the ranges quoted.

## Climate

The characteristics of the climate of the Inner Hebrides are discussed by Green and Harding (1983) and some details for Muck are given by Banks (1977) and MacEwen (1985).

Rainfall is low (122 cm p.a.) but this is spread over much of the year, there being about 200 days with more than 1 mm of rain. The wettest month is October and the spring is relatively dry. Winds are often moderate to strong and there are about 50 gales each year. Summers are fairly cool (July mean 14.4°C) although temperatures as high as 29.4°C have occurred. Conversely, winters are mild (Jan. mean 5°C), and frosts rarely last more than a few days. The lowest temperature recorded is only –4.4°C. There is abundant sunshine (over 1350 hrs p.a.) and in midsummer there are almost 20 hrs of daylight. In midwinter, however, there are only about 8 hours of light.

## Vegetation: with a list of vascular plants (RHD)

The vegetation of the Muck Isles (Fig. 5) is much influenced by their topography, geology and climate and by the past and present activities of Man. The climate, although hardly wet enough for blanket bog formation is wet and windy enough for general leaching with the development of acid conditions over wide areas. Former cultivation and present grazing over most of the island have combined to encourage grassland at the expense of heath. The fertility of the rocks is shown by the large number of basiphilous plants on the cliffs and in the wet hollows where enriched water percolates. The shell sand in the north is responsible for the dune grasslands (machair) and is spread widely by the strong winds. The combination of this and sea spray produces herb-rich grass, heath and wet communities. The general aspect of the island is therefore green, with grasslands covering the major part, and bright-coloured herbs prominent. The undulating terrain and long varied coastline provide habitats for many different plant communities, some of

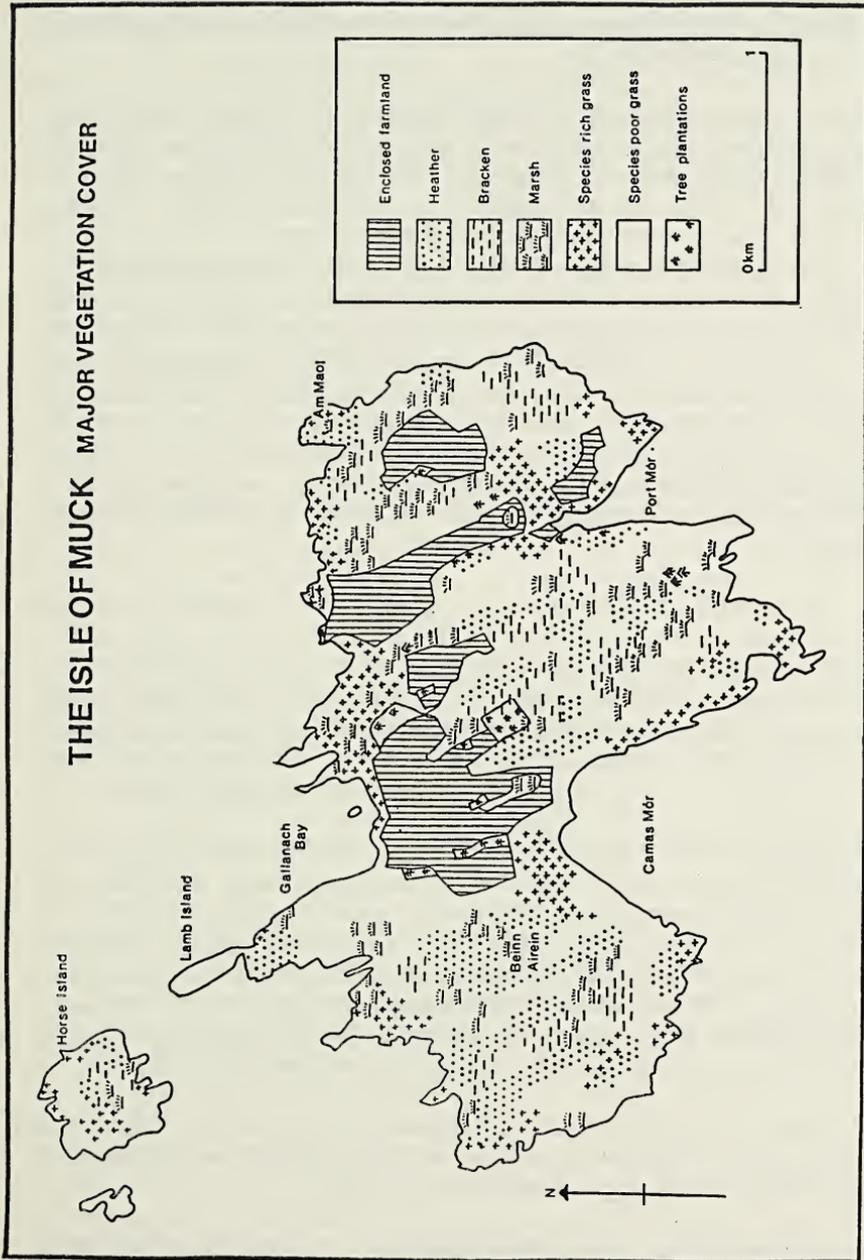


Fig. 5 The major vegetational cover of the Muck Islands.

which are of small extent. The wet conditions and high humidities are ideal for bryophytes which flourish as major components of most plant associations.

The basalt outcrops on the lower, more sheltered parts of the south, east and west of Muck were originally more or less wooded, probably mainly with birch but nothing remains of these now. At the time of the maximum population, in the early 1800s, virtually the whole basalt area was cultivated by the lazy-bed method and was fertilised with seaweed and shell-sand. The remains of the furrows are clearly visible in many places. Moderately acid conditions now prevail and these parts support a relatively species-poor *Agrostis* – *Festuca* – *Anthoxanthum* grassland, with increased numbers of herb species on the shoulders of the hills, cliff tops and other areas near the sea or free from grazing, and increased *Nardus* incidence where exposed. Bracken encroaches on the grass but is seldom tall enough to obliterate it or the few woodland species, notably celandine (*Ranunculus ficaria*), which establish themselves beneath it.

The harder, more resistant 'core' basalts and dolerite sills predominate in the 'highlands' of the west, the higher parts of the central area and at Am Maol. These weather more slowly and are more exposed to wind and rain so that more acid conditions prevail and purple moor grass (*Molinia caerulea*) takes over as the dominant grass. There are varying amounts of heather (*Calluna vulgaris*) on shallow peats. Heather is best developed on the east-facing slopes of Beinn Airein and of Gleann Mhartein where it is about 45 cm high and occurs with only a few other species. On west-facing slopes the heather is of less height and is mixed with *Molinia* and basiphilous herbs and grasses. These are most abundant in the west. Flatter, more water-logged areas with acid bog and *Sphagnum* pools on deeper peat are few, the biggest being Blar na Fionn-aird, where deer grass (*Trichophorum cespitosum*) is found with heather, *Rhacomitrium* and lichens. A larger area of accumulated peat formerly occurred at Blar Mor but was removed long ago.

Small rocky outcrops, associated with thin soils are ubiquitous and here thyme (*Thymus praecox*), stonecrop (*Sedum anglicum*) and early hair-grass (*Aira praecox*) are common.

Sills outcrop as cliffs, approximately 30 m high and where these are east-facing the gullies and ledges provide sheltered, well-watered,

fertile conditions for a wide range of plants. These conditions, akin to those of woods, allow the growth of woodland plants, including a few native trees and shrubs – the remnants of former woods. These reach their greatest development in the east. The cliffs also support tall meadow and marsh herbs which here escape grazing, together, on Beinn Airein, with a few arctic-alpine and northern-montane species. The steep slopes under the cliffs are fertile and grassy.

The vegetation of north Muck is much influenced by the presence of shell sand and there are small areas of fixed dune behind the sandy beaches which grade into dune grasslands (machair) both supporting many basiphilous and calcicolous herbs. A small acid dune area occurs in the north. The farm fields correspond to the parts covered by the most fertile glacial deposits and round the edges of these and on the knolls within them is a luxuriant growth of many species of grasses and brightly-coloured basiphilous flowering herbs typical of hay meadows. Similar ungrazed areas are found at Toaluinn and within the fences around the plantations. More typical lowland *Agrostis* – *Festuca* grassland occurs in association with raised beaches.

Fields are ploughed for oats and vegetables in rotation and a typical range of weeds appears in them. However, one field at Gallanach, Square Park, and one at Toaluinn produce some weeds individual to them, which reappear with each year of cultivation but have not spread further.

Wet areas are numerous and varied but are small in area and cover only a small proportion of the whole. Because of the undulating terrain and basicity of the rocks, most wet areas are affected by enriched water, with fen and basic flush plant associations predominating. In valleys with slow-flowing water and accumulations of organic matter, black bog rush (*Shoenus nigricans*) or paniced sedge (*Carex paniculata*) is dominant and willow (*Salix aurita*) at its greatest development at about 2 m. Where the water-flow is faster sharp-flowered rush (*Juncus acutiflorus*) is dominant, with marsh herbs. In some wet areas reed (*Phragmites*) occurs as a relic and small flushes on Beinn Airein are dominated by sedges. In flat areas near the coast, where there is seepage from the rocks, more complex associations of the above species develop, often with iris (*Iris pseudacorus*), jointed rush (*Juncus articulatus*) and colourful marsh herbs. On the sloping edges of marshes and fens

which are subject to periodic flooding and increase in acid conditions, *Molinia* is dominant in tussocks, often with basiphilous herbs between.

Of the seven small permanent lochans, two are similar in type to the valley fens. The other five are formed in hollows in the harder 'core' basalt and all have a muddy substrate, with bog bean (*Menyanthes trifoliata*) and a small number of aquatic plants. In some the slow flow of water in the wet areas around produces 'poor fens'. On their shores acid conditions develop with *Sphagnum* and bog plants and, in some, boggy islands have formed. Acid conditions are greatest at Am Maol Lochan, where bog myrtle (*Myrica gale*) occurs.

In the northern area there are a few lowland marshes which are dominated by reed grass (*Phalaris arundinacea*) or by soft rush (*Juncus effusus*) and small dune marshes occur in the dune grassland. Springs are common at low levels.

About 60 years ago, 3 sheltered areas, in the lee of east-facing cliffs, were planted with a mixture of conifers and deciduous trees. These are now up to 20 m high and are associated with some shrubs and have a grassy substrate. Beech (*Fagus sylvatica*), Rowan (*Sorbus aucuparia*) and Alder (*Alnus glutinosa*) are doing well along with Sitka spruce (*Picea sitchensis*), Corsican pine (*Pinus nigra*), and sycamore (*Acer campestre*). Tree species are listed in Appendix 1. On the cliffs are lush growths of ferns, universal woodland herbs and brambles. Lichens are prominent on the trees. These areas will be referred to as 'woods' to distinguish them from more recent 'plantations'.

Over the past 20 years 9 small plantations have been established. In 4 of these the trees are now about 5 m high and some woodland flora has developed. On their east sides several more sensitive native species and exotics including *Eucalyptus* are thriving. Tree species are listed in Appendix 2. Private gardens contain further shrubs and garden plants which have not been considered.

Coastal associations include those of sandy and stony beaches where silver weed (*Potentilla anserina*) and Babington's orache (*Atriplex glabriuscula*) are common. In sheltered places impoverished salt marshes or brackish pools are found, the latter being best developed on the east coast of Aird nan Uan and Lamb

Island. On flatter rocky coasts sea pink (*Armeria maritima*) and scurvy grass (*Cochlearia*) are prolific, together with lovage (*Ligusticum scoticum*) and bladder campion (*Silene maritima*) on west-facing sea cliffs. Lichens are prominent on the rocks. Where sea birds or gulls nest in numbers annual weeds and grasses occur but these are seldom abundant enough to replace the coastal vegetation. On the edges of grassy cliff tops, particularly in the exposed south and west, sea pinks (*Armeria maritima*) and buck's horn plantain (*Plantago coronopus*) and other coastal species are found in the sward forming a strip of maritime grassland.

Horse Island is in many respects like Muck in miniature, with west-facing cliffs, east-facing inland and coastal cliffs with some woodland species, cliff-top herb-rich and maritime grassland and a small area of west-facing, herb-rich heath. Grass with encroaching bracken occurs on the central basalt area and a permanent pond with marsh and fen vegetation of *Juncus acutiflorus* and flowering herbs flanked by *Molinia* tussocks occupies the low-lying southern part. These tussocks are larger than any in Muck, with basiphilous herbs between. The gull colony in the south-west is larger than any in Muck, and here, the annuals and grasses which flourish in the nitrophilous conditions are well developed at the expense of the usual coastal flora. Eagamol, with its large bird colonies, has similar vegetation.

Horse Island differs from Muck in that it is grazed only in winter and in summer plants grow unchecked. The central basalt area and the fertile areas below the inland cliffs support a lush growth of a wider range of grasses and flowering herbs than the similar parts of Muck. It is noteworthy that when one Muck resident enclosed a grassy and rocky area around his house the lushness of the vegetation resembled that of Horse Island.

### List of species of vascular plants found during present survey

\* = Foreign species      † = Also found on Horse Island in similar habitat  
N.R. = New record

*Huperzia selago* (Fir Clubmoss) E. facing cliffs on Beinn Airein, Blar na Fionn-aird. Uncommon.

*Selaginella selaginoides* (Lesser Clubmoss) Basic flushes. Frequent.

† *Equisetum fluviatile* (Water Horsetail) Standing water. Frequent.  
*E. palustre* (Marsh Horsetail) Marshes. Uncommon. N.R.

- E. sylvaticum* (Wood Horsetail) Central wood, W. Beinn Airein, wet moorland. Frequent.
- E. arvense* (Common Horsetail) Grass fields. Uncommon. N.R.
- † *Pteridium aquilinum* (Bracken) Woods, plantations, invading lazy-bed grass. Common.
- Oreopteris limbosperma* (Mountain Fern) In north. Rare. N.R.
- † *Asplenium adiantum-nigrum* (Black Spleenwort) Cliffs, rocks. Common.
- † *A. marinum* (Sea Spleenwort) E. facing sea cliffs. Frequent.
- A. trichomanes* (Maidenhair Spleenwort) Sheltered cliffs. Frequent.
- A. ruta-muraria* (Wall-Rue) Walls of farm buildings. Locally common. N.R.
- † *Athyrium filix-femina* (Lady-fern) Woods, E. facing cliffs. Common.
- † *Dryopteris filix-mas* (Male Fern) Woods, E. facing cliffs. Common.
- D. affinis* Woods, E. facing cliffs. Common. N.R.
- † *D. dilatata* (Broad Buckler-fern) Woods, E. facing cliffs. Common.
- D. carthusiana* (Narrow Buckler-fern) Wet places. Uncommon.
- D. expansa* (Northern Buckler-fern) Woods. Frequent. N.R.
- Blechnum spicant* (Hard-fern) Old walls, cliffs, heather slopes. Common.
- † *Polypodium vulgare* (Common Polypody)
- Polypodium interjectum* (Hexaploid Polypody) N.R.
- † *Juniperus communis* subsp. *nana* (Juniper) Beinn Airein, cliffs at Camas Mor and east coast. Frequent.
- † *Caltha palustris* (Kingcup, Marsh Marigold) Streams. Common.
- † *Ranunculus acris* (Meadow Buttercup) Species-rich grass, dunes, machair, marshes. Common.
- † *R. repens* (Creeping Buttercup) Wetter grass. Locally common.
- R. bulbosus* (Bulbous Buttercup) Dunes, machair. Locally common. N.R.
- † *R. flammula* (Lesser Spearwort) All standing water. Common.
- R. hederaceus* (Ivy-leaved Water-Crowfoot) Colonising bare mud. Frequent.
- † *R. ficaria* (Lesser Celandine) Woods, wetter grass, beneath bracken. Common.
- Thalictrum minus* subsp. *minus* (Lesser Meadow Rue) Dunes. Rare.
- Nymphaea alba* (White Water-lily) Central Lochan West. Introduced.
- Papaver dubium* (Long-headed Poppy) Square Park, Gallanach. N.R.
- Fumaria muralis* subsp. *boraei* Square Park, Gallanach. N.R.
- Brassica napus* (Rape) Introduced. Weed of cultivated fields. Common. N.R.
- B. rapa* (Turnip) Introduced. Weed of cultivated fields. Common. N.R.
- Sinapis arvensis* (Charlock, Wild Mustard) Weed of cultivated fields. Common.
- Capsella bursa-pastoris* (Shepherd's Purse) Weed of cultivated fields and gardens. Common.
- † *Cochlearia officinalis* (Scurvy-grass) Rocky shores, salt marshes, cliff-top grass. Common.
- C. scotica* (Scottish Scurvy-grass) Shores. Uncommon.
- † *C. danica* (Danish Scurvy-grass) W. facing rocky shores. Frequent.
- † *Cardamine pratensis* (Cuckoo Flower, Lady's Smock) Springs, marshes. Common.
- C. flexuosa* (Wood Bitter-cress) Woods, E. facing cliffs, marshy grass. Common.
- C. hirsuta* (Hairy Bitter-cress) Garden weed. Frequent.

- Nasturtium officinale* (Water-cress) Stream Gallanach beach. Rare. N.R.  
† *Arabidopsis thaliana* (Thale Cress) Cliffs, Port Mor. Uncommon. N.R.  
† *Viola riviniana* (Common Violet) Woods, cliffs, all short grass. Common.  
† *V. canina* (Heath Violet) In north. Uncommon.  
*V. palustris* (Marsh Violet) With *Sphagnum* near lochans and other wet areas. Frequent.  
*V. arvensis* (Field Pansy) Weed of cultivated fields. Uncommon.  
† *Polygala vulgaris* (Common Milkwort) In grass in north, cliff tops. Frequent.  
† *P. serpyllifolia* (Thyme-leaved Milkwort) Acid and lazy-bed grass, W. facing heather slopes. Common.  
*Hypericum androsaemum* (Tutsan) N. and E. facing cliffs. Frequent.  
*H. tetrapterum* (Square-stemmed St. John's Wort) Marshes. Frequent.  
*H. pulchrum* (Slender St. John's Wort) Cliffs, among heather. Frequent.  
† *Silene dioica* (Red Campion) N. and E. facing cliffs. Rare.  
*S. alba* (White Campion) Weed in Toaluinn fields. Rare. N.R.  
† *S. maritima* (Sea Campion) Sea cliffs. Common.  
† *Lychnis flos-cuculi* (Ragged Robin) Marshes and wet grass. Common.  
† *Cerastium fontanum* subsp. *glabrescens* (Common Mouse-ear Chickweed) Species-rich and some lazy-bed grass, dunes, weed of fields and gardens. Common.  
† *C. glomeratum* (Sticky Mouse-ear Chickweed) Grass fields. Frequent.  
† *C. diffusum* (Dark-green Mouse-ear Chickweed) Cliff tops, coastal rocks, beaches. Common.  
† *Stellaria media* (Chickweed) Disturbed ground, beaches, gull colonies. Common.  
*S. holostea* (Greater Stitchwort) Port nam Maol. Rare.  
*S. graminea* (Lesser Stitchwort) Grass fields where ungrazed. Rare. N.R.  
† *S. alsine* (Bog Stitchwort) Springs, stream edges. Frequent.  
† *Sagina procumbens* (Procumbent Pearlwort) Cliffs, inland and shore rocks, in grass, weeds of paths. Common.  
*S. subulata* (Awl-leaved Pearlwort) Rocky outcrops, cliffs. Frequent.  
*Honkenya peploides* (Sea Sandwort) Beaches in north. Frequent.  
*Arenaria serpyllifolia* (Thyme-leaved Sandwort) Gallanach beach, Coralag. Uncommon.  
*Spergula arvensis* (Spurrey) Weed of cultivated fields. Common.  
*Spergularia marina* (Lesser Sea-spurrey) Salt marsh in east. Rare. N.R.  
† *Montia fontana* agg. (Blinks) Springs, very wet flushes. Common.  
† *Atriplex patula* (Common Orache) Shores. Uncommon.  
† *A. prostrata* (Hastate Orache) Shores. Uncommon. N.R.  
*A. glabriuscula* (Babington's Orache) Stony shores. Frequent.  
† *Linum catharticum* (Purging Flax) Species-rich grass, dunes. Common.  
*Geranium dissectum* (Cut-leaved Cranesbill) Beside fields. Rare. N.R.  
*G. molle* (Dove's foot Cranesbill) Dry grass near the sea. Frequent.  
*G. robertianum* (Herb Robert) Woods, stony places near the sea. Frequent.  
*Erodium cicutarium* agg. (Common Storks-bill) Dry cliff tops. Rare. N.R.  
*Oxalis acetosella* (Wood-sorrel) Port Mor wood, below E. facing cliffs. Frequent.  
*Trifolium dubium* (Lesser Yellow Trefoil) Dry grass. Frequent.  
† *T. repens* (White Clover) Dunes, species-rich grass, machair, edges of marshes and salt marshes. Common.

- † *T. medium* (Zigzag Clover) Cliffs, beside hay fields. Frequent.
- † *T. pratense* (Red Clover) Beside hay fields, grass at Toaluinn. Frequent.
- † *Anthyllis vulneraria* (Kidney Vetch, Ladies' Fingers) Cliffs in the north and at Camas Mor. Frequent.
- † *Lotus corniculatus* (Birdsfoot-trefoil) Species-rich grass, dunes, cliffs, W. facing heather slopes. Common.
- Vicia cracca* (Tufted Vetch) Beside hay fields and plantations. Frequent.
- V. sepium* (Bush Vetch) Beside hayfields, widespread in grass. Frequent.
- Lathyrus pratensis* (Meadow Vetchling) Beside hayfields and plantations, widespread in grass. Frequent.
- L. montanus* (Bitter Vetch) Widespread in rough grass and heather. Frequent.
- † *Filipendula ulmaria* (Meadow-sweet) Wet grass, marshes. Common.
- Rubus idaeus* (Raspberry) Port nam Maol. Rare.
- Rubus fruticosus, sensu lato* (Blackberry, Bramble) Woods, cliffs. Frequent.
- R. polyanthemus* Widespread. The commonest bramble.
- R. laciniata* Introduced. Central Wood.  
(Others to be determined.)
- † *Potentilla palustris* (Marsh Cinquefoil) Standing water. Locally common.
- † *P. anserina* (Silverweed) Weed of cultivated fields, sandy and stony shores. Common.
- † *P. erecta* (Common Tormentil) Almost everywhere. Abundant.
- Alchemilla glabra* (Lady's Mantle) Grass beneath E. facing cliffs. Frequent.
- Aphanes microcarpa* (Parsley Piert) Disturbed ground. Uncommon. N.R.
- † *Rosa pimpinellifolia* (Burnet Rose) Cliffs, W. facing heather slopes. Frequent.
- \* *Rosa rugosa* Introduced. Near Camas na Cairidh. N.R.
- Rosa canina group* (Dog Rose)
- R. afzeliana* North facing cliffs on coasts. Frequent. N.R.  
Another to be determined.
- R. tomentosa group* (Downy Rose)
- R. sherardii* Port nam Maol. Rare.
- Prunus spinosa* (Blackthorn, Sloe) Cliffs in S. E. Uncommon.
- Crataegus monogyna* (Hawthorn) Native on cliffs in E. and S.E. Uncommon.
- † *Sedum rosea* (Rose-root) Cliffs on Beinn Airein and east coast.
- † *S. anglicum* (English Stonecrop) Rocky outcrops, cliffs. Common.
- S. acre* (Wall-pepper, Biting Stonecrop) Shell sand beaches. Uncommon.
- Chrysosplenium oppositifolium* (Golden Saxifrage) Central Wood, springs, wet N. and E. facing cliffs. Frequent.
- Parnassia palustris* (Grass of Parnassus) Dune marshes, lowland flushes. Frequent.
- † *Drosera rotundifolia* (Sundew) With *Sphagnum* in lochans, bogs and fens. Common.
- † *Epilobium montanum* (Broad-leaved Willow-herb) Woods, N. and E. facing cliffs. Frequent.
- E. obscurum* (Dull-leaved Willow-herb) Gardens, marshes. Uncommon.
- † *E. palustre* (Marsh Willow-herb) Marshes, lochans, stream edges. Common.

- Myriophyllum alterniflorum* (Alternate-flowered Water-milfoil) Some lochans and pools.
- † *Callitriche stagnalis* (Starwort) Springs, marshes. Common.
- † *C. hamulata* Lochans, pools. Frequent.
- Hedera helix* (Ivy) N. and E. facing cliffs, on trees in woods. Common.
- † *Hydrocotyle vulgaris* (Pennywort) Wet places in grass and marsh edges. Common.
- Anthriscus sylvestris* (Cow Parsley) Near farm buildings. Locally Common.
- † *Conopodium majus* (Pignut, Earthnut) Ungrazed grass in fields, woods and below cliffs. Common.
- Aegopodium podagraria* (Goutweed, Ground Elder) Garden weed. Uncommon.
- † *Oenanthe crocata* (Hemlock Water Dropwort) Streams near the sea. Uncommon.
- Conium maculatum* (Hemlock) Beside field Gallanach. Rare. N.R.
- † *Ligusticum scoticum* (Scots Lovage) Coastal rocks, sea cliffs. Common. N.R. for Muck.
- † *Angelica sylvestris* (Wild Angelica) Woods, cliffs, wet grass, marshes. Common.
- Heracleum sphondylium* (Hogweed) Rough grass beside plantations and fields. Common.
- Daucus carota* subsp. *carota* (Wild Carrot) Beside hayfields, in grass near the sea. Common.
- Euphorbia helioscopia* (Sun Spurge) Weed of cultivated fields. Uncommon.
- Polygonum aviculare* (Knot Grass) Weed of cultivated fields. Common.
- P. arenastrum* (Knot Grass) Weed of paths near buildings. Frequent.
- P. amphibium* (Amphibious Bistort) Wet hollows in grass fields. Locally common. N.R.
- P. persicaria* (Persicaria, Redshank) Weed of cultivated fields. Common.
- P. lapathifolium* (Pale Persicaria) Rare. N.R.
- P. hydropiper* (Water-pepper) Marshes. Uncommon.
- Fallopia convolvulus* (Black Bindweed) Weed in Toaluinn fields. Uncommon. N.R.
- Rumex acetosella* (Sheep's Sorrel) Widespread in drier places. Frequent.
- † *R. acetosa* (Sorrel) Beside hayfields and plantations, species-rich grass, in grass beneath cliffs. Common.
- † *R. crispus* (Curled Dock) Beaches, rocky shores, weed of cultivated fields. Common.
- R. obtusifolius* (Broad-leaved Dock) Weed beside fields and farm buildings. Common.
- Urtica urens* (Small Nettle) Gallanach beach. Locally Common. N.R.
- † *U. dioica* (Stinging Nettle) Near present and old buildings. Common.
- Myrica gale* (Bog Myrtle, Sweet Gale) Wet areas in the N.E. Frequent.
- Corylus avellana* (Hazel) A few small bushes Port nam Maol. Rare.
- Populus tremula* (Aspen) Cliffs at Port Mor. Several well grown trees. Increasing since fenced a few years ago. N.R. for Muck.
- Salix aurita* (Eared Sallow) Fens, E. facing slopes and cliffs. Common.
- † *S. repens* (Creeping Willow)

- † subsp. *repens* Widespread with heather. Common.  
 subsp. *argentea* More acid dune grass in a small area in the north.  
 Locally common.
- S. x ambigua* A few plants found. Widespread.
- † *Calluna vulgaris* (Ling, Heather) In all more acid habitats. Abundant.
- † *Erica tetralix* (Cross-leaved Heath) Wetter acid grass, bogs.  
 Common. A few specimens had white flowers.
- † *E. cinerea* (Bell-heather) With *Calluna* in drier places. Frequent.
- Empetrum nigrum* (Crowberry) Coastal in the west. Rare. N.R. for Muck.
- † *Armeria maritima* (Thrift, Sea Pink) Sea cliffs, rocky coasts, cliff-top  
 grass, salt marshes. Abundant.
- † *Primula vulgaris* (Primrose) Woods, E. facing cliffs and slopes. Common.
- Lysimachia nemorum* (Yellow Pimpernel) Stream sides in the west.  
 Common.
- † *Anagallis tenella* (Bog Pimpernel) Lowland flushes. Frequent.
- A. arvensis* (Scarlet Pimpernel) Weed of cultivated fields. Uncommon.
- Glaux maritima* (Sea Milkwort) Salt marshes. Common.
- Centaureum erythraea* (Centaury) Recently seen near Gallanach after many  
 years absence. Rare.
- † *Gentianella campestris* (Field Gentian) Machair. In grass, Horse Island.  
 Uncommon.
- † *Menyanthes trifoliata* (Bog Bean) All lochans and standing water.  
 Common.
- Anchusa arvensis* (Bugloss) Square Park, Gallanach. N.R.
- Myosotis secunda* (Water Forget-me-not) Lochans, marshes. Uncommon.
- † *M. laxa* subsp. *caespitosa* (Water Forget-me-not) Streams, flowing water.  
 Frequent.
- M. arvensis* (Common Forget-me-not) Grass fields. Uncommon.
- M. discolor* (Yellow-and-blue Forget-me-not) In grass beside cultivated  
 fields. Frequent.
- Calystegia sepium* subsp. *sepium* (Larger Bindweed) Weed in gardens.  
 Frequent. N.R.
- Scrophularia nodosa* (Figwort) Rare. N.R.
- Digitalis purpurea* (Foxlove) E. facing cliffs, rock faces in woods, old  
 houses. Common.
- Veronica beccabunga* (Brooklime) Streams. Uncommon.
- V. scutellata* (Marsh Speedwell) Some lochans and marshes. Frequent.  
 N.R.
- V. officinalis* (Common Speedwell) Widespread in grass. Common.
- V. chamaedrys* (Germander Speedwell) Woods, lazy-bed grass. Common.
- V. serpyllifolia* (Thyme-leaved Speedwell) Woods, grass below cliffs.  
 Common.
- † *V. arvensis* (Wall Speedwell) Dry grass. Frequent.
- V. agrestis* (Field Speedwell) Weed of cultivated fields. Frequent.
- † *Pedicularis palustris* (Red Rattle) Streams, flowing water. Common. A  
 few specimens had white flowers.
- † *P. sylvatica* (Lousewort) Bogs, acid dune-grass, heather slopes. Common.  
 A few specimens had white flowers.
- † *Rhinanthus minor* (Yellow Rattle)  
 † subsp. *minor* Beside hayfields, in grass in the north. Common.  
 † subsp. *stenophyllus* Beside hayfields, in grass in the north. Common.  
 † subsp. *monticola* Widespread in heather. Frequent. N.R.

- † *Euphrasia officinalis* sensu lato (Eyebright)  
 † *E. micrantha* Widespread in heather. Common. N.R.  
*E. scottica* Upland flushes. Frequent. N.R.  
*E. tetraquetra* Dunes, machair. Locally common. N.R.  
 † *E. nemerosa* Widespread in grass. Frequent. N.R.  
 † *E. confusa* Cliff-top grass and machair. Common.  
 † *E. borealis* subsp. *arctica* Beside hayfields, machair. Locally common.  
 Hybrids between these species are common. Others to be determined.  
*Odontites verna* subsp. *verna* (Red Rattle) Grassland in north. Common.  
 A few specimens had white flowers.
- † *Orobanche alba* (Red Broomrape) Rock faces, cliffs. Rare.  
*Pinguicula lusitanica* (Pale Butterwort) Upland flushes. Frequent.  
*Pinguicula vulgaris* (Common Butterwort) Flushes and wet rocks, mainly  
 in the west. Common.  
*Utricularia* sp. undetermined. (Bladderwort)  
*U. minor* (Lesser Bladderwort) Some lochans. Frequent.  
*Mentha aquatica* (Water Mint) Streams. Frequent.  
*Lycopus europaeus* (Gipsy-wort) Stony shores in south east. Uncommon.  
 N.R.
- † *Thymus praecox* subsp. *arcticus* (Wild Thyme) All short grass, rocky  
 outcrops, cliffs. Common. A few specimens had white flowers.
- † *Prunella vulgaris* (Self-heal) Species-rich grass, edges of marshes.  
 Common. A few specimens had white flowers.  
*Stachys arvensis* (Field Woundwort) Weed of cultivated fields and gardens.  
 Frequent. N.R.  
*S. palustris* (Marsh Woundwort) Waste ground near beach at Gallanach.  
 Uncommon. N.R.  
*S. sylvatica* (Hedge Woundwort) Near present and old buildings. Frequent.  
*Lamium moluccellifolium* (Intermediate Dead-nettle) Weed in gardens at  
 Port Mor.  
*L. purpureum* (Red Dead-nettle) Weed in gardens and Square Park,  
 Gallanach. Locally Common.  
*Galeopsis tetrahit* (Common Hemp-nettle) Weed of cultivated fields.  
 Common.  
*G. bifida* (Common Hemp-nettle) Weed of cultivated fields. Uncommon.  
 N.R.
- † *Scutellaria galericulata* (Common Skull-cap) Stony shores in the south  
 east. Uncommon. N.R.  
*S. minor* (Lesser Skull-cap) Widespread in wet areas. Frequent.  
*Teucrium scorodonia* (Wood Sage) Inland Cliffs. Common.  
*Ajuga pyramidalis* (Pyramidal Bugle) Cliffs on Beinn Airein. Uncommon.  
*Plantago major* (Rat-tail Plantain) Weed of road, paths around buildings  
 and bare patches near shore. Common.
- † *P. lanceolata* (Ribwort) Species-rich grass, machair, dunes, beside  
 hayfields and plantations. Common.
- † *P. maritima* (Sea Plantain) Cliffs, salt marshes, in grass near the sea.  
 Common.
- † *P. coronopus* (Buck's-horn Plantain) Shore rocks, salt marshes, cliff tops.  
 Common.  
*Littorella uniflora* (Shore-weed) Central Lochan East in dry years, dry  
 pools Lamb Island. N.R.

- Campanula rotundifolia* (Harebell) Grassy and heather slopes. Common.
- † *Galium verum* (Lady's Bedstraw) Drier species-rich grass, dunes. Common
- † *G. saxatile* (Heath Bedstraw) Lazy-bed grass, heather slopes. Common.
- † *G. palustre* (Lesser Marsh Bedstraw) Lochans, marshes. Common.
- † *G. aperine* (Goosegrass, Cleavers) Waste places, stony shores. Common.
- Sambucus nigra* (Elder) Woods, Frequent.
- Lonicera periclymenum* (Honeysuckle) Rock faces in woods, E. facing cliffs. Frequent.
- † *Succisa pratensis* (Devil's-bit Scabious) Wet acid grass, marshes, flushes, heather slopes. Common.
- † *Senecio jacobaea* (Ragwort) Beside hayfields and plantations, cliffs. Frequent.
- † *S. aquaticus* (Marsh Ragwort) Marshes. Common.
- S. vulgaris* (Groundsel) Garden weed. Frequent.
- Tussilago farfara* (Coltsfoot) Gallanach beach, Port Mor. Uncommon.
- Petasites hybridus* (Butterbur) Stream at Gallanach. Locally Common.
- Gnaphalium uliginosum* (Marsh Cudweed) Muddy paths. Locally Common. N.R.
- Antennaria dioica* (Cat's-foot) W. facing heather slopes, inland cliff tops. Common.
- Solidago virgaurea* var. *cambrica* (Golden-rod) E. facing cliffs. Frequent.
- † *Bellis perennis* (Daisy) Species-rich and cliff-top grass, machair, dunes. Common.
- Eupatorium cannabinum* (Hemp Agrimony) Geo on E. coast. N.R.
- † *Achillea millefolium* (Yarrow, Milfoil) Species-rich grass, machair, dunes. Common.
- † *A. ptarmica* (Sneezewort) Beside hayfields, marshes. Frequent. N.R.
- Tripleurospermum inodorum* (Scentless Mayweed) Beside hayfields. Uncommon.
- † *T. maritimum* (Sea Mayweed) Sea cliffs, gull colonies. Common. N.R.
- \* *Matricaria matricarioides* (Pineapple Weed) Paths, roadside. Common.
- Chrysanthemum segetum* (Corn Marigold) Weed of cultivated fields. Common.
- Leucanthemum vulgare* (Ox-eye Daisy, Marguerite) Beside hayfields. Rare.
- Arctium minus* subsp. *minus* (Lesser Burdock) Near farm buildings. Frequent. N.R.
- † *Cirsium vulgare* (Spear Thistle) Species-rich grass, dunes. Common.
- † *C. palustre* (Marsh Thistle) Marshes, wet grass. Common.
- C. arvense* (Creeping Thistle, Field Thistle) Encroaching on grass fields. Common.
- † *Centaurea nigra* (Lesser Knapweed, Hardheads) Beside hayfields and plantations, cliffs, dunes. Common.
- Lapsana communis* (Nipplewort) Woods, gardens. Uncommon. N.R.
- † *Hypochaeris radicata* (Cat's Ear) Grassy slopes, cliffs, W. facing heather slopes, dunes. Common.
- † *Leontodon autumnalis* (Autumnal Hawkbit) Wetter species-rich grass, dunes, machair, salt marshes. Common.
- var. *pratensis* on Beinn Airein.
- Sonchus oleraceus* (Milk- or Sow-thistle) Weed of fields and gardens. Uncommon.
- † *S. asper* (Spiny Sow-thistle) Weed of cultivated fields and gardens, cliffs. Frequent.

- † *Hieracium* (Hawkweed)  
 Section *Foliosa* Low level cliffs. Frequent.  
 Section *Vulgata* *H. vulgatum* Cliffs. Frequent.  
 Section *Oreadea* † *H. shoobredii* Cliffs near the sea. Frequent.  
 Others to be determined.
- † *H. pilosella* (Mouse-ear Hawkweed) Widespread in dry grass. Frequent.  
*Crepis capillaris* (Smooth Hawksbeard) Beside hayfields, grass in the north. Locally common.
- † *Taraxacum* (Dandelion)  
 † Section *Spectabilia* (Marsh Dandelions) Low level flushes, dunes. Common.  
*T. maculosum* *T. faroense* *T. unquibum*  
 Section *Erythrosperma* Dunes. Uncommon.  
 † Section *Taraxacum* Gardens, near buildings. Locally common.  
 Others to be determined.
- † *Triglochin palustris* (Marsh Arrow-grass) Marshes. Frequent.  
*T. maritima* (Sea Arrow-grass) Salt marshes, marshes near the sea. Frequent.
- † *Potamogeton natans* (Broad-leaved Pondweed) Some lochans. Uncommon. N.R. for Muck.
- † *P. polygonifolius* (Bog Pondweed) Lochans, pools. Common.  
*Ruppia maritima* One brackish pool on Lamb Island. N.R.
- † *Narthecium ossifragum* (Bog Asphodel) Bogs, wet hollows in heather, edges of lochans and marshes. Common.
- † *Hyacinthoides non-scripta* (Bluebell) Woods, cliffs, ungrazed grass, under bracken. Common.  
*Allium ursinum* (Ramsons) Gullies in E. facing cliffs. Frequent.  
*Juncus squarrosus* (Heath Rush) Bogs. Uncommon.
- † *J. gerardi* (Mud Rush) Salt Marshes, stony shores. Common. N.R.  
*J. bufonius* (Toad Rush) Colonising bare patches in fields and near shore. Frequent.
- † *J. effusus* (Soft Rush) Wet hollows in grass fields, marshes, streams, lochan edges. Common.  
 var. *compactus* often with above. Less common.
- † *J. conglomeratus* (Conglomerate Rush) Bogs, edges of lochans and marshes, acid dune grass. Frequent.
- † *J. acutiflorus* (Sharp-flowered Rush) Lowland marshes. Common. N.R.  
*J. articulatus* (Jointed Rush) Lowland flushes. Frequent.
- † *J. bulbosus* (Bulbous Rush) Lochans, pools. Common.  
*J. kochii* Streams on Beinn Airein. Locally common.  
*Luzula pilosa* (Hairy Woodrush) Port nam Maol. Rare.
- † *L. sylvatica* (Greater Woodrush) E. facing cliffs on Beinn Airein. Locally frequent. N.R.
- † *L. campestris* (Field Woodrush) Lazy-bed and cliff-top grass. Common.
- † *L. multiflora* (Many-headed Woodrush) More acid wet places. Frequent.  
 Usual form in Horse Island. Var. *congesta* commoner in Muck.
- † *Iris pseudacorus* (Yellow Flag) Marshes. Common.
- \* *Tritonia x crocosmiflora* (Montbretia) Rare. N.R.  
*Gymnadenia conopsea* (Fragrant Orchid) Beside hayfields, in grass in the north. Frequent. N.R.

- † *Platanthera bifolia* (Lesser Butterfly Orchid) Marsh on Horse Island only. Locally common.  
*Orchis mascula* (Early Purple Orchid) N. and E. facing cliffs, Camas Mor cliffs. Uncommon.
- † *Dactylorhiza maculata* subsp. *ericetorum* (Heath Spotted Orchid) Wetter grass, wet heaths, bogs. Common.  
*D. incarnata* (Marsh Orchid) Dune marsh. Rare.
- † *D. purpurella* (Northern Fen Orchid) Fens, marshes. Common.
- † *D. maculata* x *D. purpurella* Frequent.  
*Sparganium minimum* (Small Bur-reed) Am Maol Lochan. Increasing. N.R.  
*Eriophorum angustifolium* (Common Cotton-grass) Lochans, bogs, fens, wet hollows in heather. Common.  
*E. vaginatum* (Hare's-tail, Cotton-grass) Bogs. Uncommon.  
*Eleocharis quinqueflora* (Few-flowered Spike-rush) Flushed places, often near the sea. Frequent.  
*E. multicaulis* (Many-stemmed Spike-rush) Flushes, near lochans. Common.
- † *E. palustris* (Common Spike-rush) Streams, lochans, pools. Common.  
*Trichophorum cespitosum* (Deer-grass) Bogs, wetter places in heath. Frequent.  
*Scirpus maritimus* (Sea Club-rush) Sheltered coastal pools. Uncommon. N.R.  
*Blysmus rufus* (Narrow Blysmus) Salt marshes. Locally frequent. N.R.  
*Schoenoplectus tabernaemontani* (Glaucous Bulrush) One brackish pool, Aird nan Uan. N.R.  
*Isolepis setacea* (Bristle Scirpus) Small streams on Beinn Airein. Frequent. N.R.  
*Eleogiton fluitans* (Floating Scirpus) Lochans, ditches. Common.
- † *Schoenus nigricans* (Bog-rush) Fens, flushes. Common.  
*Carex distans* (Distant Sedge) Ungrazed saltmarsh. Frequent. N.R.  
*C. hostiana* (Tawny Sedge) Flushes. Commonest on Beinn Airein. Frequent. N.R.
- † *C. binervis* (Ribbed Sedge) Heather slopes, more acid grass. Common.  
*C. lepidocarpa* (Yellow Sedge) Fens. Frequent. N.R.  
*C. demissa* (Yellow Sedge) Small flushes. Commonest on Beinn Airein. Frequent.  
*C. serotina* Dune pool. Rare.
- † *C. rostrata* (Beaked Sedge, Bottle Sedge) Some lochans. Locally common. N.R.
- † *C. panicea* (Carnation-grass) Small flushes. Commonest on Beinn Airein. Frequent.
- † *C. flacca* (Carnation-grass) Dunes, species-rich and cliff-top grass, flushes. Common.  
*C. pilulifera* (Pill-headed Sedge) Widespread in acid grass. Frequent. N.R.  
*C. caryophyllea* (Spring Sedge) Cliff-top grass in the south and west, Lamb Island. Locally frequent.
- † *C. nigra* (Common Sedge) Most wet places. Common.
- † *C. paniculata* (Panicked Sedge) Fens, large flushes. Increasing. Common.  
*C. arenaria* (Sand Sedge) Dunes. Uncommon.
- † *C. echinata* (Star Sedge) Lochans, bogs, wet hollows in more acid grass. Common.

- C. curta* (White Sedge) Edges of lochans. Uncommon. N.R.  
*C. ovalis* (Oval Sedge) Edges of marshes. Frequent.
- † *C. pulicaris* (Flea Sedge) Flushes, wet cliffs, dune marshes. Common.  
*C. dioica* (Dioecious Sedge) Flushes. Frequent. N.R.  
*Festuca pratensis* (Meadow Fescue) Near farm fields. Probably an escape.  
 Rare. N.R.
- † *F. rubra* (Red Fescue) All species-rich grass. Abundant.  
 subsp. *arenaria* Dunes, grass near the sea. Common.  
 subsp. *pruinosa* Salt marshes, bird colonies. Locally common.  
 subsp. *rubra* Lazy-bed grass.
- † *F. tenuifolia* Rare. N.R.
- † *F. vivipara* (Viviparous Fescue) Acid grass, heather slopes. Common.  
*Lolium perenne* (Rye-grass) Dunes, beside hayfields, road verges.  
 Frequent.
- † *Poa annua* (Annual Poa) Disturbed ground by buildings, on cliff tops and  
 in bird colonies. Common.
- † *P. pratensis* (Smooth-stalked Meadow-grass) Woods, beside hayfields and  
 plantations. Common.
- † *P. subcaerulea* Short grass near the sea, colonising beaches. Common.
- † *P. trivialis* (Rough-stalked Meadow-grass) Woods, marshes. Common.  
*Puccinellia maritima* (Sea Poa) Salt marshes. Uncommon.
- † *Dactylis glomerata* (Cock's-foot) Beside hayfields and plantations.  
 Common.
- † *Cynosurus cristatus* (Crested Dog's-tail) Species-rich grass. Common.  
*Catabrosa aquatica* (Water whorl-grass) Streams near the sea in the north.  
 Uncommon.
- Glyceria fluitans* (Flote-grass) Lochans, deeper streams. Frequent.  
*Bromus hordeaceus* agg. (Lop-grass) Beside hayfields. Frequent.
- † *Brachypodium sylvaticum* (Slender False-brome) Cliffs, W. facing heather  
 slopes. Frequent.  
*Elymus repens* (Couch-grass, Twitch) Beside cultivated fields. Frequent.  
*E. farctus* (Sand Couch-grass) Dunes. Uncommon. N.R.
- † *Avenula pubescens* (Hairy Oat) Commonest beside hayfields. Frequent.  
*Arrhenatherum elatius* (Oat-grass) Beside hayfields and plantations.  
 Common. N.R.
- † *Koeleria macrantha* (Crested Hair-grass) All grass near the sea. Common.
- † *Deschampsia cespitosa* (Tufted Hair-grass) Marshy grass. Frequent.  
*D. flexuosa* (Wavy Hair-grass) W. facing heather slopes. Frequent. N.R.
- † *Aira praecox* (Early Hair-grass) Sea cliff tops, rocky outcrops. Common.  
*A. caryophyllea* (Silvery Hair-grass) Small patches in dry places. Frequent.
- † *Anthoxanthum oderatum* (Sweet Vernal-grass) Almost everywhere.  
 Abundant.
- † *Holcus lanatus* (Yorkshire Fog) Woods, all grassy and wet areas.  
 Common.
- H. mollis* (Creeping Soft-grass) Woods. Locally common.
- † *Agrostis canina* (Brown Bent-grass) Acid grass, with heather, more acid  
 wet areas. Common. N.R.
- † *A. capillaris* (Common Bent-grass) Lazy-bed and species-rich grass.  
 Common.
- † *A. stolonifera* (Fiorin) Beside hayfields, salt marshes. Common.  
 var. *palustris* Fank Lochan only.

*Phleum pratense* (Timothy, Cat's-tail) Near hayfields. Probably an escape. Uncommon.

† *Alopecurus pratensis* (Meadow Foxtail) Beside hayfields. Uncommon.

*A. geniculatus* (Marsh Foxtail) Grassy marshy places. Frequent.

*Phalaris arundinacea* (Reed-grass) Marshes in Central Wood and the north. Locally common. N.R.

*Phragmites australis* (Reed) Some fens, lochans and marshes. Common.

*Danthonia decumbens* (Heath-grass) Acid grass, W. facing heather slopes. Frequent.

† *Molinia caerulea* (Purple Moor-grass) All wet areas, W. facing heather slopes, acid grass. Abundant.

† *Nardus stricta* (Mat-grass) In acid grass. Nowhere dominant. Common.

### Species of vascular plants reported previously but not found in present survey

The following species reported by J. W. H. Harrison (1939) or by J. H. Harrison (1949) were not found although actively sought. Changes affecting the flora could include increased grazing and drainage, land improvement procedures and the natural changes of wet areas. Some, particularly the weeds of cultivation, have a tenuous hold.

*Botrichium lunaria.*

*Papaver rhoeas.*

*Fumaria bastardi.*

*Viola reichenbachiana.*

*Hypericum humifusum.*

*Medicago lupulina.*

*Trifolium campestre.*

*Lotus uliginosus.*

*Vicia orobus.*

*Myriophyllum spicatum.*

*Sanicula europaea.*

*Torilis japonica.*

*Ulmus glabra.*

*Fraxinus excelsior.*

*Convolvulus arvensis.*

*Galeopsis speciosa.*

*Chrysanthemum vulgare.*

*Leontodon hispidus.*

*Crepis paludosa.*

*Coeloglossum viride.*

*Cladium mariscus.*

*Carex vesicaria.*

*Lolium multiflorum.*

## Appendix 1

### Introduced trees and shrubs in 'woods'.

\* *Picea sitchensis* (Sitka Spruce.)

\* *Larix decidua* (European Larch.)

\* *Pinus nigra*

subsp. *larico* (Corsican Pine.)

subsp. *nigra* (Austrian Pine.)

*Taxus baccata* (Yew.)

\* *Acer pseudoplatanus* (Sycamore.)

*Ilex aquifolium* (Holly.)

\* *Laburnum anagyroides* (Laburnum.)

*Prunus avium* (Wild Cherry.)

*Prunus padus* (Bird Cherry.)

*Crataegus monogyna* (Hawthorn.)

*Sorbus aucuparia* (Rowan.)

\* *Fuchsia magellanica* (Fuchsia.)

*Ulmus glabra* (Wych Elm.)

*Betula pendula* (Silver Birch.)

*Alnus glutinosa* (Alder.)

*Fagus sylvatica* (Beech.)

\* *Salix daphnoides* (Violet Willow.)

*S. viminalis* (Common Osier.)

*S. cinerea* subsp. *oleifolia*

(Common Sallow.)

\* *Rhododendron ponticum*

(Rhododendron.)

## Appendix 2

### Introduced trees in 'plantations'.

- \* *Abies alba* (Silver Fir.)
- \* *A. procera* (Noble Fir.)
- \* *Picea abies* (Norway Spruce.)
- \* *P. sitchensis* (Sitka Spruce.)
- \* *Larix leptolepis* (Japanese Larch.)
- \* *Pinus sylvestris* (Scots Pine.)
- \* *P. contorta* (Beach or Shore Pine.)
- \* *P. muricata* (Bishop Pine.)
- \* *P. radiata* (Monterey Pine.)
- \* *Cupressus leylandii* (Cypress.)
- \* *Araucaria araucana* (Monkey Puzzle)
- \* *Taxus baccata* (Yew.)
- \* *Tilia platyphyllos* (Large-leaved Lime.)
- \* *T. cordata* (Small-leaved Lime.)
- \* *Acer pseudoplanatus* (Sycamore.)
- \* *Aesculus hippocastanum* (Horse Chestnut.)
- \* *Ilex aquifolium* (Holly.)
- \* *Laburnum anagyroides* (Laburnum)
- \* *Prunus serrulata* (Japanese Cherry.)
- \* *Crataegus monogyna* (Hawthorn.)
- \* *Sorbus aucuparia* (Rowan.)
- \* *S. intermedia* (Swedish Whitebeam)
- \* *Malus sylvestris* agg. (Apple.)
- \* *Ribes sanguineum* (Flowering Currant.)
- \* *Hippophae rhamnoides* (Sea Buckthorn.)
- \* *Alnus rubra* (Red Alder.)
- \* *Corylus avellana* (Hazel.)
- \* *Fagus sylvatica* (Beech.)
- \* *Quercus* sp. (Oak.)
- \* *Populus nigra* (Black Poplar.)
- \* *Salix viminalis* (Common Osier)
- \* *Fraxinus excelsior* (Ash.)
- \* *Eucalyptus* sp. various.

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### Acknowledgments

We are grateful to Mr and Mrs Lawrence MacEwen for permission to work on Muck and to them and all residents of Muck for much hospitality and friendship. Mr A. McG. Stirling gave much help with plant identification, Dr R. Tippett arranged for the analysis of water samples and Mr J. Low named the exotic planted trees. Fig. 4 is reproduced with the permission of Miss Sarah Dobson who also drew Fig. 5 specially for this paper.

## The Bryophytes of Great Cumbrae

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The island of Great Cumbrae (Fig. 1) is situated in the Firth of Clyde east of Bute in the 10-km National Grid square NS/15, V.C.100. (Clyde Isles). About 5 km long, 3 km wide and approximately 12 km<sup>2</sup> in area the island is composed mainly of Upper Old Red Sandstone and calciferous sandstone measures. Igneous intrusions of Cumbrite form the famous dykes.

For an island of its size it shows a wide variety of habitats including rocky shores, sand dunes and salt marshes, deciduous woods and a coniferous plantation, waterfalls and streams, grassland and pastures, moorland hill tops, rocky outcrops and cliffs, water-logged raised beaches, bog pools and lochans, as well as man-made walls, paths and gardens. Nowhere is very far from the sea. Only four of the 1-km squares on the map have no coastline, 66, 76, 77 and 78. There is no very high ground, the highest point just topping 400 ft.

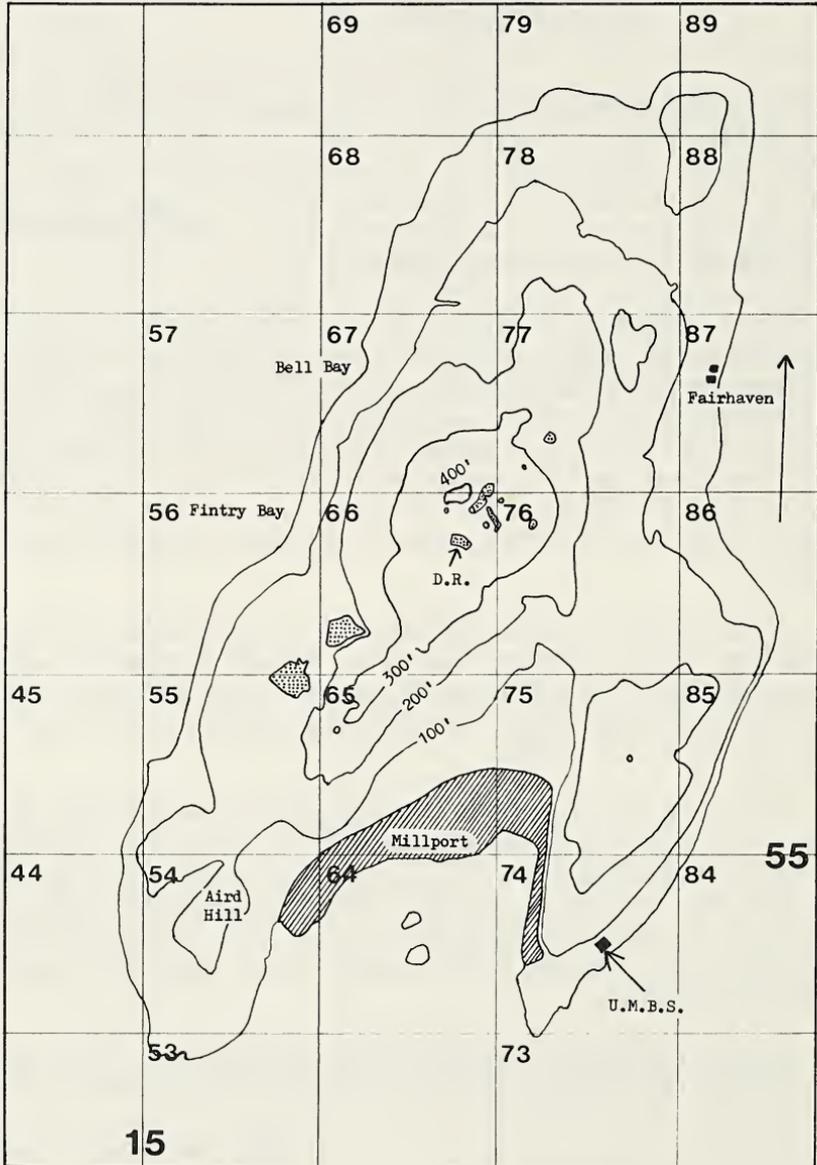
Great Cumbrae suffers the high winds, high humidity and salt conditions of its maritime situation though it receives some protection from Arran in the south-west and from Bute and Argyll in the west and north. Apart from the small island of Little Cumbrae it is exposed to the south.

The mean January rainfall for the 10 year period 1961-1970 was 4·14 in and for 1971-1980 was 4·88 in. Mean July rainfalls for the same periods were 2·93 in and 3·10 in and mean annual rainfalls were 44·97 in and 42·22 in. The annual mean number of wet days for 1961-1970 was 197·9 and for 1971-1980 was 204·0, a wet day being a period of 24 hours in which more than a trace of rain is recorded.

Balfour (1856) lists 72 species of moss and 3 species of liverwort of which 20 of the mosses are not recorded in my survey. A few

Figure 1

Map of Great Cumrae showing 1-km grid squares and contours in feet. (U.M.B.S. = University Marine Biological Station, D.R. = drained old reservoir, stippled areas = lochans and reservoirs).



of the names are ambiguous and 4 of them have no current V.C. 100 record (Corley & Hill 1981). Unfortunately Balfour did not distinguish between the Great and Little Cumbraes and this invalidates his list as far as the present work is concerned. (See appendix.) Murray (1901) lists 8 species of moss for Cumbrae (Great Cumbrae), 2 of which I have confirmed. Boyd (1907) added 1 moss for Cumbrae which has been confirmed (Crundwell, pers. comm.).

Crundwell (pers. comm.) recorded bryophytes on the island during short visits there from 1951-1976. His list has added another 12 species to mine. Long (pers. comm.) has supplied the names of 6 species from the herbarium of the Royal Botanic Garden, Edinburgh, which I also found on the island. There are no V.C. 100 records from Great Cumbrae previous to those I found in this survey.

My recording was carried out in May 1982 and May 1983 though a few specimens were collected by my husband in 1976, 1978 and 1984. The plan was to sample a wide variety of habitats in each 1-km grid square of the island so that, in addition to compiling a species list, it would also be possible to give some account of distribution.

The map of the island, Fig. 1, shows 1-km grid squares. In the list of species and the text, the numbers refer to the 1-km grid squares in the map. Twenty-five 1-km squares were sampled, being all those which could be distinguished on the ground.

## Check list of species

The nomenclature and order of taxa follow Corley and Hill (1981). An asterisk \* signifies a new vice-county record. The total number of 1-km squares recorded for any taxon is an index of the frequency of that taxon on Great Cumbrae. Details of habitats are given for each taxon. E = herbarium at the Royal Botanic Garden, Edinburgh.

### Hepaticae

- Conocephalum conicum*. Wet cliffs and rocks by streams. 55, 56, 67, 68, 77, 89.  
*Lunularia cruciata*. Paths at U.M.B.S. 74.  
*Marchantia polymorpha*. Paths at U.M.B.S. 74.  
*Metzgeria furcata*. Rocks and tree trunks. 55, 56, 67, 74, 75, 77, 78, 87.  
*Riccardia multifida*. Water-logged ground. 67 (also Crundwell 1976).  
*Riccardia chamedryfolia*. 74 (Crundwell 1976).  
*Pellia epiphylla*. Stream banks, wet moorland, wet cliffs. 55, 56, 66, 67 (also Crundwell 1976), 68, 77, 89.  
*Barbilophozia floerkei*. Cliff ledges and rocks. 75 (Crundwell 1951), 89.  
*Barbilophozia attenuata*. Shady rocks and peaty bank. 85.  
*Lophozia ventricosa*. Amongst mosses over rock. 56, 67 (Crundwell 1976), 74 (Crundwell 1976).  
*Lophozia guttulata*. Soil covered rocks and ledges. 66, 85, 89.  
*Gymnocolea inflata*. Wet moorland. 66, 74 (Crundwell 1976).  
*Mylia anomala*. 74 (Crundwell 1976).  
*Plagiochila porelloides*. Woodland floor, soil-covered rocks. 54, 56, 67, 68, 74, 86.  
*Lophocolea bidentata*. On ground on wet moor, hummock in marshy field, amongst stones and brambles, under conifers, turf by sea. 54, 55, 65, 67, 76, 79, 86, 89.  
*Lophocolea cuspidata*. Mainly on tree boles and stumps, also soil-filled crack in rock. 54, 55, 56, 67 (also Crundwell 1976), 74, 75, 76, 78.  
*Lophocolea heterophylla*. Tree stumps. 65, 77.  
*Chiloscyphus polyanthos*. Wet rocks by waterfall. 67.  
*Chiloscyphus pallescens*. Water-logged ground. 67.  
*Saccogyna viticulosa*. Rocks by waterfall, shore rocks, rocks on woodland floor, also on birch trunks. 55, 56, 67 (also Crundwell 1976), 89.  
*Diplophyllum albicans*. Shady banks, wet cliff face and moorland rocks. 56, 66, 67, 68, 89.  
*Scapania compacta*. Rocky ground on hill slopes. 54, 66.  
*Scapania undulata*. Rocky banks by stream, waterfall and drained old reservoir. 66, 67, 77.  
*Scapania gracilis*. Wet cliff face. 89.  
*Cephalozia divaricata*. Border of drained old reservoir. 66.  
*Cephalozia bicuspidata*. On ground amongst grass, etc. 67 (Crundwell 1976), 74 (Crundwell 1976), 85, 89.  
*Cephalozia connivens*. Amongst grass on moorland, bank in wood. 56, 66, 67 (Crundwell 1976), 74 (Crundwell 1976), 85.  
*Cephalozia lunulifolia*. Amongst *Leucobryum glaucum*. 89.

- Kurzia pauciflora*. 75 (Crundwell 1951).  
*Lepidozia reptans*. Tree stumps, banks and wet rock. 56, 67, 75, 77, 85, 89.  
*Calyptogeia muellerana*. Woodland floor, amongst rough grass and heather, shady banks, mouth of rabbit burrow, wet cliff face. 56, 66, 68, 85, 89.  
*Calyptogeia fissa*. Ditch side and woodland bank. 56, 67 (also Crundwell 1976), 74 (Crundwell 1976).  
*Calyptogeia arguta*. Sandy soil under rock ledge. 68.  
*Radula complanata*. Base of wall in woodland. 87.  
*Porella obtusata*. Rocks between road and Farland Point. 74. (Also recorded by Henderson 1954, near U.M.B.S., E.).  
*Frullania teneriffae*. Coastal rocks on sea side of road. 86.  
*Frullania tamarisci*. Rocks mainly on coastal plane down to *Xanthoria* zone, but also on Aird Hill (by Millport) at about 150 ft. 44, 54, 68, 74 (also Crundwell 1976), 89.  
*Frullania fragilifolia*. Rock by sea. 89.  
*Frullania dilatata*. Rocks by the sea and by U.M.B.S. hostel, also shady wall in a wood and on elder trunk. 55, 74 (also Crundwell 1976), 77, 87, 89. (Also recorded by D. G. Long 1968, Millport, E.).  
*Lejeunea cavifolia*. Rock by waterfall. 67.  
*Lejeunea ulicina*. Tree trunks notably birch. 56, 77.  
*Cololejeunea minutissima*. On bark of sycamore by U.M.B.S. 74.

#### Musci

- Sphagnum papillosum*. By drained old reservoir and on wet moorland by lochan. 66.  
*Sphagnum palustre*. Water-logged ground of raised beaches and wet moorland. 55, 66, 67 (also Crundwell 1976), 74 (also Crundwell 1976), 76, 89.  
*Sphagnum squarrosum*. 74 (Crundwell 1976).  
*Sphagnum fimbriatum*. Water-logged ground of raised beach. 74 (also Crundwell 1976).  
*Sphagnum russowii*. \* Moorland bordering drained old reservoir. 66.  
*Sphagnum capillifolium*. Water-logged ground of raised beaches and wet moorland. 66, 67 (also Crundwell 1976), 74 (also Crundwell 1976), 89.  
*Sphagnum subnitens*. Water-logged ground of raised beaches. 67 (Crundwell 1976), 74 (also Crundwell 1976), 89.  
*Sphagnum compactum*. Moorland. 66.  
*Sphagnum auriculatum* var. *auriculatum*. Water-logged ground of raised beaches. 55, 67, 74.  
*Sphagnum cuspidatum*. Water-logged ground of raised beaches and wet moorland. 66, 74 (also Crundwell 1976).  
*Sphagnum recurvum* var. *mucronatum*. Moorland. 66.  
*Andreaea rothii* ssp. *rothii*. Moorland rocks. 66.  
*Tetraphis pellucida*. Soil beside wet cliff face. 89.  
*Polytrichum formosum*. Ground in woods and moorland. 55, 56, 65, 68.  
*Polytrichum commune* var. *commune*. Moorland and water-logged ground. 55, 66, 67 (also Crundwell 1976), 74 (also Crundwell 1976), 76, 89.  
*Polytrichum piliferum*. Soil amongst rocks. 65, 66, 74, 89.  
*Polytrichum juniperinum*. Soil amongst grass, rocks, etc., sand dunes. 45, 54, 55, 56, 65, 66, 67 (Crundwell 1976), 68, 74 (also Crundwell 1976), 76, 84, 85, 86, 89.  
*Polytrichum alpestre*. Marshy ground. 55.

- Pogonatum aloides* var. *aloides*. Soil on banks. 66, 67, 68, 78.  
*Pogonatum urnigerum*. Soil covered rocks. 45, 89.  
*Atrichum undulatum*. Woodland floor and soil on banks in pasture. 56, 65, 67, 74, 78.  
*Archidium alternifolium*. 74 (Crundwell 1976).  
*Blindia acuta*. Damp cliff face. 89.  
*Ceratodon purpureus* ssp. *purpureus*. Soil, rocks, dunes, stumps. 45, 54, 55, 56, 57, 65, 66, 68, 74 (also Crundwell 1976), 77, 78, 84, 85, 86, 87, 89.  
*Dichodontium pellucidum*. Rocky bank of stream and concrete kerb of stream. 54, 67 (also Crundwell 1976).  
*Dicranella heteromalla*. Soil amongst grass, banks, woodland floor, tree stumps. 54, 55, 56, 65, 66, 67, 68, 74, 75, 76, 77, 78, 85, 89.  
*Dicranoweisia cirrata*. Trees, stumps and rocks, 65, 74, 76, 77, 78, 85, 89.  
*Dicranum bonjeanii*. Wet moorland and marshy ground. 55, 67 (Crundwell 1976), 74 (also Crundwell 1964), 75 (Crundwell 1951), 76, 89.  
*Dicranum scoparium*. Rocks, soil, stumps from moorland to shore, sand dunes. 45, 53, 54, 55, 56, 65, 66, 67 (also Crundwell 1976), 68, 74 (also Crundwell 1976), 75, 76, 85, 86, 89.  
*Dicranum majus*. Woodland floor and under heather and brambles on hillside. 67, 85, 89.  
*Campylopus pyriformis* var. *pyriformis*. Soil and old stumps. 66, 67 (Crundwell 1976), 74 (also Crundwell 1976), 77, 85, 89.  
*Campylopus paradoxus*. Rocks, soil, stumps, from moorland to coastal turf. 55, 66, 74 (also Crundwell 1976), 76, 78, 85, 86, 89.  
*Campylopus introflexus*. Moorland, tree stumps, sandy soil by shore. 45, 65, 66, 74 (also Crundwell 1976), 76, 84, 85.  
*Campylopus brevipilus*. (Murray 1901). Needs confirmation.  
*Leucobryum glaucum*. Moorland. 66, 67 (Crundwell 1976), 74 (Crundwell 1976), 89.  
*Fissidens bryoides*. Banks. 55, 65, 67, 78.  
*Fissidens curnovii*. Shady bank by waterfall. 77.  
*Fissidens taxifolius* ssp. *taxifolius*. Shaded rocky ground by stream, also dry bank. 55, 67.  
*Fissidens cristatus*. Shaded rocky ground by waterfall, wet cliff face, woodland floor. 56, 67, 89.  
*Fissidens adianthoides*. Woodland floor, bare soil in path, amongst rocks and turf by sea. 45, 56, 67, 85.  
*Tortula ruralis* ssp. *ruraliformis*. Sandy soil and dunes. 57, 65, 67 (Crundwell 1976), 75, 79.  
*Tortula intermedia*. Rock by shore. 44.  
*Tortula muralis* var. *muralis*. Rocks and walls. 44, 45, 53, 54, 55, 64, 65, 74 (also Crundwell 1976), 75, 77, 78, 86, 87, 89.  
*Tortula subulata*. Earth-covered rocks near sea. 74 (Crundwell 1952).  
*Tortula papillosa*. On elders. 74 (Crundwell 1957).  
*Pottia heimii*. Turf by sea. 53, 74 (Crundwell 1952). (Also recorded by Henderson 1954, Millport, E.).  
*Barbula convoluta* var. *convoluta*. Soil, tarmac paths by U.M.B.S. 74 (also Crundwell 1976), 85.  
*Barbula unguiculata*. Soil, rocks and walls, concrete. 44, 54, 65, 67, 74 (also Crundwell 1976), 75, 84.  
*Barbula revoluta*. Wall. 75.  
*Barbula rigidula*. Walls, rocks, concrete slip. 55, 65, 74, 75, 76, 87.

- Barbula trifaria*. \* Concrete embankment of stream. 54.
- Barbula tophacea*. Amongst rocks on shore. 74 (also Crundwell 1976), 84.
- Barbula cylindrica*. Edge of footpath, turf by sea, walls, concrete. 53, 54, 55, 56, 68, 74.
- Barbula recurvirostra*. Rock. 55.
- Weissia controversa* var. *controversa*. Wall. 75.
- Trichostomum crispulum*. Rocks. 67 (Crundwell 1976), 68, 74 (also Long 1968, E.). (Also recorded by Crundwell 1951, Millport).
- Trichostomum brachydontium*. Rocks, cliff face, soil. 55, 56, 67, 74 (also Crundwell 1976), 85, 89.
- Tortella flavovirens* var. *flavovirens*. Sandy crevices in rocks by sea. 44, 45, 74 (also Long 1968, E. and Crundwell 1976), 79, 85.
- Schistidium maritimum*. Rocks by sea. 44, 45, 53, 54, 55, 56, 57, 64, 65, 67, 68, 73, 74 (also Crundwell 1976), 75, 79, 84, 85, 86, 87, 88, 89. (Also recorded by Long 1968, Millport, E.).
- Schistidium apocarpum* var. *apocarpum*. Rocks and walls. 55, 67, 74, 75.
- Grimmia pulvinata* var. *pulvinata*. Rocks and walls. 44, 53, 54, 55, 57, 65, 66, 67, 68, 74 (also Crundwell 1976), 75, 78, 85, 86, 89.
- Grimmia trichophylla* var. *trichophylla*. Rocks. 54, 65, 68, 74, 85, 86, 87, 89.
- Racomitrium aciculare*. Rocks near stream, rocks in water-logged ground. 67, 78, 89.
- Racomitrium aquaticum*. Rock at edge of drained old reservoir. 66.
- Racomitrium fasciculare*. Rocks. 56, 65, 66, 67, 78.
- Racomitrium heterostichum*. Rocks and walls. 65, 66, 67, 74, 75, 78, 85, 86, 89.
- Ptychomitrium polyphyllum*. Rocks in pasture. 78.
- Funaria hygrometrica*. Cracks in pavement, burnt ground. 45, 55, 74 (also Crundwell 1976), 77.
- Orthodontium lineare*. \* Tree stump. 77.
- Pohlia nutans*. Rock crevices, banks, moorland. 65, 66, 74 (also Crundwell 1976).
- Pohlia bulbifera*. \* Bank of drained old reservoir. 66.
- Pohlia carnea*. Soil by U.M.B.S. 74.
- Bryum algovicum* var. *rutheanum*. \* Sand between rocks in *Xanthoria* zone. 44.
- Bryum inclinatum*. \* Cracks in footpath and on rocks. 85, 89.
- Bryum capillare* var. *capillare*. Mainly rocks and walls, also soil, dunes and tree stumps. 44, 45, 53, 54, 55, 56, 57, 64, 65, 67 (Crundwell 1976), 68, 73, 74 (also Crundwell 1976), 75, 76, 85, 86, 87, 89.
- Bryum pseudotriquetrum*. Flush, water-logged ground, drained old reservoir. 45, 55, 66, 67, 74 (also Crundwell 1976), 84, 86, 88, 89.
- Bryum bicolor*. Soil, wall, cracks in concrete slip. 45, 54, 87.
- Bryum argenteum* var. *argenteum*. Wall, cracks in pavement, burnt ground. 54, 55, 64, 65, 74, 76, 77.
- Bryum erythrocarpum*. Ambiguous. (Murray 1901)..
- Rhodobryum roseum*. (Murray 1901). Needs confirmation.
- Mnium hornum*. Tree trunks and stumps, woodland floor, banks, water-logged ground, rocks, grassy hill slopes. 55, 56, 65, 66, 67, 68, 74 (Crundwell 1976), 75, 76, 77, 78, 85, 86, 87, 89.
- Rhizomnium punctatum*. Soil and rocks by streams and in woods and wet ground. 56, 67, 78, 89.
- Plagiomnium elatum*. Border of reservoir, flush. 55.
- Plagiomnium undulatum*. Woodland floor, banks, pasture, water-logged ground, flush. 54, 55, 56, 65, 67, 68, 76, 78.
- Aulacomnium palustre* var. *palustre*. Water-logged raised beaches, wet moorland, wet pasture. 55, 66, 67 (also Crundwell 1976), 74 (also Crundwell 1976), 76, 89.

- Philonotis fontana*. Water-logged raised beaches. 55, 67 (also Crundwell 1976), 87.  
*Zygodon viridissimus* var. *viridissimus*. Walls and rocks. 44, 53, 54, 65, 67, 75.  
*Orthotrichum anomalum*. Rocks and concrete slips. 55, 75, 87.  
*Orthotrichum diaphanum*. Walls, rocks and concrete slip. 53, 54, 74, 75, 87.  
*Ulota crispa* var. *crispa*. Trees. 55, 67, 74.  
*Ulota phyllantha*. Rocks near sea, walls, trees. 44, 53, 54, 55, 56, 68, 74 (Crundwell 1976), 79, 89.  
*Pterogonium gracile*. Rock by U.M.B.S. 74. (Also recorded by Murray 1901).  
*Thamnobryum alopecurum*. Waterfall rocks. 67, 77.  
*Hookeria lucens*. Woodland floor, side of ditch. 55, 56, 67.  
*Heterocladium heteropterum* var. *heteropterum*. Steep shady banks of stream. 77.  
*Thuidium tamariscinum*. Woodland floor, water-logged ground, rough turf by shore, amongst grass and rocks on hillside. 54, 55, 56, 67 (also Crundwell 1976), 75, 85, 89.  
*Cratoneuron filicinum* var. *filicinum*. Flush, water-logged raised beach, sandy soil by road, among rocks by sea. 55, 67 (also Crundwell 1976), 74 (Crundwell 1952), 84, 86.  
*Cratoneuron commutatum* var. *commutatum*. Flush. 55.  
*Campylium stellatum* var. *stellatum*. 67 (Crundwell 1976). Wet ground of raised beach on E. side of island (Crundwell 1951).  
*Campylium stellatum* var. *protensum*. Rock on bank at edge of wood. 56.  
*Campylium polygamum*. 74 (Crundwell 1976).  
*Amblystegium serpens* var. *serpens*. Rocks, soil, old fence posts, turf by sea. 44, 53, 54, 55, 68, 74, 78, 87, 89.  
*Amblystegium fluviatile*. \* Wooden weir in stream. 54.  
*Amblystegium riparium*. Wet turf. 79.  
*Drepanocladus sendtneri*. (Murray 1901). Needs confirmation.  
*Drepanocladus fluitans* var. *fluitans*. \* Edge of bog pool, wet moorland by lochan. 66, 74.  
*Drepanocladus exannulatus* var. *rotae*. In drained old reservoir. 66.  
*Drepanocladus revolvens*. 67 (Crundwell 1976).  
*Scorpidium scorpioides*. 67 (Crundwell 1976). (Also recorded by Boyd 1907).  
*Calliergon giganteum*. 74 (Crundwell 1976).  
*Calliergon cuspidatum*. Woodland floor, water-logged ground, flush, edges of reservoir, grass verges, turf near sea. 44, 45, 55, 56, 57, 66, 67 (also Crundwell 1976), 68, 74 (Crundwell 1976), 75, 87, 88, 89.  
*Isoetecium myosuroides* var. *myosuroides*. Rocks, trees and stumps. 54, 56, 66, 67, 74, 75, 77, 78, 85, 86, 87, 89.  
*Homalothecium sericeum*. Walls and rocks down to the shore. 44, 53, 54, 55, 64, 65, 67 (also Crundwell 1976), 68, 74 (also Crundwell 1976), 75, 78, 79, 85, 86, 87, 89.  
*Brachythecium albicans*. Sand dunes, soil, amongst grass. 53, 57, 66, 67 (Crundwell 1976), 74, 86, 87.  
*Brachythecium rutabulum*. Rocks, trees, water-logged ground, amongst grass, woodland floor, rocks of waterfall. 53, 54, 55, 56, 65, 66, 67 (also Crundwell 1976), 68, 74, 75, 76, 77, 78, 79, 85, 86, 87, 88, 89.  
*Brachythecium rivulare*. Water-logged ground, rocks by waterfall, stream and lochan. 45, 55, 67 (also Crundwell 1976), 68, 78.  
*Brachythecium populeum*. Rocks, concrete slip, walls, tarmac by road edge. 54, 55, 86, 87.  
*Brachythecium plumosum*. Wet cliff face, border of reservoir, wet grass verge. 55, 68, 86, 89.

- Pseudoscleropodium purum*. Amongst grass, moorland, woodland floor, sand dunes, water-logged ground. 45, 54, 55, 56, 65, 66, 67 (also Crundwell 1976), 68, 74, 75, 76, 85, 86, 89.
- Cirriphyllum crassinervium*. Rock at foot of cliff. 74.
- Rhynchostegium riparioides*. Rocks in streams and waterfalls and ditch. 54, 56, 67, 68, 77, 78.
- Rhynchostegium confertum*. Wall and rock. 54, 87. (Also recorded by Crundwell 1951, shaded wall near Millport.)
- Eurhynchium striatum*. Ground and wall in woods. 56, 67, 68, 75.
- Eurhynchium pumilum*. (Murray 1901). Needs confirmation.
- Eurhynchium praelongum* var. *praelongum*. Rocks, trees, amongst grass, woodland floor, water-logged ground, turf and rocks by sea, waterfall rocks. 44, 45, 53, 54, 55, 56, 57, 65, 66, 67, 73, 74 (also Crundwell 1976), 76, 77, 78, 79, 84, 85, 86, 87, 89.
- Eurhynchium swartzii* var. *swartzii*. Rocks of waterfall, among rocks near sea. 77, 84.
- Rhynchostegiella tenella*. (Murray 1901). Needs confirmation.
- Plagiothecium succulentum*. On ground and stumps in wood, soil and rocks near sea. 78, 86, 87, 89.
- Plagiothecium nemorale*. Side of ditch at edge of wood, soil by stream under trees. 56, 67.
- Plagiothecium undulatum*. Ground in woods, tree trunks, shady bank, on hillside under brambles and heather, wet cliff face. 56, 66, 67, 68, 74, 75, 76, 77, 85, 89.
- Isopterygium elegans*. Soil in woods, shaded banks, tree stumps, rocks by streams, wet cliff face. 65, 67, 68, 76, 77, 85, 89.
- Hypnum cupressiforme* var. *cupressiforme*. Rocks, trees, and stumps, soil, amongst rocks and grass by sea, water-logged ground. 53, 54, 55, 56, 57, 64, 65, 66, 67 (also Crundwell 1976), 68, 73, 74 (also Crundwell 1976), 75, 76, 77, 78, 85, 87, 89.
- Hypnum cupressiforme* var. *resupinatum*. Rocks and wall, trees and stumps. 68, 74, 86, 87. (Also Crundwell 1951, shaded wall near Millport.)
- Hypnum cupressiforme* var. *lacunosum*. Rocks and soil on hillsides and near shore. 45, 65, 66, 67, 74, 78, 84, 85.
- Hypnum mammillatum*. Trees and stumps. 66, 67, 75, 77, 85.
- Hypnum jutlandicum*. Amongst grass on hillside, under brambles and heather, wet moorland, water-logged ground. 54, 55, 67 (Crundwell 1976), 74 (Crundwell 1976), 76, 85, 89.
- Ctenidium molluscum* var. *molluscum*. On hummock in water-logged raised beach. 89.
- Rhytidiadelphus triquetrus*. On soil over rock. 68.
- Rhytidiadelphus squarrosus*. Amongst grass on hill slopes, moorland, water-logged raised beaches, roadside grass verges, turf by sea, sand dunes. Present in all 1-km squares. (Also Crundwell 1976).
- Rhytidiadelphus loreus*. Woodland floor. 56, 67.
- Pleurozium schreberi*. Moorland, amongst grass and heather on hill slopes, roadside grass verges, turf by shore, wet pasture and water-logged ground. 55, 56, 66, 67 (also Crundwell 1976), 68, 74 (also Crundwell 1976), 76, 85, 89.
- Hylocomium splendens*. Amongst grass and rocks on hillsides, roadside verges, water-logged ground. 54, 55, 67 (also Crundwell 1976), 68, 85, 89.

## Discussion

### 1. New vice-county records

The most interesting new V.C. record is *Orthodontium lineare* which was first described in the U.K. in 1922 in Cheshire. Since then it has spread over most of England and new records suggest it is slowly spreading northwards in Scotland. It had been recorded from both banks of the Clyde but had not been recorded from the Clyde Isles until this survey. It was found on a tree stump in a wood near Fairhaven (77). *Pohlia bulbifera* has been taxonomically reviewed recently and would in any case be easily overlooked. It was recorded on the banks of the drained old reservoir (66). On the moorland, close by, was found *Sphagnum russowii* (66). The patches of *Bryum algovicum* var. *rutheanum* were conspicuous in fruit growing in sand between rocks in the *Xanthoria* zone (44). *Bryum inclinatum* was also eye-catching in fruit growing in soil at the kerb-edge of the roadside footpath (85) and on rocks (89). *Barbula trifaria* is a southern species which becomes very rare in Scotland especially in the west. The most westerly Scottish records up to now were in Wigtownshire and Glasgow. It was found in Great Cumbrae on the concrete embankment of a roadside stream (54). *Amblystegium fluviatile* was found on a wooden weir in the same stream (54). *Drepanocladus fluitans* var. *fluitans* was recorded at the edge of a pool amongst Sphagna (74) and on a wet moorland by a lochan (66).

### 2. Atlantic Bryophytes

Six of the bryophytes recorded are noted for their Atlantic distribution in Europe where oceanic conditions with humid climate and equable temperature prevail. Using Ratcliffe's (1968) groups of Atlantic bryophytes these are:

S. Atlantic group – *Cololejeunea minutissima*.

Widespread Atlantic group – *Fissidens curnovii*, *Frullania teneriffae*, *Saccogyna viticulosa*

Mediterranean-Atlantic group – *Tortella flavovirens*, *Porella obtusata*.

### 3. Cumbrite dykes

The Cumbrite dykes of Great Cumbrae were poor in bryophytes yielding *Polytrichum piliferum*, *Dicranoweisia cirrata*, *Dicranum scoparium*, *Grimmia trichophylla* var. *trichophylla*, *Racomitrium heterostichum*, a *Pohlia* sp. probably *P. nutans*, and *Hypnum cupressiforme* var. *cupressiforme*.

### 4. Widely distributed species

*Rhytidiadelphus squarrosus* is noteworthy for being recorded in every 1-km grid square. It is fairly large, easily recognized and often forms extensive patches. *Eurhynchium praelongum*, recorded in 21 out of 25 squares is probably to be found in the remaining three if a careful search were made.

### 5. Maritime and coastal species

*Schistidium maritimum* was found on rocks all round the coast in the spray zone. *Ulota phyllantha* was found on the north, west and south-west parts of the island growing on sea-sprayed rocks and also on trees a short distance from the coast, but was not found on the east side of the island.

Other mosses often associated with maritime habitats were found thus: *Pottia heimii*, in turf by the sea, *Tortula ruralis* var. *ruraliformis* on sand dunes and turf near the sea, *Brachythecium albicans* on sand dunes and sandy soil, and *Tortella flavovirens* var. *flavovirens* on sand in rock crevices.

All bryophytes listed below were recorded as tide-washed, ie. at least occasionally splashed by the sea –

*Saccogyna viticulosa*, *Frullania tamarisci*, *F. fragilifolia*, *F. dilatata*, *Tortula intermedia*, *T. muralis* var. *muralis*, *Barbula unguiculata*, *B. rigidula*, *Tortella flavovirens* var. *flavovirens*, *Schistidium maritimum*, *S. apocarpum* var. *apocarpum*, *Grimmia pulvinata* var. *pulvinata*, *Bryum algovicum* var. *rutheanum*, *B. capillare* var. *capillare*, *B. bicolor*, *Zygodon viridissimus* var. *viridissimus*, *Orthotrichum anomalum*, *O. diaphanum*, *Ulota phyllantha*, *Amblystegium serpens* var. *serpens*, *Calliargon cuspidatum*, *Isoetecium myosuroides* var. *myosuroides*, *Homalothecium sericeum*, *Brachythecium albicans*, *B. rutabulum*, *B. populeum*, *Eurhynchium praelongum* var. *praelongum*, *Plagiothecium succulentum*, *Hypnum cupressiforme* var. *cupressiforme*, *Rhytidiadelphus squarrosus*.

## Conclusion

My own survey resulted in a total of 166 taxa which includes 8 new records for V.C. 100. Crundwell's further 12 taxa make a grand total of 178 taxa of which 42 are liverworts and 136 are mosses. The further 6 mosses mentioned by Murray (1901) require confirmation.

It is interesting that an island of this small size and low altitude should possess about 18% of the British bryophyte flora. This richness can probably be ascribed to habitat diversity and humidity. Great Cumbrae is extremely diverse in habitat for its area and it has about 200 wet days in a year. Ratcliffe (1968) considers the number of wet days is a better index of the effective wetness of the climate than total rainfall. In the 20 years 1961-1980, the annual mean number of wet days on the island (201) just falls within his highest wet-day category.

The surveys by Long (1978) and Dickson (1983) of the tiny island of Ailsa Craig (area about 0.8 km<sup>2</sup>) produced a total of 126 taxa (33 liverworts and 93 mosses). Of these 126 taxa, 28 are not in my Great Cumbrae list. Thus these two islands with a combined area of 0.004% of the area of Great Britain and Ireland together possess rather over 20% of the bryophyte flora of Great Britain and Ireland! It seems clear that these small islands in the Firth of Clyde are incredibly rich in their bryophytes.

## Acknowledgments

I wish to thank Professor J. A. Allen of the University Marine Biological Station for allowing me to use the facilities of the Station, for allowing me to use the Station's meteorological data and for his considerable encouragement; Dr D. G. Long of the Royal Botanic Garden, Edinburgh, for help in finding old records and for advice and encouragement; and Mr A. C. Crundwell for sending me his records for the island. Finally, I thank my husband for his advice and encouragement and for bringing home the first specimens which started off the whole exercise.

## Appendix

Although Balfour (1856) did not distinguish between the Cumbraes it is of interest to list here the species he included which were *not* confirmed for Gt. Cumbrae during this survey. Balfour's names are given first and modern names, where different (Corley & Hill, 1981), follow in brackets.

\* indicates no current V.C. 100 record.

*Pleuroidium subulatum* (ambiguous, probably *Pleuroidium acuminatum*), *Gymnostomum tenue* (*Gyroweisia tenuis*), *Dicranum varium* (*Dicranella varia*), *D. cerviculatum* (*Dicranella cerviculata*)\*, *D. palustre* (*Dicranella palustris*), *Pottia truncata*\*, *Trichostomum homomallum* (*Ditrichum heteromallum*), *Racomitrium canescens* (probably var. *ericoides*), *Physcomitrium ericetorum* (*Funaria obtusa*), *Entosthodon Templetoni* (*Funaria attenuata*), *Splachnum ampullaceum*, *Bartramia pomiformis*, *Mnium rostratum* (*Plagiomnium rostratum*), *Pogonatum nanum*, *P. alpinum* (*Polytrichum alpinum*), *Fontinalis antipyretica*, *Neckera complanata*, *Pylaisea polyantha*\*, *Eurhynchium Stokesii* (*Eurhynchium praelongum* var. *stokesii*), *Brachythecium velutinum*\*

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## Book Reviews

### **The Conservation Review: The Conservation Foundation's Third Review** Introduction by DAVID BELLAMY

Webb & Bower, 1985, 208 pp., colour and monochrome illustrations. £10.95 (hardback), £4.95 (paperback).

An appreciation of the natural world is no longer the exclusive preserve of the informed natural scientist. In recent years there has been an explosion of interest among the public at large, an interest stimulated by the realization that much of our wildlife, in both town and countryside, has either disappeared or is under threat. Yet a passive interest is not enough. The protection and conservation of plant and animal diversity, the wild and untouched features of our landscape, indeed, of aspects of our built heritage, all require action by someone.

While this attractive book (produced in conjunction with Gulf Oil) is not an action guide it does serve to illustrate what individuals and private groups can achieve, given the will to do so. It features entries on the 1984 Conservation Awards presented by the Conservation Foundation with the support of the Ford Motor Company. The categories of award are urban and rural projects, heritage, conservation engineering, young people's projects, and industry. The commitment described is impressive and it is heartening to note the extent of industrial links offering advice, resources, and funding, suggesting that the conservation ethic is spreading beyond the "green fringe".

There are only two award entries from Scotland, and just four organisations with Scottish links or base feature elsewhere in the text. It is to be hoped this merely reflects our disinclination north of the border for self-advertisement. If we do require prodding into action then this book should provide stimulation and ideas.

*CLIVE I. MORGAN*

### **The Wild Flowers of Britain and Northern Europe** RICHARD FITTER, ALASTAIR FITTER and MARJORIE BLAMEY

Collins, 1985, 336 pp., numerous colour illustrations.  
Paperback £4.95.

The latest edition of this popular wild flower pocket guide, first published in 1974, incorporates relatively few changes from its predecessors. The front and back covers have been restyled with the title in a more attractive type and a completely new coloured floral group has been substituted. Some species, previously illustrated only as black and white line drawings, are now in colour, notably the water plants. There are now only two appendices, 'Additional Species', formerly listed under Appendix 1, having now been incorporated in the main body of the text. Perhaps the most significant change is in the section on Plant Ecology which has been largely rewritten. The work remains an extremely comprehensive, well illustrated handy volume for the field botanist.

*A. McG. STIRLING*

# Loch Riddon Revisited – the Inter-tidal of the Sea-loch Resurveyed after Fifty-three Years

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*Received November 1984*

As part of a comprehensive survey of the Scottish Marine Fauna, Stephen (1930) undertook a series of observations of the fauna of sandy and muddy areas of the tidal zone. As examples of the grounds at the heads of sea lochs, he sampled Loch Riddon, Loch Gilp and West Loch Tarbert in June 1929. This paper is concerned with the former loch. The other lochs have also been recently studied and it is hoped that a report of those investigations may appear at a later date. The present paper concerns a detailed, 28-station, sampling of Loch Riddon undertaken in autumn 1982.

Loch Riddon is a small sea loch in Southern Argyll ( $55^{\circ}56'N$ ,  $5^{\circ}12'W$ ), which opens into the Kyles of Bute (Fig. 1). The principal

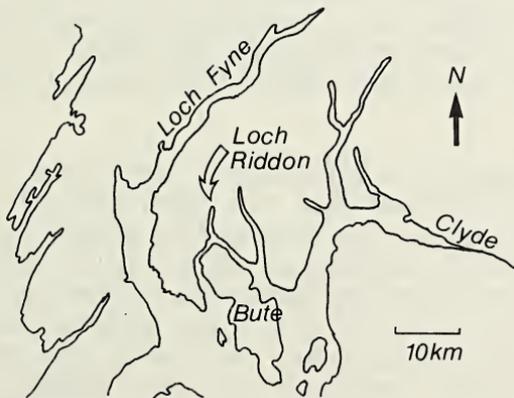


Figure 1. Loch Riddon, showing its position within the Clyde Sea Area.

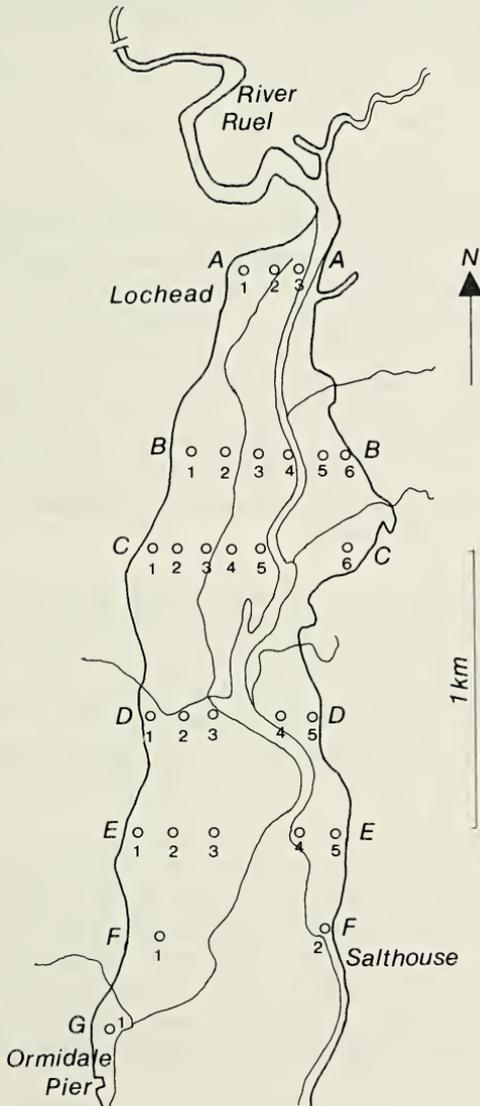
river entering the loch is the River Ruel, which drains into the loch from a largely uninhabited catchment of rough heathland. Under recent E.E.C. legislation the loch is designated as a "shellfish-rearing" area, and monitored by the Clyde River Purification Board. The Nature Conservancy Council has designated the loch as a Grade I Site of Special Scientific Interest, securing this status on the basis of its importance as a stopover point for migratory bird populations. Prater (1981), discussing the results of the "Birds of Estuaries Enquiry", describes Loch Riddon/Ruel estuary as "supporting numbers of estuary birds which are interesting in a regional context. The most significant being 60 Red-breasted Mergansers in autumn, 170 Wigeon, 120 Teal, 100 Eider, 350 Oystercatchers and 140 Curlew. The diversity of waders is low but quite reasonable". The birds are attracted to the area by the large intertidal area, which is relatively rare on the West of Scotland, and the feeding available within the intertidal sand and mud flats. The present study was undertaken to provide information on the macrobenthic invertebrate communities inhabiting the area, which may be available to the bird visitors. As far as we are aware, the fauna of the intertidal has not been previously surveyed, except for the one-day, three-station visit by Stephen in 1929. The results of our recent study are presented below, and where possible, compared with the earlier study.

## Materials and Methods

All sampling was carried out on foot and at low tide, in September 1982. 28 stations were sampled, comprising 7 transects based on E-W Ordnance Survey grid lines, at half-kilometre intervals, with individual stations being sited at 100 m intervals (Figure 2).

At each sampling station, a large faunal sample was collected using a 0.1m<sup>2</sup> metal box corer, to a depth of 20 cm. The sediment was sieved through a 1 mm mesh and the material retained within the sieve stored for sorting and analysis in the laboratory. This material was used for counting bivalve molluscs and other larger species. Two 5 x 5 x 5 cm cores were also collected and subsequently sieved through a 0.25 mm mesh. This material was used for counting *Hydrobia*, annelids, nematodes and other smaller species. After identification and counting, the animals were dried and weighed for the determination of biomass. Production was calculated by the multiplication of the biomass by known P/B ratios (production/biomass ratios). The P/B ratios used were derived from

Figure 2. Loch Riddon/Ruel estuary, showing sampling sites A – G (1-6), used for the September 1982 survey.



a wide variety of literature collated by McLusky (1981). A sediment sample was collected for physico-chemical analysis and an interstitial water sample collected for salinity determination. The full description of the techniques of analysis and the complete results are annotated in Hunter (1983). The present paper highlights the principal findings.

## Results

A total of 38 species (or taxa for nematodes and oligochaetes) was recorded within the intertidal areas of Loch Riddon and these are listed in Table 1 together with their mean abundance per  $m^2$ . Numerically most important were the nematode and oligochaete worms with 109, 514 and 28021  $m^{-2}$  respectively. However these worms are very small and the more conspicuous members of the fauna comprised the lugworm *Arenicola marina* (8.2  $m^{-2}$ ), the amphipod shrimp *Corophium volutator* (1528  $m^{-2}$ ), the polychaete *Fabricia sabella* (18086  $m^{-2}$ ), the gastropod snail *Hydrobia ulvae* (11528  $m^{-2}$ ) and the bivalve molluscs *Cardium edule*, *Macoma balthica*, *Mytilus edulis* and *Tellina tenuis* (101, 45, 686 and 14.6  $m^{-2}$  respectively).

The various species are not distributed uniformly across the Loch Riddon intertidal area and distinct patterns of distribution may be observed. In Table 2, selected data from each station sampled are presented, including 10 typical animal species, as well as information on mean particle size of the sediment, % silt and clay, salinity (‰ NaCl), % carbon, and % nitrogen. Species number, biomass and production are presented as  $m^{-2}$ , the latter as  $g m^{-2}$ .

These results show clear trends within the area, with *Nereis diversicolor* and *Corophium volutator* occurring at the stations at the head of the estuary, whilst the mussel *Mytilus edulis*, the cockle *Cardium edule* and the barnacle *Balanus balanoides* occurred at stations near the seaward end. The small snail *Hydrobia ulvae* appeared at virtually every station, whilst the tellins *Macoma balthica* and *Tellina tenuis* and the polychaete worms *Nephtys hombergi* and *Scoloplos armiger* predominate in the middle regions.

There is a clear progression of salinity conditions within the area, with the upper stations (A, B) experiencing interstitial salinities of below 10‰ the middle stations (C, D) experiencing 13 – 26‰

**Table 1** Species list from Loch Riddon/Ruel estuary, September 1982 with mean abundance of each species, expressed as  $N\ m^{-2}$ .

	$N\ m^{-2}$
<i>Anemonia sulcata</i> (Pennant)	1.07
<i>Arenicola marina</i> (L.)	8.21
<i>Bathyporeia pilosa</i> Watkin	0.35
<i>Balanus balanoides</i> (L.)	365
<i>Capitella capitata</i> (Fabricius)	10.35
<i>Carcinus maenas</i> (L.)	1.07
<i>Cardium edule</i> L.	101
<i>Corophium volutator</i> (Pallas)	1528
<i>Crangon crangon</i> L.	0.71
<i>Eteone flava</i> (Fabricius)	153
<i>Eurydice pulchra</i> Leach	1.42
<i>Fabricia sabella</i> (Ehrenberg)	18086
<i>Gammarus locusta</i> (L.)	14.20
<i>Gammarus zaddachi</i> Sexton	0.35
<i>Hyale nilssonii</i> (Rathke)	22.1
<i>Hydrobia ulvae</i> (Pennant)	11528
<i>Idotea granulosa</i> Rathke	35
<i>Lepidopleurus asellus</i> (Gmelin)	0.35
<i>Littorina littoralis</i> (L.)	71
<i>Littorina littorea</i> (L.)	445
<i>Lumbricillus lineatus</i> (Müller)	414
<i>Macoma balthica</i> (L.)	44.6
<i>Mya arenaria</i> L.	0.71
<i>Mytilus edulis</i> L.	686
Nematode spp.	109514
<i>Nephtys hombergi</i> Lamarck	10
<i>Nereis diversicolor</i> O. F. Müller	11.4
<i>Nereis virens</i> Sars	0.35
<i>Ophelia limacina</i> Savigny	93
<i>Patella intermedia</i> Jeffreys	0.71
<i>Pectinaria koreni</i> (Malmgren)	0.35
<i>Phyllodoce maculata</i> (L.)	57
<i>Pygospio elegans</i> Claparède	21.4
<i>Retusa obtusa</i> (Montagu)	21.4
<i>Scoloplos armiger</i> (O. F. Müller)	11.7
Sipunculid sp.	0.71
<i>Tellina tenuis</i> da Costa	14.6
<i>Tubifex</i> spp.	28021
<b>TOTAL</b>	<u>171294</u>



Table 2 *continued*

Cardium edule	Mytilus edulis	Hydrobia ulvae	Corophium volutator	Balanus balano.	Nereis div.	Nephtys hamb.	Scoloplos armiger	Station
0	0	10800	4400	0	130	0	0	A1
0	0	5800	1200	0	80	0	0	A2
0	0	200	0	0	0	0	0	A3
0	0	6800	8000	0	20	0	0	B1
0	0	14400	0	0	0	0	0	B2
0	0	7800	11600	0	0	10	0	B3
0	0	0	2000	0	0	0	0	B4
50	400	2100	7600	0	40	0	0	B5
0	0	200	4900	0	40	0	0	B6
0	0	13600	400	0	0	0	0	C1
0	0	11200	1200	0	0	30	0	C2
30	10	12400	0	0	0	30	40	C3
730	0	31600	400	0	0	10	40	C4
20	0	15800	0	0	0	30	30	C5
0	0	111400	200	0	0	0	0	C6
20	0	25200	0	0	0	10	0	D1
100	0	2800	200	0	0	30	80	D2
560	0	2000	400	0	0	50	110	D3
290	2200	33200	0	70	0	0	0	D4
0	20	10400	0	0	0	0	0	D5
60	10	3200	0	40	0	50	0	E1
20	50	12600	0	50	0	0	0	E2
460	90	34400	0	2290	0	20	10	E3
300	1600	24400	0	2640	0	10	0	E4
60	30	5400	400	120	0	0	0	E5
30	10	6200	0	30	0	0	0	F1
20	12800	0	0	0	0	0	0	F2
70	2000	0	0	1040	0	0	0	G1
								Mean (A-G)
101	686	11528	1528	365	11.4	10	11.07	
24	PRES	N.R.	N.R.	N.R.	N.R.	24	24	ST 1
20	PRES	N.R.	N.R.	N.R.	N.R.	16	4	ST 2
0	PRES	N.R.	N.R.	N.R.	N.R.	8	0	ST 3
15	PRES	—	—	—	—	16	8	ST mean

and the lower stations (E – G) experiencing salinities approaching that of sea water. There is also a progression of sedimentary characteristics. The mean particle diameter of the sediment is expressed as phi ( $\phi$ ) units; for comparison 0 – 0.9 = coarse sand, 1 – 1.9 = medium sand 2 – 2.9 = fine sand, 3 – 3.9 = very fine sand, 4 – 8 = silt, >8 = clay. Within Loch Riddon the upper and middle stations (A – D) are predominantly fine sand, whereas the lower stations (E – G) are coarse/medium sand. The percentage of silt and clay (i.e. that fraction of the sediment with phi 4 or greater), the percentage carbon and the percentage nitrogen is very variable within the area, emphasising the diversity of localised habitats within the entire area.

## Discussion

The results of the present survey of Loch Riddon/Ruel estuary have revealed a diverse and abundant fauna inhabiting the intertidal areas. Stephen (1930), in the only previously recorded study of the area, sampled only three stations, which were described as being near Ormidale Pier. From the information given in his report they are believed to correspond to E1, E2 and E3 of the present study. He recorded only 6 species (*Tellina tenuis*, *Macoma balthica*, *Cardium edule*, *Nephtys caeca*, *Scoloplos armiger* and *Travisia forbesii*). The first five species are still living in the area, although we recorded the closely related *Nephtys hombergi* rather than *N. caeca*. The last species is a small ophellid polychaete, similar to *Ophelia limacina*, which was recorded at station E1 this time. In the present survey 11 – 19 species were found at these three stations. However these include species retained by the 0.25 mm sieve, as well as the 1 mm sieve, whereas Stephen used only a 2 mm sieve. The larger sieve used by Stephen may not only account for the increased diversity seen this time, but also the increased abundance, as the small individuals of the species recorded by Stephen, as well as many entire species would certainly be expected to pass through a 2 mm sieve. After making allowances for the differences in diversity and abundance recorded due to the different sieve sizes, one may suggest that the composition of the fauna for these three stations has changed little over the intervening 53 years. Mettam (1983) has resurveyed estuarine areas of the Severn after 45 years and likewise reports little change and stability of populations.

However, comparison of the present results with those

published earlier emphasises a very important difference, namely that the area sampled by Stephen represented only one small area within the approximately 2 km<sup>2</sup> of intertidal area of Loch Riddon. The present results have shown that there is a gradation of conditions within the area, with the upper third being composed of fine sand, with low interstitial salinity, inhabited by typical estuarine animal species such as *Hydrobia ulvae*, *Nereis diversicolor* and *Corophium volutator*. The middle third is composed of fine sand with intermediate salinities and a wide variety of species, having a high biomass, including the bivalves *Macoma balthica*, *Cardium edule* and *Tellina tenuis*, and annelids such as *Nephtys hombergi* and *Scoloplos armiger*. The lower third is composed of coarse/medium sand, with almost fully marine salinities and a typical marine fauna, including *Mytilus edulis* and *Balanus balanoides*. These latter species are predominantly filter-feeding organisms relying on a supply of food from tidal incursions, whereas the species living further up the Loch are predominantly deposit-feeding organisms relying on material deposited in the sediments, either from the River Ruel, or from the sea.

Within Loch Riddon/Ruel estuary there is a virtually complete estuarine sequence of environmental conditions and associated fauna in miniature. Over the 2.5 km length of the Loch Riddon intertidal area there is a gradation from low salinity to high salinity conditions and from fine estuarine sediments to coarser marine sediments. As the conditions change so there is a sequence of fauna from brackish-water species through to fully marine species. This sequence is typical of any estuary, as described by McLusky (1971), and the range of species found in Loch Riddon is typical of any clean estuarine ecosystem, as described by McLusky (1981). Thus over the short length of Loch Riddon there is an environmental gradient, similar to that on the Clyde from Glasgow to Greenock, or on the Forth from Stirling to Edinburgh, or on the Tay from Perth to Dundee. The gradient of conditions is in contrast to many situations in West Coast sea lochs of Scotland, where rivers flow almost directly into the sea with virtually no intermediate brackish-water or estuarine conditions. Loch Riddon is also unusual in having a large, 2.5 km long, intertidal area at its head, in contrast to lochs such as Loch Long, Loch Goil or Loch Fyne where the equivalent intertidal area is only 100 – 200 m long.

Whereas most of the major estuaries of Scotland, such as the Clyde, Forth, Don and S. Esk (at Montrose), suffer from organic

enrichment or pollution, the Ruel estuary is unaffected by man's activities and thus provides a valuable comparison. Compared with the Forth (McLusky, 1983) or the Clyde (Minto et al., 1974) intertidal areas, the Ruel estuary has a greater diversity of species, having 38 recorded here, compared with approximately 12 in equivalent habitats in organically enriched estuaries. The enriched estuaries typically have intertidal faunal biomasses of 15 – 25 g m<sup>-2</sup> (excluding *Mytilus*) (McLusky, 1981, 1983). Many stations in the Ruel/Loch Riddon estuary do have biomasses less than this value, but it is noticeable that several stations do equal or exceed these values, showing that non-enriched habitats may be comparable with organically enriched habitats.

The present survey has shown that the Ruel estuary/Loch Riddon is an important estuarine/brackish-water habitat having a wide diversity of species which are abundant and contribute to a substantial biomass of invertebrates within the intertidal mud/sand flats. Coupled with the relative scarcity of such intertidal habitats in the West of Scotland sea loch areas, it becomes clear why Loch Riddon should prove to be such an attractive feeding ground for migratory waders and wild-fowl.

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## The Fan-mussel, *Pinna fragilis* Pennant, in Scotland

F. R. WOODWARD

Art Gallery and Museum, Kelvingrove, Glasgow

*Received November 1985*

A large example of the Fan-mussel, *Pinna fragilis* Pennant, was recently presented to the Kelvingrove Art Gallery and Museum via the Campbeltown Public Library and Museum. This specimen (Plate 1), 28 cm long, 13 cm broad and 5.1 cm thick, (Registration no. NHZ1983-204), had been taken alive at a depth of about 46 m approximately 3.7 km east of Sanda Island, off the Mull of Kintyre, and was handed in by Mr Wareham, a local fisherman.

This is the largest European bivalve and, although widely distributed around British coasts, is rarely encountered by collectors. Due to this scarcity in collections, coupled with variations in sculpture and thickness of its shell, the species has been described under the following names by past British workers – *borealis*, *pectinata*, *fragilis*, *muricata*, *ingens*, *laevis*, *rudis*, *papyracea*, *rotundata* and *elegans*.

Tebble (1966) states that around the British Isles specimens have been reported from various localities offshore to considerable depth, though more off the south coast than elsewhere. It lives with its pointed end buried in bottoms of mud, sandy mud or gravel, attached to small stones, or pieces of shell, by its byssus which passes through the anterior ventral gape. It is distributed south to the Iberian Peninsula. Jeffreys (1863) adds that the species is gregarious and has not been noticed as occurring anywhere north of Shetland. Fragments of it have been found in the Coralline Crag (Pliocene, preglacial deposits).

Smith (1837-9) does not record it from the Clyde Basin, although he refers to it (as *P. ingens*) occurring in Ireland, and the first Clyde records appear to be those of Brown (1878) who lists it under species depending on "doubtful or insufficient authority" thus: '*Pinna pectinata (rudis)*, Smith, Landsborough and Martin, Lamlash and Skelmorlie'.

Knight (1901) and Allen (1962) repeat Brown's records and, although giving no further details of the Lamlash record, mention that the single specimen from Skelmorlie (off Largs – Allen) was dredged by a Major Martin, changed hands several times and was finally given to G. A. F. Knight. Examination of the Knight Collection in the Hunterian Museum, Zoology Department, University of Glasgow, revealed a shell (Reg. No. GLAHM-ZB3032) labelled '*Pinna fragilis* Penn. (= *rudis*), Skelmorlie Bank. Dredged by Major Martin, given to D. Landsborough, from him to the Rev. J. E. Somerville and then to GAFK – one specimen'.

This confirms the presence of the species at Skelmorlie Bank and, although the ownership sequences given by Knight and Allen differ slightly from that on the label, the specimen is almost certainly the one they and Brown refer to.

It is a typically large individual, 29·1 cm long, 12·4 cm wide and 5·5 cm thick, and consists of both valves, now broken (Plate 2). There are no animal or plant encrustations on their inner surfaces so the specimen was probably caught alive. The date of collection is not known, but since D. Landsborough (Senior) died in 1854 it must have been earlier than that.

A further, and hitherto unpublished, record associated with the senior D. Landsborough has recently come to light. In a letter, dated 29 March 1851, addressed to a Mrs Gatty, he refers to a "fragment of *Pinna* from the Island of Coll". This can only refer to the species under discussion.

Some three or four years ago I saw another unrecorded example in the Museum at Gairloch, Ross and Cromarty. The owner of the Museum stated that it had been found in Loch Ewe, is 31 cm long and 15 cm wide, and is about 20 years old.

## Previous records

Previous Scottish records of *P. fragilis* are widely dispersed, so, to obtain a general picture of present knowledge of its distribution, these, together with the present records, are summarised below. Localities are indicated as precisely as possible by numbers

Plate 1 The Kintyre specimen of *Pinna fragilis* (slightly greater than half size).

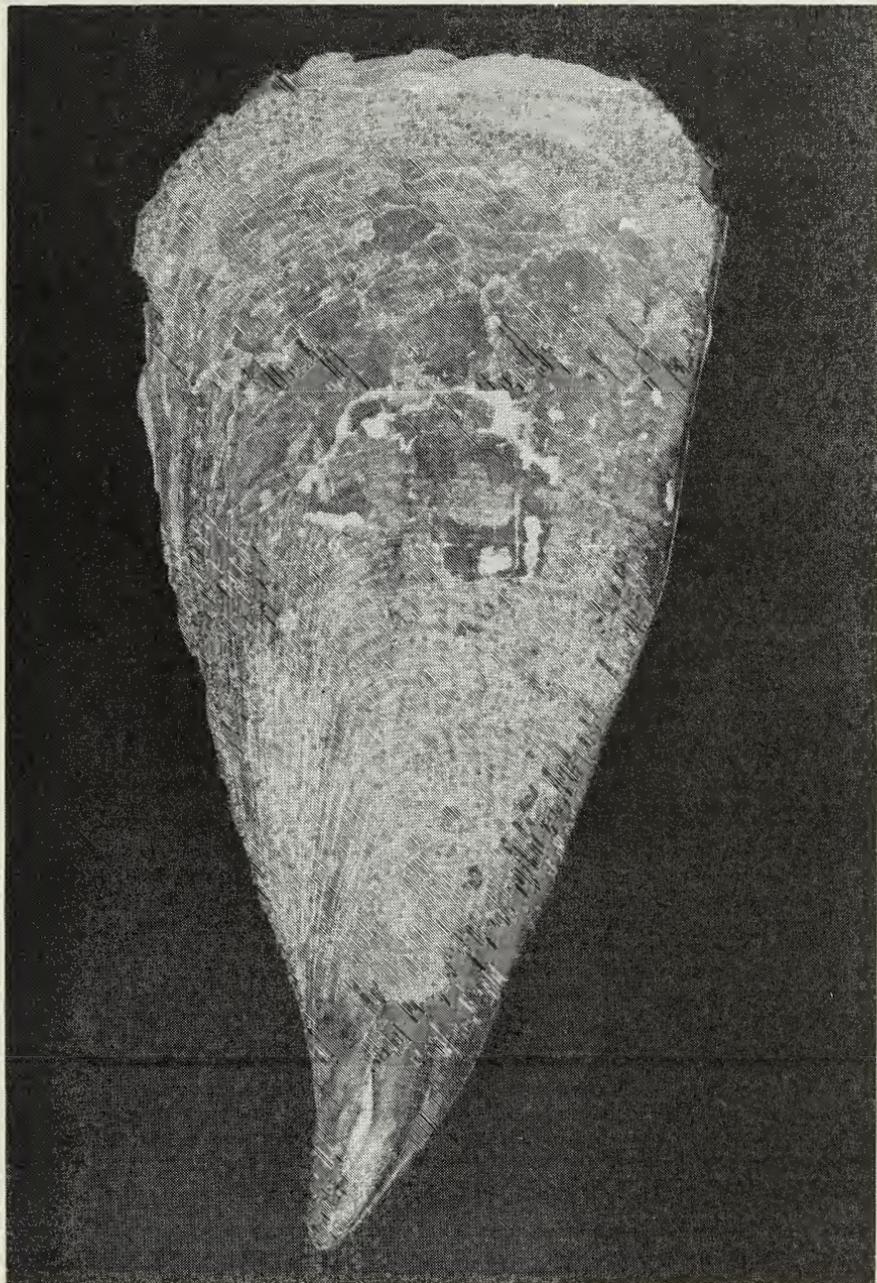
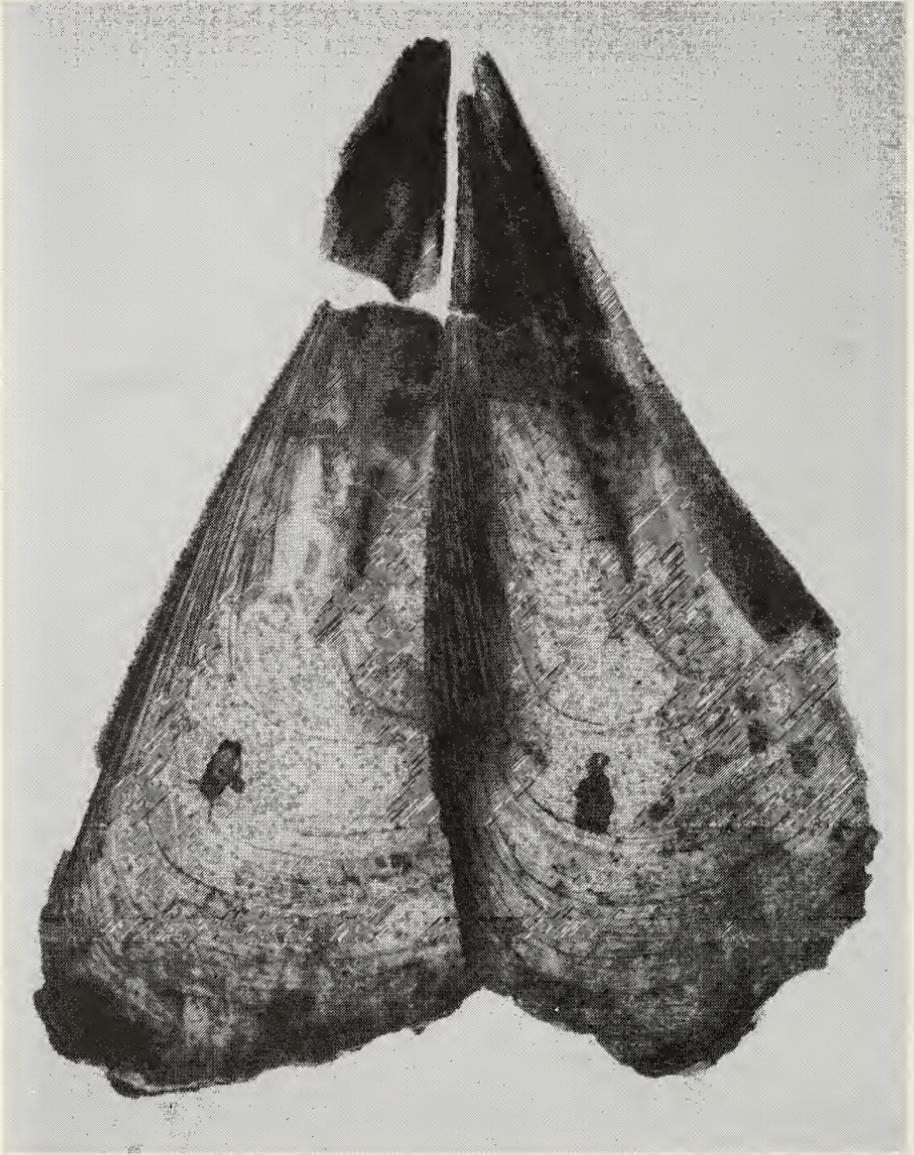


Plate 2 Major Martin's specimen of *Pinna fragilis* (slightly less than half size).



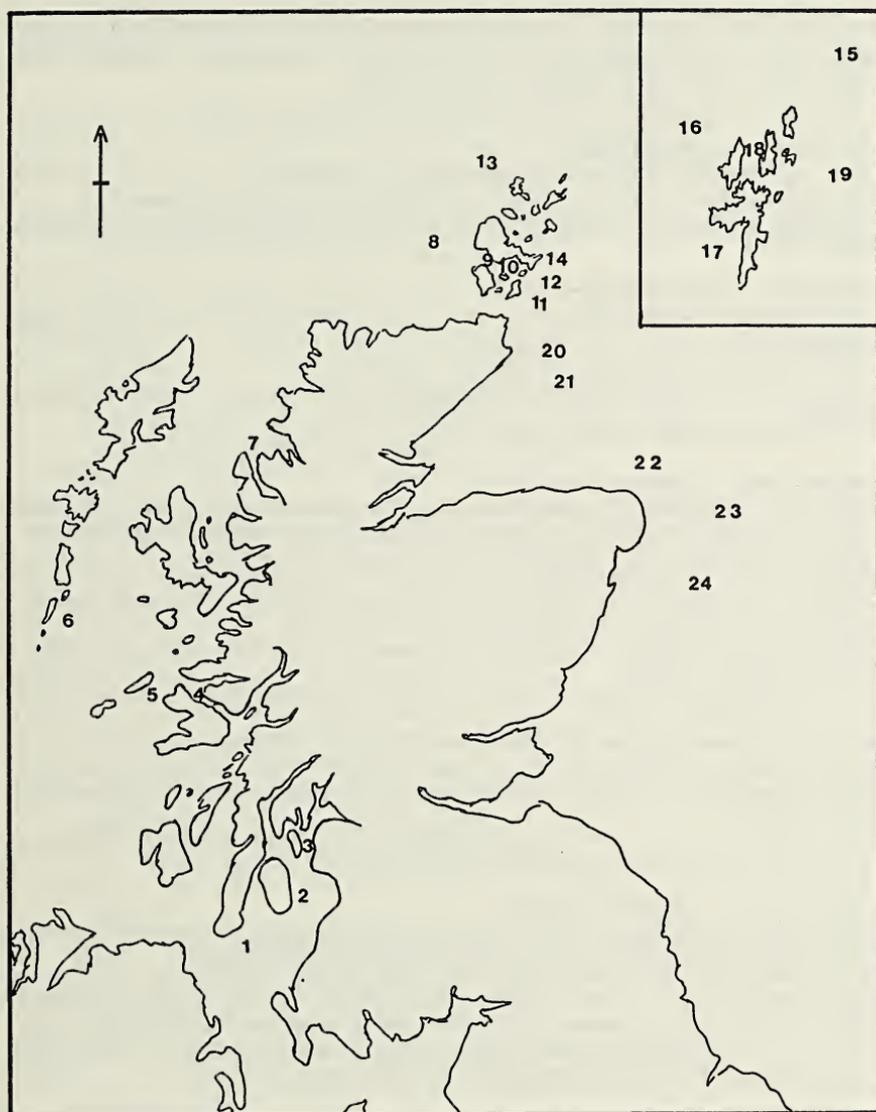


Figure 1 Map of Scotland (Shetland inset) to show, 1 - 24, localities of the records of *Pinna fragilis* detailed in the text.

on the map (Figure 1). Several old records have been published repeatedly; here the original formal publication is indicated and subsidiary accounts are only included if they contribute materially to the original. Various units of measurement were used in the past

and the distinction was not always made between nautical and statute miles. Here all measurements have been converted to metric and miles have been assumed to be nautical.

#### West coast – Firth of Clyde

- ( 1 ) E. of Sanda Is., Mull of Kintyre; details in present pub.
- ( 2 ) Lamlash, Arran; Brown, 1878 (*P. pectinata (rudis)*); not confirmed.
- ( 3 ) Skelmorlie Bank (nr. Largs); Brown, 1878 (*P. pectinata (rudis)*); confirmed in present pub.

#### West coast – north of Clyde

- ( 4 ) 'Scaladale' (= Scallastle?), Sound of Mull; Laskey, 1811b (*P. ingens*); small specimen.
- ( 5 ) Isle of Coll, Inner Hebrides; details in present pub.
- ( 6 ) Isle of Barra, Outer Hebrides; Pennant, 1770 (*P. ingens*); several found by Walker in 1764.
- ( 7 ) Loch Ewe; details in present pub.

#### Northern Isles – Orkney

- ( 8 ) Orkney; Traill, 1830 (*P. ingens*); specimen probably dead when found, dredged from 55-73m depth; confirmed by Heppell, 1973; specimen in Royal Scottish Museum, Edinburgh, Reg. no. RSM 1959-52-1; dimensions 22.5 x 11 cm.
- ( 9 ) Scapa Flow, Brings Deep (between Cava and Graemsay islands); Rendall, 1953; shell only, on fisherman's line in 1951 from depth up to 53m; now in Stromness Museum (see Marwick, 1951); 29.2 x 14 cm.
- (10) Scapa Flow; Heppell, 1973; from sandy bottom at 30 m, Dec. 1968; good double valve damaged by dredge.
- (11) 11 km SSW Isle of Copinsay; Rendall, 1956; two specimens from 77 m, Feb. 1937; 15.2 and 16.5 cm.
- (12) 9 km S Copinsay; Rendall, 1956; from 70 m, Oct. 1937; 20.3 cm.
- (13) Noup Deeps, 28-37 km off Noup Head, Westray; Rendall, 1956; taken live by Seine net boat, depth 137-205 m, Apr. 1956; now in Stromness Museum (see Marwick, 1956; 31.8 cm.
- (14) 58°55'N, 2°50'W (co-ordinate wrong, falls on S. Mainland, Orkney. Specimen presumably from sea nearby); Heppell, 1973; from 100 m, Apr. 1969.

#### Northern Isles – Shetland (Zetland)

- (15) 56 km ENE Shetland; Laskey, 1811a (*P. ingens*); caught alive on fish-hook by Walker; No. 2268 in Walker Ms 'Catalogue raisonnee' (*P. borealis?*).
- (16) Off Shetland coast; Donovan, 1803 (*P. laevis*); dredged, in cabinet of A. Macleay.
- (17) Burra Haaf; Rae & Lamont, 1963; caught live on small line Feb. 1940; 28 cm.
- (18) Yell Sound; Rae & Lamont, 1963; dead shell in seine net, July 1949; 29.2 cm.
- (19) E of Out Skerries lighthouse; Ritchie, 1921; damaged empty shell on haddock line at 128 m, Feb. 1921; now at Roy. Scot. Museum; 29.2 cm.

#### East coast

- (20) 20 km ESE of Wick; Rae & Lamont, 1963; taken in May 1937.
- (21) Smith Bank (near locality 20); Rae & Lamont, 1963; two empty valves taken by Seine-net vessel, summer of 1959 or '60; one was 26.9 cm.
- (22) 22 km off Fraserburgh; Rae & Lamont, 1963; in trawl, May 1937; 20.3 cm.
- (23) 74 km from land (off Fraserburgh?); MacGillivray, 1844 (*P. ingens*); taken Oct, 1842?
- (24) Off Aberdeen; MacGillivray, 1844 (*P. ingens*); in deep water on hard bottom, not very infrequently brought up on lines. In winter 1841-2 half a dozen specimens, one alive.

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## Book Reviews

### **The Nature Watchers: Exploring Wild Life with the Experts**

ROBIN BROWN and JULIAN PETTIFER  
Wm. Collins Sons & Co. Ltd., Glasgow 1985  
240 pp.; £12.00

This book is dedicated to the "enthusiastic amateur" of natural history. It considers the work of some "nature watchers" around the world, describing their research and findings concerning many of the little known creatures with which we share the earth.

Subjects vary from the Cleaner Wrasse of Hawaii, which has a symbiotic relationship with larger more aggressive fish, by feeding off the mucus and debris on the latter, to the elegant white oryx of the Arabian deserts – the animal thought to be the basis of the fabulous tales of unicorns.

Several curiosities are described, such as the recently identified "internal compass", found in the skulls of many animals, including man. This is thought to be the basis of our "direction sense", discovered to be best in those who sleep with their feet facing northwards!

Great attention is paid to the efforts of field workers to promote conservation and encourage breeding in endangered species, particularly in localities such as Mauritius, where many creatures have become extinct, or vulnerable, because of the heedless actions of man.

More mundane descriptions, such as Bill Oddie's obsessive childhood bird-watching at Midlands reservoirs, illustrate how the amateur, by careful observation and recording can add to the wealth of knowledge concerning local species.

Overall, the book contains many informative descriptions of creatures and their "nature watchers", and is well illustrated with colour photographs, but, by its very format, tends to be rather disjointed. It is by no means a scientific textbook, but makes easy and interesting reading, although perhaps a little overpriced at £12.

BARBARA C. M. MACPHERSON

### **A Map Flora of Mainland Inverness-shire**

G. HADLEY (Ed.)

Botanical Society of Edinburgh and Botanical Society of the British Isles, 1985, 146pp.,  
30 x 21 cm., 800 maps, paperback £4.95\*.

This book, the product of extensive field work over several years by many botanists, has 29 pages of text and no less than 788 distribution maps (8 to a page). The text deals with geography, geology, climate, land utilisation, botanical history and plant distribution. The latter section covers plants of the coast, the lowlands, the uplands, the wetlands and mid-altitudes and moorland as well as plants of widespread range, of east-west orientation and plants of acidic and basic soils. Each distribution map has a very brief description of "one typical habitat". Examples are *Selaginella selaginoides* "common in flushed grassy places", *Montia fontana* agg. "very common in wet places generally" and *Epilobium nerterioides* "Introduction. Damp shingle to 900 m."

Many a field botanist whether Scottish or visiting from south of the border will find much of interest in this book.

J. H. DICKSON

\* Available from Miss J. Muscott, A.R.C. Unit of Statistics, (Edin. Univ.), James Clerk Maxwell Building, King's Buildings, Mayfield Road, Edinburgh, EH9 3JZ.

## Fossil Evidence for *Radiola linoides* Roth (All-seed) During the Roman Iron Age near Glasgow

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*Received March 1985*

During recent pollen analysis of sediments from the Antonine fort at Bar Hill, near Twechar (NS 707 759), two fossil pollen grains of *Radiola linoides* Roth (All-seed) were recorded. Since this appears to be the first record of this distinctive pollen type (Moore & Webb, 1978) in a British fossil context (cf. Godwin, 1975), its significance is discussed here.

*Radiola linoides* is a very small (1·5-8 cm high) delicate annual which commonly grows on damp bare sandy or peaty ground on grasslands or heaths (Clapham *et al.*, 1981). There are several reasons for its previous absence from the fossil record, the main ones being that it has a moderately enclosed flower (Ross-Craig, 1952, plate 24; Clapham *et al.*, 1957) and that it is a very small plant. For both reasons, the dispersal of its pollen is restricted to the very close surrounding area. Since its pollen dispersal is limited, and since *R. linoides* does not grow on bogs, its pollen is unlikely to be trapped in the long bog peat sequences which are commonly sampled for pollen analysis studies. The sediments at Bar Hill are somewhat different from these, being fossil soil turves (Boyd, 1985), and clearly the plant from which the *Radiola* pollen came from must have been growing on that soil. The results of the entire pollen analysis from this site indicate that the surrounding vegetation probably was a mosaic of heather and grasses, with some damp areas and patches of bare soil, and that this was in an area of rough heath and grassland pasture (Boyd, in Keppie, in press). In other words, the environment was that which was suited to *Radiola linoides*.

According to Clapham *et al.* (1981), *R. linoides* has a widespread, but local distribution over the whole of Great Britain, although Perring & Walters' (1976) distribution map suggests that

at present *R. linoides* is limited, in Scotland, to a relatively small number of coastal sites. Pre-1930 records on Perring & Walters' map indicate a wider distribution, especially at inland sites in south and central Scotland, and Ewing (1899), Ferguson (1915) and Lee (1933) all indicate that *Radiola* was present in and around the Glasgow area. Hopkirk (1812) suggests that *Radiola* was not common and refers to its presence around Langside and, in abundance, on the roadside between Dumbarton and Helensburgh. On the other hand, Henedy (1878) considers *Radiola* to occur frequently, and he refers to localities which include a cutting at Possil marsh and places on the Gourock Hills. There are no recent records of *Radiola* within the Glasgow district (Perring & Walters, 1976; J. H. Dickson, pers. comm.). The fossil evidence presented here suggests that during the Roman Iron Age, *R. linoides* was probably also present at inland sites, possibly being more widely distributed than it is at present.

## Acknowledgment

The research described here was funded by the Scottish Development Department (Ancient Monuments Branch).

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## Book Review

### **Eric Hosking's Wildfowl**

Text by JANET KEAR

Croom Helm 1985, 153 pp., numerous colour,  
few monochrome photographs; £14.95.

Eric Hosking must be one of our best bird photographers and his vivid, accurate photographs, allied to a readable, informative text by the editor of *Ibis*, make this an ideal 'coffee table book'. Konrad Lorenz, one of Hosking's greatest admirers, provides an enthusiastic foreword.

Some of the colour photographs, e.g. one of Snow Geese, are marred by loss of quality during reproduction and the practice of extending plates over two pages can be annoying. An excellent study of a Goosander has been distorted through this.

In her introduction, Dr Kear says that her text "provides an introduction to the waterfowl group, a background for the lovely photographs and a selection of recent research that has interested me particularly". She achieves all three admirably.

Throughout the book she sprinkles informative tit-bits e.g. "the art of painting in 'Tempera' was developed through the use of goose egg yolk as a fixative". In one chapter she deals with place names derived from birds and also compares bird names in different languages. Unfortunately Scottish Gaelic is not included in a list of Celtic languages.

In conclusion, an interesting, informative and delightful book, good value for its price.

IAN C. McCALLUM

## Book Reviews

### **Coasts: An Introduction to Coastal Geomorphology** ERIC C. F. BIRD

3rd Edition, Basil Blackwell, 1984, 320 pp.,  
with numerous plates and figures; £7.50.

The author states that this book is based on his university courses on coastal geomorphology. Although it is a textbook aimed at undergraduate students there is much for the general reader with an interest in coastal features.

The book deals with coastal landforms and the processes at work on them. After introductory chapters on coastal evolution, on tides, waves and currents and on the effects of changes in sea level, each major type of coast – cliffs, beaches, estuaries, deltas, lagoons, coral reefs, etc. – is discussed in detail. The last chapter examines the many attempts at classification of coastal landforms, none of which it seems are found wholly satisfactory by geomorphologists. Understanding of problems involved is not helped by errors in the text. For example in Shepard's classification (pages 280-285) 'Coasts shaped by diastrophic movements' are shown to include 'Mangrove coast' and 'Marsh grass coast' surely not the intention of the original author. Their correct category, 'Coasts prograded by organisms' also contains misplaced entries (Nos. 4 to 6).

This publication is written in a very readable style, technical terms are explained and it is well illustrated with photographs and figures to back up the text. It is only to be expected that a book by a Reader in Geography at the University of Melbourne should rely on examples drawn largely from Australia although, being parochial, the inclusion of more examples from Scotland's coastline may have added to its interest.

A. H. GUNNING

### **How to Make a Wildlife Garden**

CHRIS BAINES

Elm Tree Books/Hamish Hamilton, 1985, 192 pp.,  
many colour photographs and line drawings, £8.95.

In this attractive book, Chris Baines argues that much of the wild life which is being killed in farmlands by some agricultural methods could find a home and live happily with man in the thousands of acres of land which is divided into our gardens. He makes it sound an easy and attractive way of gardening: "Think long and hard before you kill anything or tidy anything away – and if that sounds like an open invitation to relax in the garden, then you are getting the message". The photograph of the author asleep in the meadow with feet dangling in the pool of his own wildlife garden illustrates that he practises what he preaches.

The main part of the book, however, describes how to create new habitats in the garden, and this shows the necessity for a lot of hard work and much patience. The few habitats referred to are woodland edge, hedgerow, wild flower meadow and pond. These chapters are full of practical information on the creation and management of the habitats, and contain lists of suitable plants for each. The contents-list at the beginning of the book is informative; but it is regrettable that there is no index, as I am sure that this is a book not only to be read for enjoyment but also to be used as a practical guide.

The photographs are almost all taken by the author, many of his own garden, and show how attractive and interesting a wildlife garden can be: and I hope the book will encourage people to follow his example.

JEAN M. MILLAR

## Records for "The Flora of Glasgow" 3. Some little recorded and overlooked species

**J. H. DICKSON**

Department of Botany, University of Glasgow

*Received October 1985*

*Aethusa cynapium* L.

Fool's Parsley

White Cart, Newlands; 1984, PM, tetrad 56T60, V.C. 76. Gardens, Cardonald; July 1984, GS, tetrad 56T24, V.C. 76. One plant, waste ground by White Cart, Linn Park; August 1982, GNHS, tetrad 55T88, V.C. 76. Several plants on waste ground, Govan Shipbuilders; July 1985, JHD, PRO, AW, tetrad 56T46, V.C. 77. One plant waste ground at Newton bing; August 1985, GNHS, tetrad 66T60, V.C. 77.

"Frequent" according to Hennedy (1865) and "not common" according to Lee (1933) the above localities, which are the only discoveries in the present survey, show Fool's Parsley to be rare enough to be noteworthy.

*Brassica nigra* (L.) Koch

Black Mustard

Abundant, Dalmarnock; 1981, PM, tetrad 66T02, V.C. 78. Few plants, Belvidere Hospital; July 1985, PM & ACM, tetrad 66T22, V.C. 77. Abundant, Carmyle; July 1985, PM & ELSL, tetrad 66T20, V.C. 77. Abundant, Linthouse; September 1985, PM, tetrad 56T46, V.C. 77. One tall, lax plant in shade of trees, Kenmuir Wood; July 1985, JHD, RH, JRSL and MMHL, tetrad 66T62, V.C. 77.

Seldom recorded in the Glasgow area or elsewhere in Scotland in recent decades, Black Mustard was known to Hennedy (1865, p.15) on the "banks of the Clyde near Carmyle". Black Mustard occurs along the Thames (Burton 1983) and, for Shropshire, Sinker *et al.* (1985, p.185) describe it as a member of "the tall-herb community in the flood zone along larger rivers". Such a description fits the occurrences in Glasgow, all of which occur along the Clyde.

*Bidens tripartita* L.

Bur-Marigold

Edge of the Brock Burn, south of Nitshill Road; August 1984, GHNS and BSBI, tetrad 55T28, V.C. 76.

Sparse in Scotland, Bur-Marigold is a rarity in the Glasgow area. Lee (1933) lists Balgray Dam which lies a few km uphill from the above locality.

*Cardaria draba* (L.) Desv.

Hoary Cress

Large patch, north side of Shieldhall Road; 1980, PM and ET, May 1984, JHD, tetrad 56T24, V.C. 77. Single plant in rosebed, Glasgow College of Technology; May 1984, JHD, tetrad, 56T86, V.C. 77. Large patch on old bing, Cambuslang; August 1984, GNHS, tetrad 66T40, V.C. 77.

Grierson (1930) knew Hoary Cress "at several places round Glasgow . . . well established". It seems to have been little recorded recently and, though widespread, is not common.

*Erodium cicutarium* (L.) L'Herit. Stork's Bill

Dalbeath; May 1985. AEC, tetrad 66T22, V.C. 77.

There were only a few small plants on bare ground, rapidly being overgrown at the edge of a new walkway close to the Clyde. Stork's Bill was familiar to Henedy (1865) as an inhabitant of the now mostly worked out and infilled sandpits of the Tollcross-Kenmuir area. See *Ornithopus*.

*Fagopyrum esculentum* Moench Buckwheat

Rubbish dump, with *Phalaris canariensis* and *Helianthus annuus*, Darnick St; July 1985, JHD and TNT, tetrad 66T06, V.C. 77.

According to Grierson (1930, p.43) "Occurs as casual fairly often . . . .". The above is the only record in the present survey. Thrown-out bird seed was the probably source.

*Fumaria muralis* Sond. ex Koch subsp. *boraei* (Jord.) Pugsl. Common Ramping Fumitory

There are records, made in 1983-85, from at least 12 widely separated tetrads.

Lacking modern taxonomic advances, 19th century authors had a poor knowledge of Fumitories as did Lee who may well have been suitably cautious in describing this species as only "apparently rare". *F. muralis* is just as widespread as, and appears to be more abundant than *F. officinalis* in the Glasgow rectangle.

*Fumaria purpurea* Pugsl. Purple Ramping Fumitory

With *F. officinalis* and *Lamium hybridum* on heap of topsoil, Lenzie; June 1984, GHNS excursion, tetrad 67T62, V.C. 86. Habitat removed by 1985.

This British endemic species is unrecorded by Lee (1933) and did not occur in the west-central lowlands, according to the BSBI Atlas, but it has been recorded in the east of Scotland.

*Geranium phaeum* L. Dusky Cranesbill

Near houses, Williamwood; July 1985, DB, tetrad 55T46, V.C. 76. Riverside, Cambuslang; 1980, PM and ELSL, tetrad 66T40, V.C. 77. West bank of Clyde at Blantyreferme; May 1984, GNHS, tetrad 66T80, V.C. 77. Well-established at roadside and in field, south of Michillin Road; June 1985, RH, tetrad 57T60, V.C. 86.

Recorded in the Blantyre-Bothwell area since 1813 (Hopkirk, Blantyre Priory), Dusky Cranesbill is found here and there in the rectangle, sometimes clearly a garden outcast as at the locality south of Michillin Road.

*Geranium pyrenaicum* Burm. Fil. Mountain Cranesbill

Waste ground, near Carmunnock; September 1985, PM and BCM, tetrad 65T06, V.C. 77. Allotment, Cluny Villas; June 1985, PRO, tetrad 56T46, V.C. 77.

At Cluny Villas five clumps grew in an abandoned allotment where they looked well-established. The habitat is now destroyed. This species which is sparse and very largely eastern in Scotland appears unrecorded by earlier authors in the west.

*Hieracium flagellare* Willd.

Hawkweed

Bing at Kenmuirhill; June 1985, AEC, tetrad 66T50, V.C. 77. Bing at Dalton; August 1985, JHD, tetrad 65T68, V.C. 77. Bing at Newton; August 1985, GNHS and BSBI, tetrad 66T60, V.C. 77.

These may be the first records for the west of Scotland. Resembling *H. aurantiacum* L. (Fox and Cubs) but with yellow flowers, this Hawkweed "occurs on roadside and railway banks in a few scattered localities in southern and central England, and on railway banks in the Forth area, Scotland." (Perring 1968, p.132).

*Lamium hybridum* Vill.

Cut-leaved Dead-nettle

Garden at Yoker Ferry; August 1985, GNHS, tetrad 56T08, V.C. 76. Back garden, Cluny Villas; June 1985, JHD and PRO, tetrad 56T46, V.C. 77. On heap of topsoil, Lenzie; June 1984, GNHS, tetrad 67T62, V.C. 86.

This is a little-known (overlooked ?) plant in west-central Scotland where perhaps it does not now deserve the description "frequent" given by both Henedy and Lee.

*Lamium molucellifolium* Fr.

Dead-nettle

Cathkin tip; October 1982, PM, tetrad 65T28, V.C. 77. Field west of Newton Farm; August 1985, GNHS and BSBI, tetrad 66T60, V.C. 77.

Both Henedy (1865) and Lee (1933) list Cambuslang which lies only c.2km southwest of Newton Farm. This Dead-nettle is seldom seen in west-central Scotland.

*Limosella aquatica* L.

Mudwort

Balgray Reservoir; June 1984, GNHS, tetrad 55T06, V.C. 76.

In 1975 John Mitchell (1976) found only "a few scattered colonies . . . ." at Balgray but in 1984 the plant occurred in such profusion on the drying out mud of the empty reservoir as to make the area look green from a distance.

*Mentha requienii* Benth.

Corsican Mint

Several well-grown, flowering patches on south-facing stone wall, Barrhead Station; June 1985, GNHS, V.C. 76.

This locality is outside the rectangle but only by some 120m (west of tetrad 55T08). The habitat appears to be atypical; it has often been found on gravel or cindery paths (Dickson and Boyd 1982, Lousley 1976) and is "Thoroughly established in woodland rides in Kent . . . ." (Lousley 1976). These habitats and rills at c. 1000 feet, Slieve Gullion, Armagh (Clapham *et al.* 1962) seem to contrast with south-facing vertical stonework at Barrhead.

*Nuphar x spennerana* Gaud

Hybrid Yellow Waterlily

Dougalston Loch; June 1984, JHD and RH, tetrad 57T62, V.C. 86. Kilmardinny Loch; June, 1984, JHD and RH, tetrad 57T40, V.C. 90.

At both of these lochs Hybrid Yellow Waterlily occurs abundantly in the absence of the parents, *N. lutea* and *N. pumila*. Mugdock Loch, the British *locus classicus* of the latter lies only a few km to the north.

*Ornithopus perpusillus* L.

Birdsfoot

Newlands; since 1974, ELSL and BAL, tetrad 56T60, V.C. 76. One plant between stonework, edge of abandoned canal, Port Dundas; May 1984, JHD, tetrad 56T88, V.C. 77. Sandy slope, Garscadden Burn; September 1985, JHD,

tetrad 57T20, V.C. 99.

Birdsfoot, a local plant in Scotland, has now probably vanished from its largely lost sandy habitats at Tollcross but it has persisted as a garden weed at Newlands for over 10 years.

*Papaver rhoeas* L.

Field Poppy

Waste ground, Newton Mearns sewage works; August 1985, GHNS, tetrad 55T46, V.C. 76. Waste ground, Gartnavel; July 1985, JMcK and PRO, tetrad 56T46, V.C. 77. Heap of soil near Summerston coup; July 1985, JHD and RH, tetrad 57T60, V.C. 86. Belvidere Hospital; July 1985, PM and ACM, tetrad 66T22, V.C. 77. Fresh topsoil, India Street; October 1985, GS, tetrad 56T84, V.C. 77. King George V Dock; October 1985, P.M., tetrad 56T26, V.C. 77.

Common on soil heaps and waste ground, by far the most abundant red poppy of the Glasgow rectangle is *P. dubium* (Long-headed Poppy). However, Field Poppy occurs here and there. Though recorded for west-central Scotland (BSBI Atlas) *P. argemone* (Long Prickly-headed Poppy) has yet to be found in the present survey.

*Pyrola minor* L.

Lesser Wintergreen

Dalton bing; August 1985, GHNS and BSBI, tetrad 65T68, V.C. 77. Bing at Blantyre Priory; August 1985, JHD, tetrad 65T88, V.C. 77.

Hennedy lists "Bothwell Woods" for the Lesser Wintergreen which is well-established at both localities, especially at the site near Blantyre Priory on the bank of the Clyde directly across from Bothwell Castle.

*Rumex alpinus* L.

Monk's Rhubarb

Large patch in overgrown ditch, Auchinairn Road; June 1985, AEC, tetrad 66T08, V.C. 77.

Though well known in the east, this species is little recorded in the west of Scotland (Dickson 1984).

*Saxifraga rotundifolia* L.

Round-leaved Saxifrage

West bank of the Kelvin at Dawsholm; May 1983, AEC, tetrad 56T48, V.C. 99. Bank of Kelvin at Bunhouse Road; 1985, AW, tetrad 56T66, V.C. 77.

At Garscube, a little upstream from Dawsholm, the plant has been known for many years (A. McG. S.). It seems to have spread down the Kelvin.

*Silene alba* x *S. dioica*

Hybrid White x Red Campion

Hedgerow, Lochgrog; August 1984, JHD and CAD, tetrad 67T20, V.C. 77. Waste ground, Mount Vernon; June 1985, JHD, tetrad 66T62, V.C. 77. Waste ground, Braehead; June 1984, AEC, tetrad 56T06, V.C. 77. Overgrown bing, Gartloch Cottages; July 1985, FM and JHD, tetrad 66T66, V.C. 77.

At Lochgrog there was only one plant with neither parent nearby. At Mount Vernon the hybrid occurred in the absence of Red Campion as it did at Gartloch Cottages.

*Spergularia rubra* (L.) J. & C. Presl.

Sand Spurrey

At two places on Cardowan bing; June 1985, GNHS and JHD, tetrad 66T66, V.C. 77. Near site of Blantyre Priory; August 1985, GHNS and BSBI, tetrad 65T88, V.C. 77. Waste ground, Duntocher; 1983, AMcGS, tetrad 57T00, V.C. 99.

Hennedy (1865) called Sand Spurrey "frequent" and gave three Glasgow area

localities but for Lee (1933) it was "rare" and even requiring confirmation. Now it appears to be very rare because these are the only discoveries in the present survey.

### *Trifolium aureum* Poll.

Frankfield Loch; August 1984, CP, tetrad 66T46, V.C. 77. Braehead; August 1985, PM and ET, tetrad 56T05; V.C. 77.

In the Glasgow rectangle, this species was known previously only from Hyndland Station (Macpherson and Stirling 1983) where it could not be seen in 1985.

### *Scrophularia auriculata* L.

Water Figwort

At edge of Brock Burn, south of Nitshill Road; August 1984, GHNS and BSBI, tetrad 55T28, V.C. 76.

With few previous records from the Glasgow area, Water Figwort is largely coastal in Scotland. Wood (1893) found this species at the Aurs Burn which joins the Brock Burn.

**Abbreviations:** ACM – Nan Macpherson; AEC – Adult Education Class; AMcGS – Alan Stirling; AW – Agnes Walker; BAL – Bruce Lindsay; BCMM – Barbara Macpherson; BSBI – Botanical Society of the British Isles; CAD – Camilla Dickson; DB – Derek Blackburn; ELSL – Elspeth Lindsay; ET – Evelyn Teasdale; FM – Forbes Meek; JHD – Jim Dickson; RH – Dick Hunter; JRSL – John Lyth; MMHL – Margaret Lyth; JMCK – June Mackay; PM – Peter Macpherson; PRO – Bob Orr; CP – Charles Palmar; GS – Graham Steven; TNT – Norman Tait.

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## Book Reviews

### **The Pond**

GERALD THOMPSON, JENNIFER COLDREY and  
GEORGE BERNARD

Collins, London, 1985, 256 pp.

over 400 colour photographs, many drawings, £9.95.

This publication is excellent. It combines a popular approach with an informative and authoritative text uncluttered with jargon. The colour photographs, by Oxford Scientific Films, range from 14 x 9 to 2½ x 1½ in (page size 10 x 8½ in) and, with few exceptions, are of the highest quality. The pictures of a diving frog on front and back covers are extraordinary and testify to the advanced techniques used.

After defining and characterising ponds and summarising the biological processes within them, the book proceeds to detailed accounts of their plant, including algae, fungi and bacteria, and animal inhabitants. The emphasis is biological rather than descriptive and this section, with its photographs, is the heart of the volume. To British readers the choice of representative types may at times seem odd – ducks are barely mentioned, yet reptiles receive 4 pages. The book, presumably, aims at world-wide sales, so such inclusions are probably justified.

Supporting sections explain how pond animals breathe, swim and survive and give hints on how to study pond life. There is a glossary and a summary of plant and animal classification and the end pages give useful drawings of pond microlife and the immature stages of insects. There is an index and short bibliography.

The book is recommended to amateurs, pupils, students and teachers.

*RONALD M. DOBSON*

### **The Concise Birds of Britain and Europe**

HERMANN HEINZEL

Hodder & Stoughton, London, 1985, 64 pp.,

fully illustrated in colour with maps, £2.95.

Here is a check list and pocket guide to bird identification which is slim and light and really designed for the pocket, but which has nevertheless managed to include a large amount of information.

Birds are listed in species order, including subspecies, each with notes on characteristics, status in Britain and distribution throughout the area. Each is illustrated in colour, showing both sexes and some also in flight. Distribution maps for each and extra illustrations to show habit are most useful.

While the maps and illustrations are necessarily small they are very clear and can be magnified without loss of clarity. Lists of vagrants and scientific and English indexes complete the book which should be very useful to all birdwatchers.

*RUTH H. DOBSON*

## Shell Shape in Living and Fossil ('25ft' Beach) Dog-whelks, *Nucella lapillus* (L.), from the Isle of Cumbrae, Scotland

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Received July 1984

For modern dog-whelks, *Nucella lapillus lapillus* (L.), the chief selection pressures affecting shell shape have been shown to be wave action and crab predation. Dog-whelks from wave-pounded shores tend to be small and squat, with a relatively large aperture accommodating an enlarged, adhesive foot (Fig. 1a). Those in shelter, however, are larger and more elongate, with a relatively smaller aperture (Fig. 1b) which resists crab attack better (Kitching *et al.* 1966, Seed 1978, Hughes & Elner 1979, Crothers 1983)

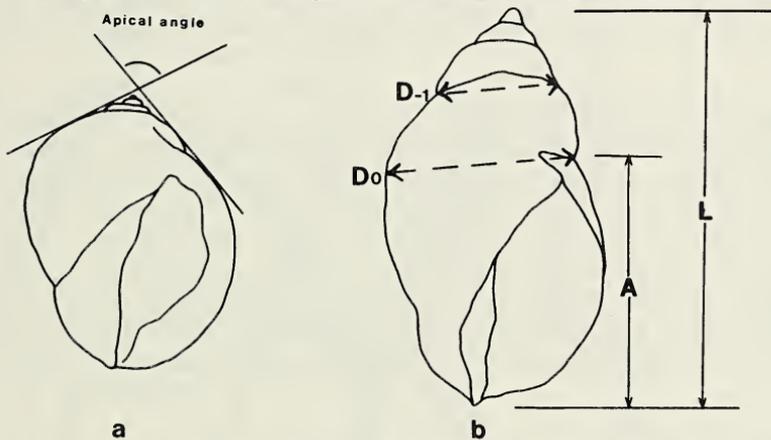
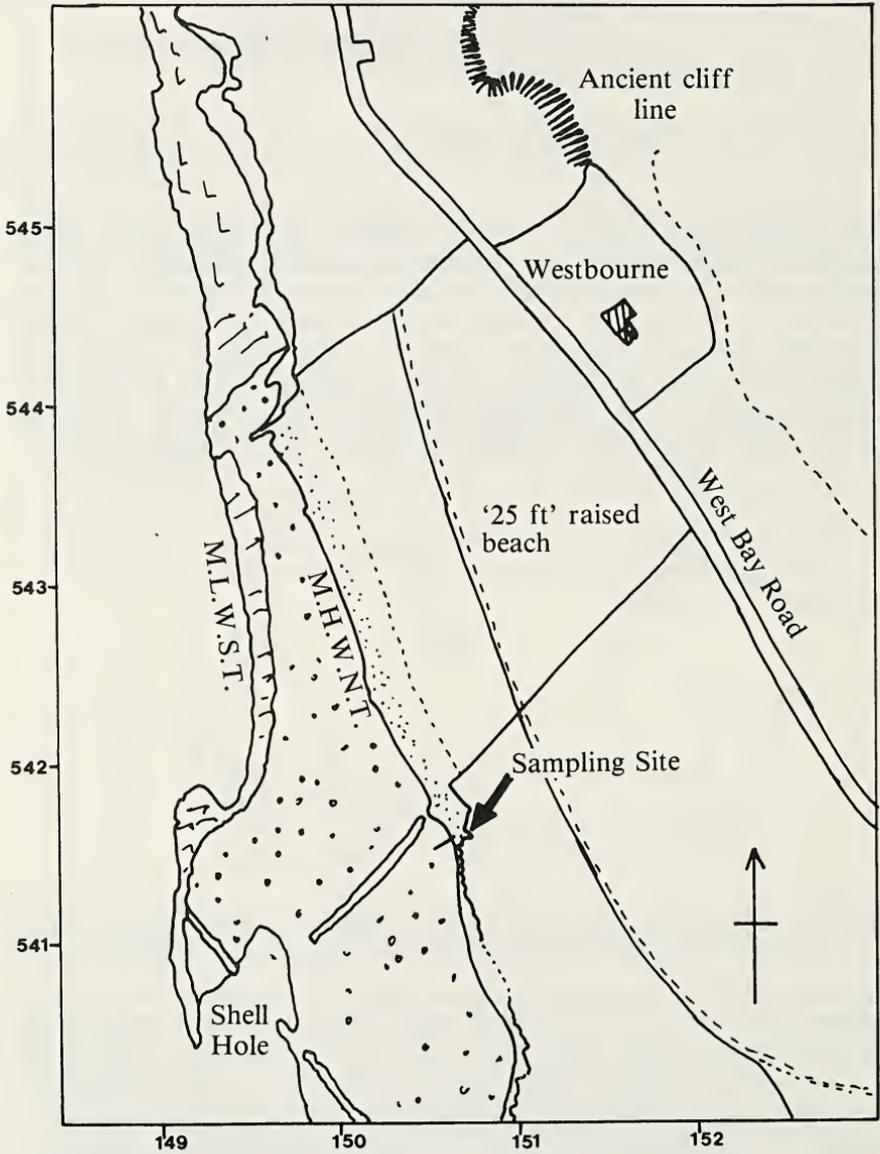


Figure 1 Shell shape of dog-whelks (*Nucella lapillus*) from wave exposed (a) and wave sheltered sites (b), showing measurements referred to in text.

Crothers (1973) expressed the relationship between shell aperture ratio ( $L/A$ , see Fig. 1) and wave exposure rating of sites (assessed on the Ballantine scale) as a regression equation for West Pembrokeshire which has since been regarded as the norm of Europe (Crothers 1982). This equation is written as  $Y = 1.214 + 0.036X$ , where  $Y$  is aperture ratio and  $X$  is Ballantine exposure rating.

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Figure 2 Map showing location of sampling site, S.S.W. of Westbourne, Gt Cumbrae Is. Scales are O. S. Grid numbers.



*Nucella* from certain localities on the west coast of Scotland, though not the Clyde (Crothers 1982), from the Solway, Conway and Severn regions (Crothers 1983) and from the North Sea (Cambridge & Kitching 1982), however, depart from this norm, being considerably taller and narrower than predictions based on site exposure rating (i.e. all shells with aperture ratio  $> 1.60$ ). Fossil *Nucella* shells from the early Pleistocene (Norwich Crag) were found by Cambridge & Kitching (1982) also to be tall and narrow, though this is not true of all Crag *Nucella* (Harmer 1914), the several Crags being of different ages and depositional conditions. It was conjectured, by both Cambridge & Kitching (1982) and by Crothers (1983), that this ancestral stock was eliminated during the Ice Age and that afterwards, normal (i.e. 'Pembrokeshire') populations, carrying the genes for the full range of shell shape, spread to their present position from the south west. Could the modern, unusually elongated shells in the above sites represent remnants of the former type which have not yet been absorbed into or eliminated by the 'normal' type? Crothers (1983) stated that the only shred of evidence for this suggestion is the fact that most of the fossil *N. lapillus* in the British Museum (Natural History) collections are of an elongated form.

Since only limited data have been published on shell shape of fossil *Nucella*, the opportunity has been taken here to describe shells from a Scottish west coast, Flandrian (early Neolithic) exposure and to compare them both with living shells from an adjacent beach and with the Norwich Crag (Pleistocene) form described by Cambridge & Kitching (1982). These authors, however, rightly cautioned both against the automatic presumption that the Crag *Nucella* was the direct ancestor of modern North Sea forms and also against the transference of ecological interpretations from the latter to the former.

## Sites

Fossil *Nucella* and other molluscs were collected in August 1983 from a shelly stratum *in situ* beneath 64 cm of overlying soil exposed in a narrow gully behind the modern beach S.S.W. of Westbourne, Gt Cumbrae Is. (O.S. grid ref. NS 15085416) (Fig. 2). Shells on the northern face of this gully were confined to a band 10 cm deep on top of a 4 cm seam of blue clay which itself rested on Old Red Sandstone bedrock. The sampled location represented the seaward

edge of the wave-cut platform, the '25ft' 6-8,000 years old (early Neolithic) raised beach, which is such a prominent feature of the Cumbrae islands and much of the Clyde (Robertson 1877, Steers 1973). Contemporary *Nucella* shells were sampled from the adjacent, gently-shelving, broken rock and shingle beach at Shell Hole. Assemblages of dead shells were sampled at the spring tide high water mark and a random collection of live *Nucella* and of living and dead (loose-lying shells) molluscs in general was taken from below the barnacle line for faunal analysis and comparison. Since the possibility could not be discounted that fossil shells, worked out of the clay by wave action, might contribute to the modern death assemblages, shell morphological comparison was confined to *in situ* living and fossil *Nucella*. Note also that the faunal composition of fossil and modern shell assemblages quoted here is not exhaustive (cf. Robertson 1877): no attempt was made to census tiny shells.

### Shell Measurements

Shell shape of *Nucella* has been assessed in different ways by different workers. Crothers used the aperture ratio, i.e. the ratio of shell height (called length) to aperture height ( $L/A$ ). Cambridge & Kitching, however, measured apical angle and whorl ratio ( $D_0/D_{-1}$ ), from two shell diameters one complete whorl apart, and then calculated spiral angle (Moore 1936). In order to facilitate present comparisons, all the above measurements were taken (see Fig. 1) from individually numbered Cumbrae shells. The presence or otherwise of teeth in the outer lip of the aperture and the extent of extraneous damage (excluding that caused by the boring sponge *Cliona* or by the boring marine worm *Polydora*) was noted for each shell. Damage to the shells of the limpet *Patella vulgata* (L.) and the edible winkle *Littorina littorea* (L.) in these samples was also assessed. The apical angle of *Nucella* was measured directly using a protractor device modified from that illustrated by Thomson (1952). Other shell parameters were measured using a vernier caliper to 0.1 mm accuracy. All samples were taken indiscriminately but the data on fossil shells cannot be assumed to be representative: they may have been transported from elsewhere after death.

### Results

The distribution of shell heights in the samples is shown in

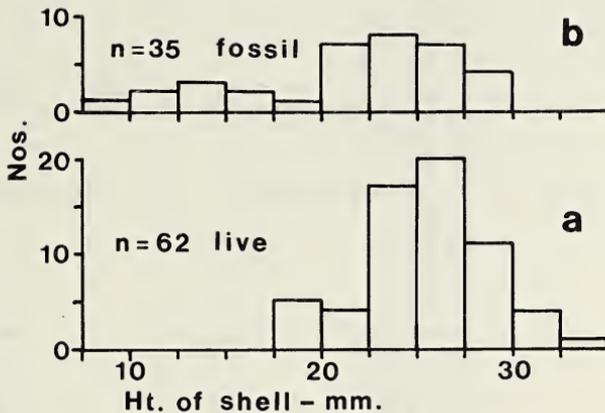


Figure 3 Frequency distribution of shell height in *Nucella lapillus* collections from Westbourne beach, Gt Cumbrae Is. (a) mid-low level living population and (b) fossil '25ft' beach shells.

Figure 3 and the species composition of each collection, together with data on damage load of important species are summarized in Table 2. Table 1 itemizes the shell shape data for *Nucella lapillus* from Cumbrae derived both from the present study and from other data in the literature. Linear regression analyses of the relationships between aperture ratio (L/A), whorl ratio, apical angle and shell height for fossil shells (see scatter diagrams in Fig. 4) all produced equations of best fit which did not differ significantly ( $P > 0.05$ ) from horizontal. Data for apical angle and spiral angle (Table 1) are therefore independent of shell height in this sample. This apparent contrast with the findings of Cambridge & Kitching (1982) and with the present data on live *Nucella* (Fig. 5), may be attributable to the limited size range of shells in the fossil collection (Fig. 3) compared with Cambridge & Kitching's material. On the other hand, greater variability may be a genuine attribute of fossil snails. At a mean shell height of 21.6 mm, the fossils depart somewhat from the 25 mm size selected as standard by Cambridge & Kitching (1982). Mean height of live *Nucella* was closer (at 25.3 mm) and shell parameters were significantly dependent ( $P < 0.05$ ) on shell height (Fig. 5).

For living *Nucella*, there was a highly significant ( $r = -0.81$ , df. 60,  $P < 0.001$ ) negative regression between two of the shape parameters used by different authors. Regressing aperture ratio

TABLE 1

Shell measurements (A) for living and fossil *Nucella lapillus* from the beach near Westbourne, Gt. Cumbrae Is., and (B) from literature for live *Nucella* from other Cumbrae sites. \*Numbers differ from Table 2 because of supplementary collection and from each other due to differential shell damage. n.a. = not assessed due to shell damage and water wear and the possibility of contamination by reworked fossil shells.

A

Site	Date of collection	No. of shells	Food at site	Whorl ratio (Gnd mean)	Apical angle ( $\pm$ S.E.)	Spiral angle ( $\pm$ S.E.)	L/A (Gnd mean)	%shells damaged	% shells with teeth
Fossil raised beach	19.8.83	37*	—	2.01	63.4 $\pm$ 0.92 (n = 35)*	78.06 $\pm$ 0.31 (n = 33)*	1.49	12.1 (n = 33)*	18.8 (n = 32)*
Modern H.W.M. strandline	19.8.83	57	—	n.a.	n.a.	n.a.	n.a.	59.6	14.3
Living mid- to low-littoral population	25.8.83	62	barnacles	2.19	65.5 $\pm$ 0.99	76.24 $\pm$ 0.52	1.47	4.8	11.3

B

Kames Bay (Moore 1936) Ref. M1	—	—	—	—	68.4	80.9	—	—	—
Farland Point (Moore 1936) Ref. M2	—	—	—	—	69.4	—	—	—	—
Gt. Cumbrae, N side (Crothers 1982) July 1974	—	—	—	—	—	—	1.42	—	—

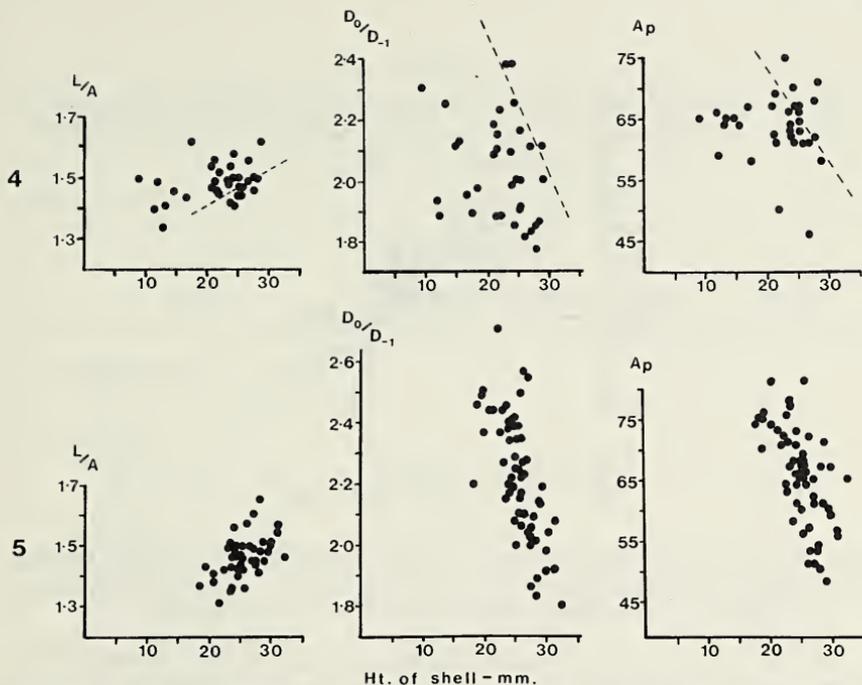


Figure 4 The relationships between aperture ratio ( $L/A$ ) (left), whorl ratio ( $D_0/D_{-1}$ ) (middle), apical angle ( $A_p$ ) (right) and shell height in fossil *Nucella lapillus* from Westbourne beach, Gt Cumbræ Is. Dotted lines represent linear regressions for living *N. lapillus* (Fig. 5)

Figure 5 The relationships between aperture ratio ( $L/A$ ) (left), whorl ratio ( $D_0/D_{-1}$ ) (middle), apical angle ( $A_p$ ) (right) and shell height in living *Nucella lapillus* from Westbourne beach (Shell Hole), Gt Cumbræ Is.

( $L/A$ ) on apical angle produced (Fig. 6) the following equation of best fit,

$$Y \text{ (aperture ratio)} = 1.9025 - 0.0067X \text{ (apical angle).}$$

Whether this equation has applicability to collections from other areas is not known, but it could provide a useful means of interconversion.

As would be expected, there is considerable agreement between the relative abundance of molluscs sampled on the beach and that of the contemporary, strandline death assemblage (Table 2). Differences are easily explicable in terms either of undersampling (e.g. live attached *Patella* not collected; loss of small strandline *L. rudis*) or shell fragility (strandline *Gibbula*). While there is a considerable resemblance between the species composition of the

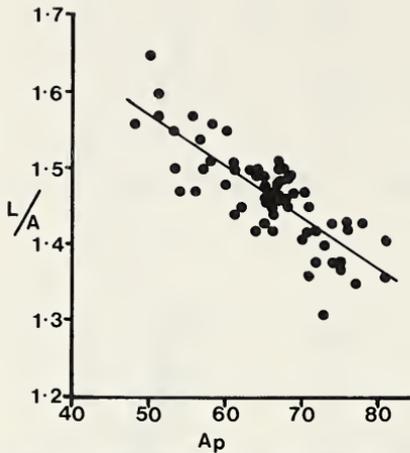


Figure 6 The relationship between the aperture ratio ( $L/A$ ) of Crothers and the apical angle ( $Ap$ ) measure of Cambridge & Kitching in shells of living *Nucella lapillus* from mid-low shore at Shell Hole, Gt. Cumbrae Is.

modern and fossil, raised beach Mollusca (see also Robertson 1877), there remain notable differences between them, especially in terms of relative abundance (Table 2). The predominance of flat periwinkles (*L. 'obtusata'*) in the fossil assemblage is the most striking difference, another is the absence of any mussel (*Mytilus*, *Modiolus*) remains (Robertson 1877). The presence of fossil *Monodonta lineata* (da Costa) in these beds (Robertson 1877), contrasts with its modern absence from the Clyde. Only *Trivia* sp. is additional to Robertson's (1877) list. The presence in the collection of low- or off-shore species like *Venerupis pullastra* (Montagu), *Clausinella fasciata* (da Costa), *Dosinia exoleta* (L.), *Trivia* sp., *Buccinum undatum* L. and the absence of terrestrial elements, adds weight to the idea that Robertson's locality was at a higher tidal level than the one here sampled.

## Discussion

Although Robertson (1888) reported that shells of *Nucella* (as *Purpura*) *lapillus* were rare in the post-Tertiary clays of the Clyde, he listed it elsewhere as 'v. common' on the '25ft' raised beach to the S.W. of Great Cumbrae Island (Robertson 1877). In the present fossil collection from that general area, however, dog-whelk shells were certainly not a major element of the fauna (2.6%) — the

TABLE 2

Percentage of total shells collected at each site (see text) S.S.W. of Westbourne, Gt. Cumbræ Is. Percentage of damaged shells shown in italics and parentheses.

Species	Site		
	Ancient '25ft' beach deposit	Modern strandline death assemblage	Modern surface-lying molluscs (mid-to low-tide level)
Polyplacophora <i>Lepidochitona cinerea</i> (L.)	—	—	0.8
Gastropoda			
<i>Littorina 'obtusata'</i>	54.9	1.2	1.2
<i>L. littorea</i> (L.)	21.5 (39)	44.9 (81)	50.8 (6.5)
<i>L. 'rudis'</i>	3.9	0.6	10.7
<i>Gibbula cineraria</i> (L.)	7.2	} 5.2 (many broken)	25.2
<i>G. umbilicalis</i> (da Costa)	6.5		6.5
<i>Gibbula</i> (unident. frags)	1.5		—
<i>Patella vulgata</i> L.	1.9	25.1 (44)	2.5
<i>Nucella lapillus</i> (L.)	2.6 (21)	16.6 (60)	5.4 (46)
<i>Buccinum undatum</i> (L.)	0.2	1.7	0.8
<i>Nassarius reticulatus</i> (L.)	0.2	—	—
<i>Clathrus clathrus</i> (L.)	0.2	—	—
<i>Natica ? catena</i> (da Costa)	0.2	—	—
<i>Acmaea tessulata</i> (Müller)	—	—	2.5
<i>Patina pellucida</i> (L.)	—	—	0.4
Bivalvia			
<i>Dosinia exoleta</i> (L.)	0.6	—	0.4
<i>Cerastoderma edule</i> (L.)	0.6	—	—
<i>Clausinella fasciata</i> (da Costa)	0.4	—	—
<i>Mytilus edulis</i> (L.)	—	4.7	4.1
<i>Venerupis pullastra</i> (Montagu)	—	—	2.9
<i>Modiolus modiolus</i> (L.)	—	—	1.2
Total number of shells collected at each site	540	343	242

sample recovered being the result of many hours of labour. Robertson (1877) described his sampling locality as "exposed in a cutting for a new road near the battery" and noted that many shells were "more-or-less broken and water worn". It is impossible to position his site with accuracy but obviously it must have been situated much closer to the ancient cliffline than mine (see line of road in my Fig. 2) and probably represented a strandline death assemblage (*vide* Robertson's comments on shell damage and wear — cf. my data and Table 1; high shore *Monodonta lineata* recorded as 'moderately common' and terrestrial snails featuring in Robertson's list).

The presence of *Monodonta lineata* in these deposits is a clear indication that temperature conditions were somewhat warmer in the Clyde in Neolithic times; the northern geographical limits of *M. lineata* now being further to the south (N. Ireland, Lewis (1964) Fig. 65). Clearly though, even if Welsh temperatures once prevailed, the shell shape of the Clyde fossils would still not fall on the "Pembrokeshire" regression of Crothers (1982, Fig. 9) unless the site experienced considerably more violent wave action than now and this idea is incompatible with local geomorphology and with the other death assemblage data (see below).

The shore off Westbourne falls within category 5-6 of the Ballantine/Dalby exposure scale (see Dalby *et al.* 1978). The mean aperture ratio for Cumbræ shells (fossil and modern) thus lies somewhat above the Pembrokeshire norm of about 1.40 for a site of this exposure, though it falls within the range typical of the West of Scotland (Crothers 1982, Fig. 9) and is still less than 1.60. The percentage of fossil shells with an aperture ratio above 1.59 was 6.0% (2 out of 33), i.e. not more than Crothers (1982) attributed to the combination of chance and measurement inaccuracies (10%).

Shell form (Table 1) and size range (Fig. 3) of *Nucella lapillus* in the Clyde has thus not changed appreciably in 6-8,000 y (the question of variability remains an open one, cf. Figs. 4 & 5 and comments above). Clyde fossil shells, though generally rather elongated (Crothers 1983, Fig. 6A), are not unusually so (cf. Crothers 1982, Fig. 17). The shape of Clyde fossil shells is compatible with a sheltered habitat (Cambridge & Kitching 1982), as is the species composition of the fossil assemblage (dominance of *Littorina obtusata*, *L. littorea*, *Gibbula* spp.; subordinate status of *Patella* and *Nucella*; absence of *Mytilus* and paucity of barnacle fragments (see also Robertson 1877); low proportion (18.8%) of *Nucella* shells with teeth). The question of food availability for dog-whelks arises if barnacles and mussels were scarce and it may be significant that fossil *L. littorea* shells were found with drill holes (see also Funnell *et al.* 1979). The fossil assemblage is not a true littoral community since it includes several sublittoral elements (*Dosinia exoleta*; *Clausinella fasciata*; *Gibbula magus* (L.); large *Buccinum undatum*). All these species live at present immediately offshore from Shell

Hole, on the mearl (*Lithothamnium* gravel) ground around the Tan Buoy. Other species characterize the low shore, mixed habitat, broken beach at Shell Hole (*Trivia*; small *Buccinum undatum*; *Nassarius reticulatus* (L.); *Venerupis pullastra*; *Natica*). It would seem therefore that only minor transportation need have influenced the composition of the death assemblage samples (*vide* also the low incidence of broken and water-worn shells).

Though of a more modest size, the shape of Clyde fossil *Nucella* shells is very similar to the Norwich Crag shells described by Cambridge & Kitching (1982). Further data on fossil dog-whelks from other localities of different ages would be of considerable interest.

### Acknowledgments

I am grateful to my wife, Judith, and children Penelope, Rupert and Roderick for their indefatigable assistance with the excavation of fossil shells. Professor J. A. Allen kindly confirmed my shell identifications and the Revd. Dr. P. E. P. Norton generously checked the text for geological misconceptions.

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## Lepidoptera in the West of Scotland 1984

COMPILED BY I. C. CHRISTIE

Gartlea, Caldarvan by Alexandria

*Received September 1985*

1984 was a most favourable year for insect life generally. Warm dry weather started in late April, and continued, with only minor interruptions, well into the autumn. Following the dry summer of 1983, populations of many moth species were already at high levels, and these increased further in 1984, benefitting not only from the warmth, but also from the abundant supplies of nectar and honeydew throughout the season. Most species appeared earlier than usual, and several produced partial second generations, though normally univoltine at this latitude. Of the many new distribution records obtained in the West of Scotland, the following are selected as being of particular interest. Where relevant, some older records are added, and also a few obtained in 1985, so as to avoid future repetition. Specific names and reference numbers are as in Bradley, J. D. and Fletcher, D. S. 1979, *A Recorder's Log Book or Label List of British Butterflies and Moths*. Curwen Books, London.

- 10 *Eriocrania salopiella* (Stt.), Tainish, Knapdale, V.C. 101, 28/4/84, (three), ICC.
- 39 *Ectoedemia heringi* Toll, Garscadden, Glasgow, V.C. 99, 18/11/84, (vacated mine in oak-leaf), RKJ.
- 56 *Stigmella dryadella* Hofm., Lawers, Killin, V.C. 88, 9/6/84, Mines in *Dryas*, RKJ; Ben Lui, Tyndrum, V.C. 98, 17/6/84, RKJ; Succoth, Dalmally, V.C. 98, larvae in October, pupated November, emerged April, ICC. Apparently bivoltine.
- 58 *Stigmella ulmariae* Wocke, Old Kilpatrick, V.C. 99, 21/10/84, (vacated mines in meadowsweet), RKJ.
- 67 *Stigmella plagicolella* Stt., Lang Craigs, Dumbarton, V.C. 99, 4/11/84, (vacated mine in sloe leaf), RKJ.
- 112 *Stigmella luteella* (Stt.), Pollok, Glasgow, V.C. 76, 19/10/84 and Ruchill, Glasgow, V.C. 77, 2/11/84, (vacated mines in birch leaves), RKJ.
- 145 *Nemophora minimella* (D. & S.), Colony in Cart and Kittoch, S.S.S.I., Glasgow, V.C. 77, 16/7/84, RKJ.
- 149 *Adela cuprella* (D. & S.), Tainish, Knapdale, V.C. 101, 9/5/84, (several), ICC; Strachur, Cowal, V.C. 98, 7/5/85, (several), ICC.
- 169 *Zygaena filipendulae* (L.), (Six-spot Burnet), colony at Hurlet, Glasgow, V.C. 76, 18/7/84, RKJ.

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- 287 *Caloptilia robustella* Jackh., Gartlea, Loch Lomond, V.C. 99, 19/6/84, ICC.
- 310 *Callisto denticulella* (Thunb.), Dawsholm, Glasgow, V.C. 99, Leaf mines in apple July 1984. Emerged May 1985, RKJ: Carnbooth, Glasgow, V.C. 77, 20/10/84, (vacated mines), RKJ.
- 354 *Phyllonorycter emberizaepenella* (Bouche), Glasgow, V.C. 77, leaf mines in honeysuckle. Emerged May 1985, RKJ.
- 361 *Phyllonorycter trifasciella* (Haw.), Glasgow, V.C. 76, 20/6/84, RKJ.
- 383 *Bembecia muscaeformis* (Esp.), (Thrift Clearwing), colony at Southend, Kintyre, V.C. 101, adults on 28/5/84, RKJ.
- 413 *Argyresthia sorbiella* (Treit.), Dawsholm, Glasgow, V.C. 99, 10/7/84, RKJ.
- 600 *Elachista luticomella* Zell., Ardfern, Loch Craignish, V.C. 98, 3/7/84, ICC; Paisley, Renfrewshire, V.C. 76, 17/7/84, JM.
- 603 *Elachista subnigrella* Dougl., Ben Feall, Isle of Coll, V.C. 103, 16/8/84, ICC; Isle of Muck, V.C. 104, 3/8/80, RMD.
- 623 *Elachista bisulcella* (Dup.), Drumchapel, Glasgow, V.C. 99, 8/7/84, RKJ; Taynish, Knapdale, V.C. 101, August 1984, ICC; Glen Nant, Taynuilt, V.C. 98, 5/8/85, ICC.
- 674 *Depressaria badiella* (Hub.), Possil, Glasgow, V.C. 77, 29/8/84, RKJ; Dowanhill, Glasgow, V.C. 77, 31/8/84, RKJ.
- 695 *Agonopterix alstroemeriana* (Cl.), Possil, Glasgow, V.C. 77, 22/5/84, RKJ.
- 710 *Agonopterix conterminella* (Zell.), Possil, Glasgow, V.C. 77, 22/7/84, RKJ.
- 714 *Agonopterix yeatiana* (Fab.), The Reef, Isle of Tiree., V.C. 103, 23/8/84, PW.
- 747 *Chrysoesthia sexguttella* (Thunb.), Bennane Head, Ballantrae, V.C. 75, (many), 24/7/84, ICC.
- 773 *Teleiodes paripunctella* (Thunb.), Possil, Glasgow, V.C. 77, 22/5/84, RKJ; Gartlea, Loch Lomond, May 1984 (plentiful), ICC.
- 776 *Teleiopsis diffinis* (Haw.), Gartlea, Loch Lomond, V.C. 99, 15/9/84, (two), ICC.
- 800 *Gelechia rhombella* (D. & S.), Strathblane, V.C. 86, 29/7/84, RKJ.
- 819 *Scrobipalpa costella* (H. & W.), Paisley, Renfrewshire, V.C. 76, 7/9/84, JM; Glasgow, V.C. 77, 20/8/81, RKJ.
- 852 *Anacampsis temerella* (L. & Z.), Cornaigbeg, Isle of Coll., V.C. 103, pupae on *Salix repens*. Emerged 27 to 31/7/84, KPB.
- 853 *Anacampsis populella* (Cl.), Glasgow, V.C. 76, 24/9/84 (two), RKJ.
- 899 *Pancalia leuwenhoekella* (L.), Isle of Muck, V.C. 104, June 1984, RMD.
- 964 *Cochylis dubitana* (Hub.), Ailsa Craig, V.C. 75, 16/6/84, (two), ICC.
- 967 *Cochylis pallidana* Zell., Bennane Head, Ballantrae, V.C. 75, larvae abundant in *Jasione* seedheads 1984, ICC.
- 1013 *Olindia schumacherana* (Fab.), Gartlea, Loch Lomond, V.C. 99, 6/7/84, ICC; Carsluith, near Wigtown, V.C. 73, 7/7/84, RKJ.
- 1019 *Cnephasia conspersana* Dougl., Ailsa Craig, V.C. 75, 16/6/84, ICC; Bennane Head, Ballantrae, V.C. 75, 24/7/84, ICC; Cornaigbeg, Isle of Coll, V.C. 103, 25/7/84, KPB.
- 1103 *Endothenia ericetana* (H. & W.), Possil, Glasgow, V.C. 77, 12/7/84, RKJ; Gartlea, Loch Lomond, V.C. 99, 22/7/78, ICC.
- 1145 *Epinotia nanana* (Treit.), Glasgow, V.C. 77, 9/7/84, RKJ.
- 1152 *Epinotia maculana* (Fab.), Gartlea, Loch Lomond, V.C. 99, 14/9/84, ICC; Glasgow, V.C. 76, larva on aspen. Emerged 24/9/84, RKJ.
- 1182 *Epiblema turbidana* (Treit.), Linn Park, Glasgow, V.C. 77, 16/7/84, RKJ.
- 1193 *Eucosma tripoliana* (Barr.), Old Kilpatrick, V.C. 99, 23/7/84, RKJ.
- 1202 *Eucosma obumbratana* (L. & Z.), Glasgow Zoo, V.C. 77, 28/7/84, RKJ.
- 1205 *Spilonota ocellana* (D. & S.), Paisley, Renfrewshire, V.C. 76, 25/7/84, JM.

- 1212 *Rhyacionia pinivorana* (L. & Z.), Glasgow, V.C. 77, 9/7/84, RKJ.
- 1239 *Pammene rhediella* (Cl.), Gartlea, Loch Lomond, V.C. 99, 13/5/84, (several) ICC; Glasgow, V.C. 76, 8/6/84, RKJ.
- 1242 *Cydia internana* (Guen.), Paisley Moss, Renfrewshire, V.C. 76, 18/5/84, JM.
- 1271 *Cydia gallicana* (Guen.), Bennane Head, Ballantrae, V.C. 75, 24/7/84, (many) ICC; The Reef, Isle of Tiree, V.C. 103, 16/8/84, PW; Isle of Muck, V.C. 104, 11/7/82, RMD.
- 1274 *Dichrorampha alpinana* (Treit.), Barrhead, Renfrewshire, V.C. 76, 26/5/84, JM.
- 1288 *Alucita hexadactyla* (L.), Paisley, Renfrewshire, V.C. 76, 27/4/84 (two), JM; Tainish, Knapdale, V.C. 101, 28/4/84, (several), ICC.
- 1303 *Agriphila selasella* (Hub.), Old Kilpatrick, V.C. 99, 23/7/84, (several) RKJ; Aber Bog, Loch Lomond, V.C. 99, 5/8/80, (many), ICC.
- 1330 *Donacaula mucronellus* (D. & S.), Gartlea, Loch Lomond, V.C. 99, 7 and 9/7/84, (several), ICC
- 1335 *Scoparia ulmella* Knaggs, Tainish, Knapdale, V.C. 101, 1/9/84, ICC; Glen Nant, Tainuilt, V.C. 98, 5/8/85, ICC
- 1337 *Eudonia alpina* (Curt.), Lawers, Killin, V.C. 88, 9/6/84, RKJ; Cononish, Tyndrum, V.C. 87, 27/6/82, ICC.
- 1378 *Eurrhypara coronata* (Huf.), Paisley, Renfrewshire, V.C. 76, 1/7/84 and 17/7/84, JM; Glasgow, V.C. 77, 12/7/84, RKJ.
- 1484 *Phycitodes saxicola* (Vaugh.), Old Kilpatrick, V.C. 99, 23/7/84, RKJ; Bennane Head, Ballantrae, V.C. 75, 24/7/84, ICC.
- 1494 *Capperia britanniodactyla* (Gregs.), Ailsa Craig, V.C. 75, 16/6/84, (several), PW; Craigton, Fintry, V.C. 86, 30/6/85, (several), ICC; Bennane Head, Ballantrae, V.C. 75, 24/7/85, (several), ICC.
- 1506 *Stenoptilia saxifragae* Fletch., Paisley, Renfrewshire, V.C. 76, 27/8/84, JM.
- 1509 *Stenoptilia pterodactyla* (L.), Glasgow, V.C. 77, 19/7/84, RKJ.
- 1531 *Ochlodes venata* (B. & G.), (Large Skipper), Bennane Head, Ballantrae, V.C. 75, 19/7/84, ICC.
- 1553 *Anthocharis cardamines* (L.), (Orange-tip), Glasgow Zoo, V.C. 77, 23/5/84, RKJ; Rotten Calder, Glasgow, V.C. 77, 18/5/85, ICC.
- 1629 *Aphantopus hyperantus* (L.), (Ringlet), Linn Park, Glasgow, V.C. 77, 6/7/84, RKJ.
- 1651 *Cilix glaucata* (Scop.), (Chinese Character), Gartlea, Loch Lomond, V.C. 99, 13/8/84, ICC; Ailsa Craig, V.C. 75, August 1984, RKJ.
- 1665 *Pseudoterpna pruinata* (Huf.), (Grass Emerald), Gartlea, Loch Lomond, V.C. 99, 12/7/84, ICC.
- 1689 *Scopula marginepunctata* (Goeze), (Mullein Wave), Ailsa Craig, V.C. 75, June 1984, RKJ.
- 1708 *Idaea dimidiata* (Huf.), (Single-dotted Wave), Bennane Head, Ballantrae, V.C. 75, 19 and 24/7/84, (several), ICC.
- 1749 *Pelurga comitata* (L.), (Dark Spinach), Paisley, Renfrewshire, V.C. 76, 24/7/84, JM; Corrie, Arran, V.C. 100, 24/7/83, RKJ.
- 1806 *Perizoma blandiata* (D. & S.), (Pretty Pinion), Barcaldine, Oban, V.C. 98, 16 and 24/7/84, JCAC; Succoth, Dalmally, V.C. 98, 16/7/84, ICC.
- 1833 *Eupithecia expallidata* Doubl., (Bleached Pug), Tainish, Knapdale, V.C. 101, 5/10/84, many larvae on *Solidago*, ICC.
- 1879 *Lobophora halterata* (Huf.), (Seraphim), Barcaldine, Oban, V.C. 98, 25/5/84, JCAC.
- 1884 *Abraxas grossulariata* (L.), (Magpie), Botanic Gardens, Glasgow, V.C. 77, 10/8/84, RKJ.

- 1960 *Theria primaria* (Haw.), (Early Moth), Garscube, Glasgow, V.C. 99, 11/2/84, RKJ; Gartlea, Loch Lomond, V.C. 99, 11/2/84, ICC.
- 1982 *Hemaris tityus* (L.), (Narrow-bordered Bee Hawk), Lake of Menteith, V.C. 87, May 1984, per RKJ. This moth was found drowned in a beetle trap. The species is thought to be resident only in the Oban District V.C. 98.
- 1984 *Macroglossum stellatarum* (L.), (Humming-bird Hawk), Ailsa Craig, V.C. 75, 19/7/84, BZ.
- 2017 *Clostera pigra* (Huf.), (Small Chocolate-tip), Barcaldine, Oban, V.C. 98, 9/5/84, JCAC.
- 2083 *Euxoa cursoria* (Huf.), (Coast Dart), Torastan, Isle of Coll, V.C. 103, 21/8/84, ICC; Barcaldine, Oban, V.C. 98, 5/8/82, JCAC.
- 2123 *Diarsia rubi* (View), (Small Square-spot), Glasgow, V.C. 76, 15/9/84; Glasgow, V.C. 77, 4 and 28/9/84, second generation, RKJ; Gartlea, Loch Lomond, V.C. 99, 30/7/77 and 12/8/77, ICC.
- 2156 *Lacanobia contigua* (D. & S.), (Beautiful Brocade), Barcaldine, Oban, V.C. 98, 23/5/84, JCAC.
- 2159 *Lacanobia suasa* (D. & S.), (Dog's Tooth), Kirkdale, Dumfries, V.C. 83, 7/7/84, RKJ.
- 2167 *Hadena perplexa* (D & S.), (Pod Lover), Ailsa Craig, V.C. 75, late June 1984, (common), RKJ.
- 2178 *Tholera decimalis* (Poda.), (Feathered Gothic), Gartlea, Loch Lomond, V.C. 99, 29/8/84 and 4/9/81, ICC; Possil, Glasgow, V.C. 77, 29/8/82, RKJ
- 2214 *Cucullia chamomillae* (D. & S.), (Chamomile Shark), Glasgow, V.C. 77, 21 and 24/5/84, RKJ; Bennane Head, Ballantrae, V.C. 75, late July 1984, several larvae on scentless mayweed, ICC.
- 2300 *Mormo maura* (L.), (Old Lady), Pollok, Glasgow, V.C. 76, 17/8/84, (two), JM.
- 2314 *Enargia ypsilon* (D. & S.), (Dingy Shears), Paisley, Renfrewshire, V.C. 76, 22/7/84, JM.
- 2329 *Apamea furva* (D. & S.), (The Confused), Strathblane, V.C. 86, 29/7/84, (two), RKJ.
- 2331 *Apamea unanimitis* (Hub.), (Small Clouded Brindle), Taynish, Knapdale, V.C. 101, late June 1984, ICC.
- 2380 *Charanyca trigrammica* (Huf.), (Treble Lines), Kirkdale, Dumfries, V.C. 83, 7/7/84, RKJ.
- 2412 *Eustrotia uncula* (Cl.), (Silver Hook), Black Lochs, Connel, V.C. 98, 13/6/84 (several), PW.
- 2437 *Polychrysis moneta* (Fab.), (Golden Plusia), Paisley, Renfrewshire, V.C. 76, 24/7/84, JM.
- 2440 *Plusia putnami* Grote, ("Gracilis"), Possil, Glasgow, V.C. 77, 19/7/84, RKJ.

### Contributors: –

- KPB – Dr K. P. Bland, 35 Charterhall Road, Edinburgh  
 ICC – I. C. Christie, Gartlea, Alexandria, Dunbartonshire  
 JCAC – Dr J. C. A. Craik, Grendon, Barcaldine, Connell, Argyll  
 RMD – Dr R. M. Dobson, 664 Clarkston Road, Glasgow  
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 JM – J. Morgan, 35 Penilee Road, Oldhall, Paisley  
 PW – P. Wormell, 9 Letterwalton, Ledaig, Connel, Argyll  
 BZ – B. Zonfrillo, 28 Brodie Road, Glasgow

## Obituary

**PROFESSOR KENNETH W. BRAID O.B.E.**  
**(1887-1984)**

Professor Braid, who died on 29th August, 1984 at the age of 97, was President of the Glasgow and Andersonian Natural History and Microscopical Society from 1949 to 1951 and was one of our Honorary Members. He joined the Microscopical Society of Glasgow in 1928 and remained a member of our society under its various titles until the time of his death. His term as President included the society's centenary year 1951.

An Aberdonian, Professor Braid was for many years head of the botany department at the West of Scotland Agricultural College, Glasgow and Auchincruive, Ayr, retiring from that post in 1952. In the same year he was honoured with the O.B.E. in recognition of his services to agricultural botany. In this field he will be best remembered for his studies on bracken and its control, a subject on which he addressed the society on a number of occasions.

Most of Kenneth Braid's retiral years were spent at Skene in his native Aberdeenshire where he was always delighted to welcome visiting friends from the south. He was able to renew 'auld acquaintance' with Andersonians on the occasion of his 90th birthday in June 1977 when a reunion with friends and former students was held at Glasgow University.

Those who knew Professor Braid will remember him as a kindly man with a great love of the countryside. A knowledgeable field botanist, he was always ready to encourage the younger members and to demonstrate with obvious pleasure the localities of some of the less common plants during society excursions which he led from time to time. His portrait forms the frontispiece of *Glasg. Nat.* 19 part 2 (1974).

A. Mc. G. Stirling

## Book Reviews

### **Naturalised Mammals of the World**

Sir CHRISTOPHER LEVER

Longman, London & New York, 1985, 487 pp.,  
many line drawings, £40.00.

The opening paragraph of the introduction to this large and important book dealing with the history and status of mammals which have been deliberately or accidentally moved about the world by man sets its tone – "Man is an inveterate and incorrigible meddler, never content to leave anything as he finds it but always seeking to alter and – as he sees it – to improve. In no field is this more true than in that of the animal and vegetable kingdoms."

After brief sections in which terms are defined and reasons for, and consequences of, animal translocations are discussed and guidelines for future relocations are given, the book considers the detailed case histories of 66 major and numerous minor species which have been transferred to new environments by man. The appendix discusses exotic ungulates acclimatized in fenced enclosures of New Mexico and Texas and tabulates the principal naturalized species of the world according to continent and country. Short notes and references follow individual accounts and the terminal bibliography of important sources comprises some 1300 entries. Distribution maps are given and the text is enhanced by the lively drawings of animals by Mrs N. Hansell.

This book has been meticulously researched and carefully produced. It will stand as the major reference work of its kind for years. Its price may, however, deter some would-be purchasers.

RONALD M. DOBSON

### **The Flowering Plants of Kinross (Ed. 2)**

G. H. BALLANTYNE

Scottish Wildlife Trust, Kirkcaldy. 1985, 110 pp.,  
line drawings, 1 map, £3.00 (plus £1 post & packing)\*.

A welcome revised edition of a Scottish local flora that has been out of print for some time.

This modestly-priced paper back introduces the reader to Kinross-shire with descriptions of the county's geology and topography, followed by an explanation of how the present-day landscape evolved through far-reaching changes in land use. Reference is made to some of the early naturalists who first botanically explored the area, and the work concludes with a useful regional bibliography.

The main part of any local flora is, of course, an annotated check-list of the district's flowering plants and ferns, in this case made up of well over 800 species, micro-species and hybrids which have been reliably recorded within the confines of the county. Kinross 'specialities', such as the Creeping Spearwort, Mountain Milk-vetch (regrettably now collected out), Monk's Rhubarb, Slender Rush and Holygrass are understandably given detailed treatment, but it is difficult to see why valuable space is given over to the inclusion of named localities for the most wide-spread species as well.

To anyone unfamiliar with Kinross-shire the most unsatisfactory feature of this particular publication is the appended map, originally the ordnance survey 1"-to-the-mile, but reduced to such a small scale as to make it almost totally undecipherable. The substitution of an uncluttered two-page diagram, depicting only the principal hills, rivers, lochs and the most frequently mentioned place names, would have made all the difference.

JOHN MITCHELL

\* Available from Mrs E. Cormack, 58 Buchanan Gardens, St. Andrews, Fife.

## Andersonian Naturalists' Society Centenary

One hundred years ago – during the spring and summer of 1885, a group of young students attended a series of Botany evening classes in Anderson's College, George Street, Glasgow. The lecturer, Prof. Alexander Stoddart Wilson, (who was also Minister of Bridgeton Free Church), was a born naturalist and an excellent teacher. His enthusiasm for botany and other branches of natural history was so great, it is not surprising that it was quickly passed on to his students. Wilson emphasised the importance of field observations and led many excursions within the environs of the city as part of the course, which proved very popular.

Towards the end of the lecture series, the students decided that they would like to continue to meet as a group to study natural history. A letter was written to the college, requesting permission to meet as a natural history Society in the college premises. A few weeks later, permission was granted and on 25th August the inaugural meeting of the Society was held. The Directors of the College suggested that as the Society would be meeting in *Anderson's* College, it should be called the *Andersonian* Naturalists' Society, in order to avoid confusion with the Natural History Society of Glasgow, founded in 1851.

After a few problems in the early years the Society prospered and became a well-known and respected organisation in the Glasgow area. In 1931 it amalgamated with the Natural History Society of Glasgow and the Microscopical Society of Glasgow. The new Society continued to use the word 'Andersonian' in its title until 1979 when it was renamed the Glasgow Natural History Society.

To mark the Centenary of the formation of the Society, an exhibition was held in the Art Gallery and Museum, Kelvingrove, from 23rd August – 30th September. The exhibition, which was opened by Prof. Blodwyn Lloyd-Binns, looked at the history of the Society and at the Glasgow Natural History Society in 1885, with the help of specimens, archive photographs and recent colour photographs produced by the photographic section. A smaller version of the exhibition was on display at the Mitchell Library from mid-October until the end of the year.

A special Centenary Excursion was run on 14th September to Stonelaw, Cathkin and Carmunnock – the original destination of the first excursion in September 1885. As it had been 100 years before, the weather was ‘most unpropitious’ but did not stop over 30 members attending. Many of these changed into period costume at Carnbooth House, Carmunnock, where photographs were taken by the press before the party continued to Busby for a meal.

The centenary celebrations were concluded on 22 October when Strathclyde University acted as hosts for a special Centenary Dinner, after which guest speaker Tom Weir took those present on ‘Weir’s Way round Scotland’.

*Richard Sutcliffe*

## **Book Review**

**The Dragonflies of Great Britain and Ireland** (2nd. Ed.; 2nd. Imp., with minor additions and corrections)

CYRIL O. HAMMOND  
(revised by ROBERT MERRITT)

Harley Books, Colchester, 1985, 116 pp., many colour plates, line drawings and distribution maps. Hardback £16.95, Paperback £9.75.

The late C. O. Hammond’s monograph was first published in 1977 and a second, revised, edition was produced by R. Merritt in 1983. The present volume is a second impression of the latter in which the opportunity has been taken to further update the contents.

This book is established as the definitive work on the British and Irish Dragonflies and the appearance of a new impression in hardback at the old price and, in particular, of a well-bound and full-size paperback at considerable saving cannot fail to delight the enthusiast.

RONALD M. DOBSON

## **The Flora of the Clyde Area**

by JOHN R. LEE

The Society has for sale copies of ‘The Flora of the Clyde Area’ by John R. Lee (1933). This is still the only work of its type on the area and is now in short supply. It contains a list of species found, with descriptions, localities and keys for identification.

Unbound copies price £2; handbound copies price £4 (postage extra 50p per copy) from the Librarian, Mrs R. H. Dobson, 664 Clarkston Road, Glasgow, G44 3YS.

## Short Notes

COMPILED BY A. McG. STIRLING

### Cryptogams

#### A hybrid Club-moss, *Diphasiastrum x issleri* (Rouy) Holub in West Sutherland

A. G. KENNETH

While botanising on Canisp, West Sutherland, V.C. 108, on 13 July 1985, I discovered a population of the club-moss *Diphasiastrum x issleri*, the putative hybrid between *D. complanatum* and *D. alpinum*. The plants were coning freely, the cones being borne on relatively long, sparsely bracteate pedicels which readily differentiate this taxon from *D. alpinum*, a laxer form of which it superficially resembles. The locality is at c. 800 feet on the south-east side of the hill, and the plants were growing in sparse vegetation among boulders. My tentative identification has been confirmed by A. C. Jermy, British Museum (Nat. Hist.), and voucher material has been lodged there and at the Royal Botanic Garden, Edinburgh.

This appears to be one of the few recent certainly confirmed records of *D. x issleri* in the British Isles, and is new for north-west Scotland.

### Fungi

#### Early fruiting of the Field Mushroom

R. A. BROAD  
and J. MITCHELL

Towards the end of May 1985, exceptionally early patches of the edible Field Mushroom *Agaricus campestris* Fries were noted in hill pastures on the northern slopes of the Campsie and Fintry Hills, Stirlingshire. All stages of cap development were represented, the older and larger specimens already past their best. Over the course of the next two weeks, a number of individual mushrooms were seen scattered about the same general area. We would like to thank Dr R. Watling of the Royal Botanic Garden, Edinburgh, for confirming the identification.

*Compiler's note:* On 24 May 1982 I found several fruiting bodies of what I took to be the Field Mushroom growing in calcareous grassland near the car park at the head of Glen Ogle, Perthshire (NN 5528). This is the only occasion I have noted *Agaricus* species at such an early date. The fruiting season is usually quoted as 'late summer to autumn'.

## Flowering plants

### *Monotropa hypopitys* L. in East Perthshire, V.C. 89

R. KNILL-JONES

On August 1985, during a visit by a small party from Kindrogan Field Studies Centre to an area of rich ravine woodland bordering the River Tilt, near Blair Atholl, a vigorous colony of the Yellow Bird's Nest, *Monotropa hypopitys*, was discovered. The population, which numbered about 20 flowering spikes, was growing on a steep and almost bare slope under mixed deciduous trees, including hazel. This is only the third recent Scottish site for this saprophytic perennial, the others being in Fife, V.C. 85, and Moray, V.C. 95. There are also old records for Inverness and Nairn, V.C. 96.

### Observations on the habitat of the Green Winged

### Orchid in Ayrshire

A. McG. STIRLING

The previously unsuspected occurrence of the Green Winged Orchid *Orchis morio* in several colonies in a coastal area in south Ayrshire, V.C. 75, was recently reported. Some investigation into the extent of these populations and numbers of individuals involved has been carried out, but information regarding habitat and ecology was lacking. It was therefore with a view to investigating this aspect that the writer visited two of the described sites on 16 May 1985. Both the sites examined were natural grassland over base-rich substrate and subject to only light grazing. The first area was at an elevation of about 100 metres with an exposure varying from west to south. The grass-dominated vegetation was rooted in shallow soil over basic volcanic rocks which were frequently exposed over the area in low outcrops. The basic influence of the soil was apparent in the richness of the vegetation accompanying the many spikes of *Orchis morio* which were scattered over the site. Noteworthy associated species included *Ranunculus bulbosus*, *Saxifraga granulata*, *Primula vulgaris*, *Pimpinella saxifraga*, *Scilla verna* and *Carex caryophyllea*. The second site examined, which was at a lower elevation (about 50

metres), was less obviously base-rich, though supporting good numbers of the orchid. Here, also, the plants grew in short, unmanaged grassland, but rocky outcrops were less frequent, and the accompanying herbs were less typical of base-rich habitats. There appear to be no immediate threats to the survival of the Green Winged Orchid at this, its only confirmed Scottish locality, but 'improvement' of the pasture by the application of artificial fertilisers, or a dramatic increase in grazing pressure might significantly alter the situation.

**Rat's-tail Fescue  
in the Glasgow area**

P. MACPHERSON  
and E. L. S. LINDSAY

In early June 1985 a veritable carpet, 45 square yards in area, of Rat's-tail Fescue *Vulpia myuros* (L.) C.C. Gmelin was seen growing on an old unused parking bay in a run-down industrial complex within the boundaries of the King George V Dock (Lanarks., V.C. 77). A further, smaller, colony was detected among agricultural grasses on the bank of a newly constructed road one mile further west. At the second site the plants grew to a height of one metre.

Later in the month Dr J. H. Dickson found a colony north of the Clyde on an old railway bridge near Bunhouse Road, Partick and he has subsequently seen plants at Summerston coup (both V.C. 77) and on an abandoned railway line east of Yoker (Renfrews., V.C. 76).

In *Grasses* (1954) Hubbard states that *V. myuros* is an uncommon weedy grass of waste and cultivated ground, roadsides, dry sandy and gravelly places, probably native in S. England, Wales and S. Ireland. In the *Atlas of the British Flora* (1982) Perring and Walters give no records of it in Lanarkshire or the neighbouring vice-counties.

*Compiler's note:* Grierson, in his *Clyde Casuals* (1931, *Glasg. Nat.* 9: 49) gives 'Ibrox and Gartsherrie (77), 1921. Rare and casual'.

***Potentilla intermedia*  
at Cambuslang**

E. L. S. LINDSAY  
and P. MACPHERSON

In June 1985 four plants of the introduced cinquefoil, *Potentilla intermedia* were seen growing in rough grassland leading to a derelict industrial site at Cambuslang, Lanarkshire, V.C. 77. The plant is superficially like Trailing Tormentil *P. anglica* whereas that species is creeping in habit, has variously divided leaves and 4 or 5 petals,

*P. intermedia* has ascending stems, the lower leaves have five leaflets and it always has five petals. It can be distinguished from Ternate-leaved Cinquefoil *P. norvegica*, another similar plant of erect habit, by the latter having trefoil leaves and rather larger flowers.

*P. intermedia* is a biennial or perennial herb. The largest plant at Cambuslang was two feet tall and had many stems giving a total diameter of four feet.

Trailing Tormentil is fairly common in the West of Scotland. There are two recent records of Ternate-leaved Cinquefoil (Stirling, A. McG. 1980. *Glasg. Nat.* 20: 88; Macpherson, P. and Stirling, A. McG. 1983. *Glasg. Nat.* 20: 375-6) but the only reports of *P. intermedia* pre-date 1919 (Grierson, R. 1931. *Glasg. Nat.* 9: 26).

We are grateful to R. J. Pankhurst, British Museum (Nat. Hist.), for confirming the identification.

### Aliens at a Glasgow Dock

P. MACPHERSON  
and E. TEASDALE

In October 1984 we paid a visit to King George V Dock (Lanarks., V.C. 77) and saw, scattered along a 200 by 1.5 yards stretch, between a roadway and a single storey brick shed, a remarkable assemblage of annual alien plants. They were growing at the east side of the building between and on granite setts, the surface of which was patchily covered with a thin layer of grit similar to the blaize used for tennis courts.

#### *Chenopodium strictum*

“Upright” Goosefoot

This is olive to glaucous green. The inflorescence is the best distinguishing feature, having erect spikes, with flowers appearing in small, pearl-like groups.

#### *Amaranthus hybridus*, *A. retroflexus* and *A. spinosus*

Pigweeds

Plants with flowers in dense spikes, mixed with bristle-like bracts, the latter so named because of its stem thorns.

#### *Ambrosia artemisiifolia*

Ragweed

This is distinctive in that the male heads are hemispherical, dropping in a spike-like raceme. Female flowers are at a lower level, singly or in clusters. It is native in North America where it is an important cause of hay fever.

#### *Datura stramonium*

Thorn Apple

A striking plant with Bindweed-like trumpet flowers and Horse Chestnut-like spiny fruits. A narcotic and very poisonous.

#### *Abutilon theophrasti*

Velvet Leaf

This has heart-shaped felted leaves which were once used to give a pattern to butter (Butter Leaf), and solitary orange-yellow mallow-like flowers.

- Setaria viridis* Bottle-grass  
This has unbranched, dense cylindrical 1-2" bristly flower heads.
- Digitaria sanguinalis* Crab-grass  
This has flower heads of four or more unbranched finger-like spikes.
- Panicum miliaceum* Common Millet  
With large dense nodding flower heads.

While some of the plants are constituents of bird seed the particular combination of species found indicates that the source was a ship's cargo.

We are grateful to Prof. J. P. M. Brenan and Dr A. C. Leslie for help with identification.

***Juncus balticus* Willd.: a new southern limit on the east coast** P. K. KINNEAR and S. J. LEACH

*Juncus balticus* is a very local plant of sandy coasts in northern Britain. Its southern limit on the west coast is at Birkdale, S. Lancs., V.C. 59 (Smith, P. H. 1984. *Watsonia* 15:15-26), although in Scotland it only occurs as far south as Tiree, V.C. 103. On the east coast its southernmost locality has hitherto been thought to be at Tentsmuir, Fife, V.C. 85, where it was first noted in 1854. It is almost certain that the records listed by W. Young in 1936 (*A list of the flowering plants and ferns recorded from Fife and Kinross*, V.C. 85. Edinburgh) for 'boggy land near Tayport' and 'near Leuchars' also refer to Tentsmuir.

However, in 1982 one of us was surprised to find a small patch of *J. balticus* in a dune slack on one of the roughs at St. Andrews Links (Kinnear, P. K. 1984. *Watsonia*, 15: 139). During 1983/84 a thorough search of the site turned up twelve stands of the rush in three dune slacks alongside the Jubilee Golf Course, between NO 500179 and NO 499182. It occurs here in grassy hollows among dense *Ulex europaeus* scrub where it is associated with *Festuca rubra*, *Anthoxanthum odoratum*, *Poa pratensis*, *Trifolium repens*, *Holcus lanatus*, *Dactylorhiza purpurella* and *Ranunculus acris*.

The *Juncus balticus* sites at St Andrews are of interest as they represent a new southern limit to the plant's range on the east coast of Britain. The nearest known site, at Tentsmuir Point National Nature Reserve (NO 503275) is some 10 km to the north.

***Sanguisorba officinalis* at Hogganfield  
Loch Golf Course**

R. C. MACKENZIE

A single specimen of *Sanguisorba officinalis* L. (Great Burnet) was found on the 17th of July 1985 growing on a NE-facing slope which forms part of the Hogganfield Loch golf course. The slope is moist underfoot, and forms part of the course 'rough' and is therefore left uncut.

The specimen found was approximately 1m in dia. and 0.75m at its maximum height. Over 100 compound leaves were counted together with 12 flower heads. The flower heads subsequently produced ripe seed in mid-September. The overall size of the plant and its general appearance suggest that it has been established on this site for some years. Its location also makes it an unlikely candidate as a garden escape.

Searches through Henney's *Clydesdale Flora*, Lee's *Flora of the Clyde Area*, and the *Glasgow Catalogue of Native and Established Plants* suggest this is the first record for *Sanguisorba officinalis* in the Glasgow rectangle. The map in the BSBI Atlas shows that Great Burnet is very seldom recorded north of the Border counties.

## Invertebrates

### Platyhelminthes

**The Flatworm *Bdellocephala punctata*  
at Possil Marsh Nature Reserve  
D. J. LAMPARD**

Since 1983 regular visits to Possil Marsh SSSI have revealed the presence of the triclad flatworm *Bdellocephala punctata* (Pallas) (Fig. 1). This is the largest British flatworm; at Possil individuals up to 3 cm long have been recorded. The species can be identified by its narrow lobed head with a narrow neck expanding into a long, wide body. The background colour is generally brown, with scattered patches of dark pigment. Adults are most abundant

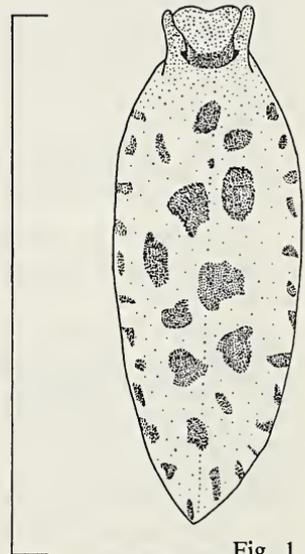


Fig. 1  
*Bdellocephala punctata*.  
(Pallas)  
(Scale line = 3 cm.)

during January to May when they may be found gliding along the underside of stones and the many tin cans which litter the loch floor. This species is an active predator, feeding on the water louse *Asellus aquaticus* (L.) and the many gastropod molluscs. Although it has a wide distribution in Britain it is rather rare. In Scotland *B. punctata* seems to be confined to the midland valley and has been found previously only near Edinburgh and at Bardowie Loch, north of Glasgow.

## Insects

### New records for the Azure Damselfly

D. M. BAYNE

The Scottish distribution of the Azure damselfly *Coenagrion puella* (L.), as shown in Hammond, C. A. (revised Merritt, R.) 1985. *The Dragonflies of Great Britain and Ireland, Ed. 2*, indicates a very local spread from Lothian district, south of the Forth estuary, to the west coast of the Mull of Kintyre. Only twelve 10 km squares are recorded for this species with no records south to the Borders or further north in Scotland. *C. puella* is widespread and abundant in England. During 1984 the author recorded this damselfly from three sites which were further north than previous published records: Lossburn Reservoir, near Bridge of Allan, (NS 828989, 3 July; Laggan Fen, Strathyre, (NN 558155), 20 July; and Ochtertyre Moss, (NS 735974), larva taken 20 March (the first records for V.C. 87). The presence of large adult and larval populations indicates a resident population. It is likely that this species has in the past been overlooked for the Common blue damselfly *Enallagma cyathigerum* (Charpentier) which it superficially resembles.

### Dragonflies at the Dubh Loch

D. M. BAYNE

At the Scottish Entomologists' meeting at the Universities Field Station, Rowardennan, on 24 - 29 June, 1983, the Downy Emerald *Cordulia linaenea* Frazer was 'rediscovered' at the Dubh Loch, Loch Lomondside, (V.C. 86). This species was first noted from the Dubh Loch by Mr J. A. Downes (*Entomologist's mon. Mag.* 83 : 219. 1947) and appears as a pre-1961 record in Hammond, C. O. (revised Merritt, R.) 1985 *The Dragonflies of Great Britain and Ireland, Ed. 2*, but there have been no later published records from

this site.\* A single nymph was collected by the author and several males and ovipositing females were observed.

This rare dragonfly was, at the time (1983), only known elsewhere in Scotland from three sites in Sutherland, but it has since been discovered at the Black Lochs, Argyll (V.C. 98) (Smith, E. M. & Smith, R. W. J. 1984. *J. Br. Dragonfly Soc.* 1 : 51-54.)

Other Odonata recorded from the Dubh Loch and its tributaries were *Calopteryx virgo* (L.), *Pyrrhosoma nymphula* (Sulzer), *Ischnura elegans* (van der Linden), *Enallagma cyathigerum* (Charpentier) and *Libellula quadrimaculata* L.

*\*Editor's comments:* The Downy Emerald has probably been present at the Dubh Loch throughout without being recorded e.g. a single nymph was reared to maturity by me (Ed.) in the early 1970s. It appears to be common now: Mr C. E. Adams writes that "in 1984 hawking adults were first observed on 15 May and last seen on 6 July. In 1985 the first record of adults on the wing was 4 June. Although adults have not been recorded from any other aquatic sites around Loch Lomond, there seems to be no shortage during the flight period. Likewise the nymph stages have only been found in the Dubh Loch and are normally found in dredge and Ekman grab samples, suggesting that they may prefer deeper water. However, one specimen was taken this year and one last year with a pond net when sampling the littoral benthos from the E. side of the loch."

### **The Dragonfly *Somatochlora arctica* (Zett.)**

**near Oban**

R. P. KNILL-JONES

The excursion of the Glasgow Natural History Society on 6 July 1985 to the Black Lochs SSSI near Oban, Argyll, was rewarded by the discovery by the author of a freshly emerged male *Somatochlora arctica* (Zetterstedt, 1840), the Northern Emerald, in a sphagnum-rich boggy area (NM 9432). The identification was confirmed by re-examination several hours later. This record brings the number of dragonfly species in this immediate area to fifteen. Of some interest is the fact that this is the most southerly record of the Northern Emerald in Scotland, although it does occur in south-west Ireland. Also noteworthy is the occurrence at this interesting site of *Brachytron pratense* (Muller, 1764), the Hairy Dragonfly, a species with a mainly south-eastern distribution in Britain.

The Black Lochs SSSI is therefore probably unique as the only British site in which a northern and a southern species exist together at the extremes of their known distributions.

### Two interesting records from Glen Tilt, Perthshire

R P. KNILL-JONES

On 18 August 1985 a small party from the Kindrogan Field Studies Centre, on a course led by the author, visited Glen Tilt, near Blair Atholl. Of the entomological records made on this occasion, two are noteworthy.

A specimen of *Halzia 16-guttata* (L.) (Coleoptera; Coccinellidae) was found by Alister Clunas in rich ravine woodland bordering the Tilt (NN 8768), an area which has recently been notified as an SSSI. The specimen was identified by Dr. Michael Majerus under the Cambridge Ladybird Recording Scheme. This unusual ladybird has a patchy distribution and appears to be recorded only rarely, with less than ten recent site records in Scotland, and under twenty-five in the whole of Britain.

The main objective was achieved later in the day and is reported elsewhere (Knill-Jones, R. P. and Bland, K. P. 1985. The rediscovery of *Eana argentana* (Clerk), (Lepidoptera; Tortricidae) in Perthshire. *Ent. Gaz.*, in press).

These two records indicate the richness of the site and support its designation as an SSSI.

### *Hylecoetus dermestoides* and other beetles at Erskine, Renfrewshire

R. A. CROWSON

The old Erskine House (now Erskine Hospital) estate has fairly extensive mixed woodlands, no doubt originating from 18th and 19th century planting, in a favoured lowland site close to the Clyde shore. Two short collecting visits to these woods have yielded several more or less uncommon species of Coleoptera, the most notable being the Lymexylid *Hylecoetus dermestoides* (L.) (Fig. 2). In

Scotland, this species seems largely confined to the woods of the Highlands, including the Loch Lomond woods from about the Ross peninsula northwards. It has never been found e.g. at Mugdock, just north of Glasgow, an apparently suitable site.

Other locally uncommon woodland species found at Erskine include *Rhizophagus ferrugineus* (Payk.), *Enicmus transversus* (Oliv.), the introduced Australian *Cis bilamellatus* Wood (now apparently declining in the Clyde valley) and the Melandryid *Orchesia minor* Walker. As might be expected, the species I regard as reliable indicators of primary woodland sites, such as the Curculionid *Acalles ptinoides* (Marsh.) and the Ptinid *Ptinus subpilosus* Sturm, have not been found at Erskine.

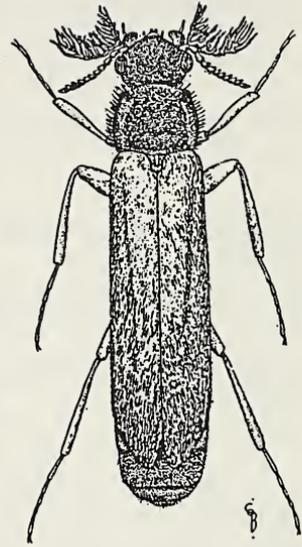


Fig. 2  
*Hylecoetus dermestoides*  
(L.), Male.

(Reproduced with the permission of The Royal Entomological Society of London)

## Records of Coleoptera from Callendar Wood, Falkirk

R. A. CROWSON

The estate attached to Callendar House, Falkirk (NS 8978) now largely a local authority controlled park, contains a considerable area of old-established woodland, predominantly of oak but with substantial admixture of ash, beech, pine etc. Most of the woodland lies on a north-facing slope, so would receive considerably less solar radiation than similar woods on south-facing slopes, and at critical seasons the Callendar Wood will probably offer distinctly cooler habitats than many similar woods in the midland valley of Scotland. However, from four collecting visits, I have found that it is moderately rich in woodland Coleoptera. Among the less common species found at Callendar Wood are the following:

### Leiodidae

*Leiodes cinnamomea* (Panz.)  
*Agathidium atrum* (Payk.)  
*Anisotoma glabra* (Kugel.)  
*Anisotoma orbicularis* (Hbst.)

### Cryptophagidae

*Atomaria umbrina* (Gyll.)

### Erotylidae

*Triplax aenea* (Schall.)

- |   |   |
|---|---|
| Scydmaenidae<br><i>Stenichnus bicolor</i> (Denny)   | Rhizophagidae<br><i>Rhizophagus perforatus</i> Erichs.  |
| Pselaphidae<br><i>Euplectus piceus</i> Motsch.  | Lathridiidae<br><i>Enicmus fungicola</i> Thoms.<br><i>Enicmus transversus</i> (Oliv.)<br><i>Dienerella elongata</i> (Curtis)      |
| Staphylinidae<br><i>Acidota cruentata</i> Mann.<br><i>Coryphium angusticolle</i> Steph.<br><i>Quedius maurus</i> (Sahlb.)<br><i>Mycetoporus rufescens</i> (Steph.)<br><i>Tachyporus obtusus</i> (L.)<br><i>Anomognathus cuspidatus</i> (Erichs) | Mycetophagidae<br><i>Mycetophagus atomarius</i> (F.)  |
| Cantharidae<br><i>Podabrus alpinus</i> (Payk.)<br><i>Malthodes pumilus</i> (Breb.)  | Tetatomidae<br><i>Tetratoma ancora</i> F.<br><i>Tetratoma fungorum</i> F.   |
| Nitidulidae<br><i>Epuraea pusilla</i> (Illig.)  | Curculionidae<br><i>Coeliodes dryados</i> (Gemil. in L.)<br><i>Rhynchaenus quercus</i> (L.)<br><i>Curculio pyrrhoceras</i> Marsh. |
|   | Scolytidae<br><i>Dryocoetinus villosus</i> (F.)   |

The list does not include any of the species I regard as reliable markers of old, 'primary' woodland sites, such as the Silphid *Dendroxena quadrimaculata* (Scop.), the Lucanid *Sinodendron cylindricum* (L.), the Ptinid *Ptinus subpilosus* Sturm, the Cerylonids *Cerylon histeroides* (F.) and *C. fagi* Bris., the Cisids *Cis alni* Gyll. or *C. fagi* Waltl, the Salpingid *Rabocerus gabrieli* Gerh., species of Melandryidae, or the Curculionids *Acalles ptinoides* (Marsh.) or *Rhynchaenus avellanae* (Donov.). It seems likely that the wood originated from plantings within the last three centuries.

### The mayfly *Ephemerella notata* Eaton in the River Clyde

C. R. DOUGHTY

Nymphs of the mayfly *Ephemerella notata* were first recorded in the River Clyde at Wolfclyde, near Biggar (NT 018364) in April 1978 by Mrs Barbara Wright. The fact that *E. notata* was absent from regular collections made by the Clyde River Purification Board along the whole length of the river during the previous ten years suggests that this species has colonised the Clyde only recently. Since 1978 it has been taken from Carstairs Junction (NS 956445), Hyndford Bridge (NS 915414), Kirkfieldbank (NS 863438) and Highlees (NS 775527). To date, it has not been found anywhere else in the Clyde area, Ayrshire or Argyll. Nymphs have been found only during February, March and April, which suggests that the

species overwinters in the egg stage in accordance with the findings of Wise (1980. *Freshw. Biol.* 10: 101-111). Nymphs of the common *Ephemerella ionita* (Poda) normally appear in May, thus direct competition between the two species is avoided.

### **Narrow-bordered Bee Hawk Moths in West Central Scotland**

R. SUTCLIFFE

On 3 June 1985 while photographing plants in a marshy part of Drumclog Moor, Mugdock, Milngavie, Stirlingshire, 10 km square NS57, I noticed what I thought at first was a strange bumble bee moving from flower to flower. On closer examination I realised that it was in fact a specimen of *Hemaris tityus* (L.), the Narrow-bordered Bee Hawk Moth. I watched the moth for a few minutes as it hovered, feeding with its proboscis on the flowers of bogbean, *Menyanthes trifoliata*, and succeeded in getting one photograph of it before it flew off over the moor.

This would appear to be only the second record for this insect in recent years for west central Scotland. The other record is for the Lake of Menteith, West Perthshire, 10 km square NN50, where one was found in a water trap left for beetles from 22 to 29 May 1984 by Dr Garth Foster. It is now in the collection of Dr R. Knill-Jones.

### **Further Hawk Moth records from the West of Scotland**

R. P. KNILL-JONES

A specimen of *Acherontia atropos* (L.), the Death's-head Hawk Moth, flew into the kitchen of the Glasgow Golf Club, Killermont, Bearsden on 27 September 1983 to the delight of Mrs Brenda Cole. A photograph subsequently appeared in the local press with an appropriate background – a plateful of golf balls!

On 25 September 1984 Dr Garth Foster reported to me the finding of a full-grown larva of *Agrius convolvuli* (L.), the Convolvulus Hawk Moth, in a builder's yard on Barrmill Road, Galston, Ayrshire, and on 5 September 1985 Professor C. A. Wood found a live adult *Agrius convolvuli* at rest on a wall in Seabank Road, Prestwick, Ayrshire. These two records represent separate immigrations in the last two years, with breeding from a spring immigration in 1984; there can be no connection between them, as the species does not survive British winters in the wild.

## Larval foodplants of the Scarce Footman I. C. CHRISTIE

During a visit to the west coast of the Mull of Kintyre, V.C. 101, on 2 June 1985 I found a larva of the Scarce Footman *Eilema complana* (L.) on a small clump of nettles. It had probably recently assumed the final instar. The literature being of limited help in suggesting suitable foodplants, I offered it nettle, docken, bird's-foot trefoil, knotgrass and lichen growing on old nettle stems. After a hesitant start it settled into the curious routine of eating nettle and docken alternately and taking irregular rest periods, which gave rise to anxiety that it might be parasitised. However, all was well, and, having nibbled nothing but lichen for three days, it spun up on a heather stem and soon pupated. Pieces of lichen were incorporated in the cocoon. The adult emerged on 10 July 1985. This is thought to be only the second record for Scotland, and the furthest north. The first was obtained by Dr R. Knill-Jones at Carsluith, Kirkcudbrightshire, V.C. 73, on 27 July, 1983.

## Two insects from the Loch Lomond NNR I. C. CHRISTIE

On 21 April 1985 a small party of Glasgow Naturalists visited Gartfairn Wood in the Stirlingshire section of the Nature Reserve (10 km square NS48). While examining dead stems of the Loch Lomond Dock *Rumex aquaticus* (L.), Dr R. Knill-Jones came across a section containing pupal cells of a solitary wasp. On emerging, these were identified as *Trypoxylon attenuatum* Smith, a species which uses small spiders for larval food. Another occupied section was found nearby. It contained nine cells, the cavity of the dock stem being divided by cross-partitions of mud. This is thought to be the northernmost record for the species.

On 30 May 1985 I found an adult female of the Rhagionid fly *Xylophagus ater* Mg. on Creinch, an island in the Dunbartonshire section of the Reserve, 10 km square NS 38. It was walking on a dead branch lying among ferns, and superficially resembled an ichneumon in both shape and movement. This species is said to be of very local distribution in Britain. The larvae have been found under the dead bark of various deciduous trees including birch, alder and oak, where they may prey on other insects.

**The water bug *Aphelocheirus aestivalis* (Fabricius) in the Black Cart Water** C. R. DOUGHTY

According to Macan's key to the British aquatic Hemiptera (1965. *Sci. Publ. Freshwat. biol. Ass. No. 16*), the bug *A. aestivalis* (= *A. montandoni* Horvath) is found on stony bottoms in rivers, mainly in southern Britain, although it has been recorded from the Tweed catchment. *A. aestivalis* was discovered in the Black Cart Water at Garthland Bridge, Howwood (NS 395606) in September 1980 by Miss Marion Shields. Further specimens were taken in March and May 1985 from the same location. Despite the abundance of apparently suitable habitats in other parts of the Clyde area, Ayrshire and Argyll, the species has not been recorded elsewhere. However, it was found to be common further south in the River Dee near Castle Douglas (NX 732641) in April and July 1980 and also in the River Cree above Newton Stewart (NX 387690) in April 1980.

## Vertebrates

### Fish

**The status of the Gudgeon *Gobio gobio* (L.) in the River Irvine catchment** C. R. DOUGHTY

Gudgeon were first reported from the River Irvine at Gatehead (NS 3936) in June 1979 (Clyde River Purification Board Annual Report, 1979) and since then appear to have become established in the lower reaches of the river and in at least two tributaries. In 1984, dead gudgeon were found in the river at Shewalton (NS 341372) and in the Annick Water at Cunninghamhead (NS 375424) as a result of copper pollution and natural deoxygenation respectively. In June 1985, following serious pollution of the Carmel Water by silage effluent, several dead gudgeon were found at Kilmaurs (NS 413412) and Knockentiber (NS 399391). Gudgeon, which were previously absent from the west of Scotland, have recently been reported from the River Clyde and Cadzow Burn (Clyde River Purification Board Annual Report 1983) and from the White Cart Water (S. J. Edwards, 1984, *Glasg. Nat.* 20, 488). The latest records provide further evidence to suggest that the species is likely to spread to other rivers in the area.

## Birds

### Unusual mortality of Grey Heron *Ardea cinerea*

A. J. MOORE

On 13 May 1985, while driving north on the M74 between junctions 4 and 5, I observed a Grey Heron flying from the heronry in Hamilton Low Parks across the motorway. Its low gliding flight brought it into the path of a large container lorry which immediately killed it.

I have not been able to adequately research the literature but I believe this to be a very unusual occurrence.

## Mammals

### Sika Deer *Cervus nippon* Temmink on Loch Lomondside

J. MITCHELL

In October 1983 and May 1984 a single Sika Deer stag was observed with several Red Deer *C. elaphus* L. stags on the east side of Cruach Tarbet, Dunbartonshire (per G. W. Blake, Ardgarten Forest). As far as is known, this Japanese species had not been previously recorded on Loch Lomondside (ref. *Scot. Wildlife* 19 (3): 20-24, 1983).

Towards the end of the 19th century a small herd of Sika Deer was successfully established at Carradale, Kintyre (*Western Nat.* 4 : 17-18, 1975). The deer soon spread locally from their point of introduction, with more recent long-range dispersal undoubtedly assisted by the extensive conifer afforestation that has taken place throughout Argyll. In the last few years stragglers have been reported on Forestry Commission ground in the county as far north as Dalmally and eastwards to Loch Long.

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## Proceedings 1984

The chairman, place\* and number present, lecturer's name, title of lecture and note of any exhibits are given for each meeting.

\*GMK: Glasgow Museum and Art Gallery, Kelvingrove  
UGBD: University of Glasgow, Botany Department

- 10 JANUARY.** With Scottish Wildlife Trust  
Mrs A. Craib, UGBD, 51.  
Mr D. McEwan, Paisley Colour Photographic Club:  
Nature photographs from the 15th Paisley International  
Colour Slide Exhibition.  
Exhibit: Remains of a dead Barn Owl (Mr I. McCallum)  
The death was announced of Miss May Mathisen.
- 14 FEBRUARY.** Mrs A. Craib, UGBD, 42. 54th A.G.M.  
Reports on activities during 1983 were read, elections  
were held (see page 116), and appointments made by  
Council were announced. The Report of Council stated  
that there were 338 members (261 Ordinary members, 35  
Family members, 13 Junior members, 21 School  
members and 7 Honorary members). There were 33  
excursions organised during 1983 (15 Botanical, 4  
Ornithological, 4 Geological, 3 Zoological and 5 Joint-  
sectional outings).  
Exhibits: Colour transparency of a spider's web? from  
Africa (for identification) (Mr J. Morgan).  
Herbarium sheets of alien plants collected in Glasgow  
(Dr J. Dickson).  
Freeze-dried specimens of the St. Kilda fieldmouse and  
woodmouse, from Kelvingrove Museum. (Mr R.  
Sutcliffe).  
The film "St. Kilda, the Lonely Islands" was shown.
- 21 FEBRUARY.** Dr J. H. Dickson, UGBD, 25.  
Dr Alan Silverside: Looking at Fungi.
- 13 MARCH.** Dr P. Macpherson, UGBD, 64.  
Mr J. G. H. Williams: A Closer Look at Arran.  
Exhibit: Mosses (Mr R. Hunter)
- 10 APRIL.** Dr P. Macpherson, UGBD, 55.  
A Botanical Evening.  
Dr E. L. S. Lindsay: Oxlips in Lanarkshire (with  
B.C.M.M.).  
Miss B. C. M. Macpherson: A Survey of Toadflaxes  
and their hybrids (with E.L.S.L.).  
Dr P. Macpherson: What local people know of Plants in  
their Neighbourhood!  
Exhibit: Skunk Cabbage (Mr R. Hunter).  
Sale of garden plants (Mrs A. C. Macpherson).

- 8 MAY.** Dr J. H. Dickson, UGBD, 26.  
The Goodfellow Lecture  
Prof. A. C. Wardlaw: Without water, the work of death  
would be incomplete.  
Exhibit: Lamb's Lettuce *Valerianella locusta* (L.) from  
Lamlash, Isle of Arran (Mr J. Lyth).
- 12 JUNE.** Royal Botanic Gardens Edinburgh 38  
Natural History Social Evening.
- 15 SEPTEMBER.** GMK.  
*Annual Exhibition Meeting*  
Membership and Fundraising table Mr R. and Mrs A. Sutcliffe  
Natural History Quiz ..... Mr R. Sutcliffe  
Plants from Crete ..... Mr J. Lyth  
Fungi ..... Mr R. Hunter and Dr A. Walker  
Saddle Fungus ..... Mr F. Woodward  
Some Insects from an Ayrshire garden ..... Mr F. Woodward  
History of G. N. H. S. .... Photographic Section  
Plants and paintings of plants from the Bunhouse Road  
area Mr M. Jarvis, Mrs J. Millar, Mrs I. Nove, Dr A. Walker  
Conifers ..... Natural History Department  
Common Wild Grasses ..... Natural History Department  
The McKechnie Collection ..... Natural History Department  
Caterpillars ..... Mr R. Sutcliffe  
Recording the Flora of Glasgow ..... Dr J. Dickson  
and Botanical Section  
Kidney Saxifrage, St Patrick's Cabbage  
and intermediates ..... Dr P. and Mrs A. C. Macpherson
- 9 OCTOBER.** Dr P. Macpherson, UGBD, 46.  
Dr R. M. and Mrs R. H. Dobson: A Quick Look at  
Newfoundland  
Exhibit: A meadow grass for identification (Dr J. Dickson).  
Sale of indoor plants (Dr J. Dickson).
- 23 OCTOBER.** Mr T. N. Tait, UGBD, 33.  
Mr T. N. Tait and Mr F. G. Rodway: Close-up Photography
- 3 NOVEMBER.** With Botanical Society of the British Isles and Botanical  
Society of Edinburgh Dr P. Macpherson, UGBD, 60  
Exhibition Meeting and Lecture:  
Miss Lynne Farrell: Rare Plant Surveying.
- 13 NOVEMBER.** Dr P. Macpherson, UGBD, 67.  
Mr C. E. Palmer: Fifty Years of Natural History  
Exhibits: Thorn Apple *Datura stramonium* and Ragweed  
*Ambrosia artemisiifolia* from a Glasgow dock  
(Dr P. Macpherson).
- 4 DECEMBER.** R.N.V.R. ship Carrick, 51.  
Annual Dinner Dance.
- 11 DECEMBER.** Dr P. Macpherson, UGBD, 60.  
Dr R. W. Furness: Seabirds of Shetland

# The Glasgow Naturalist

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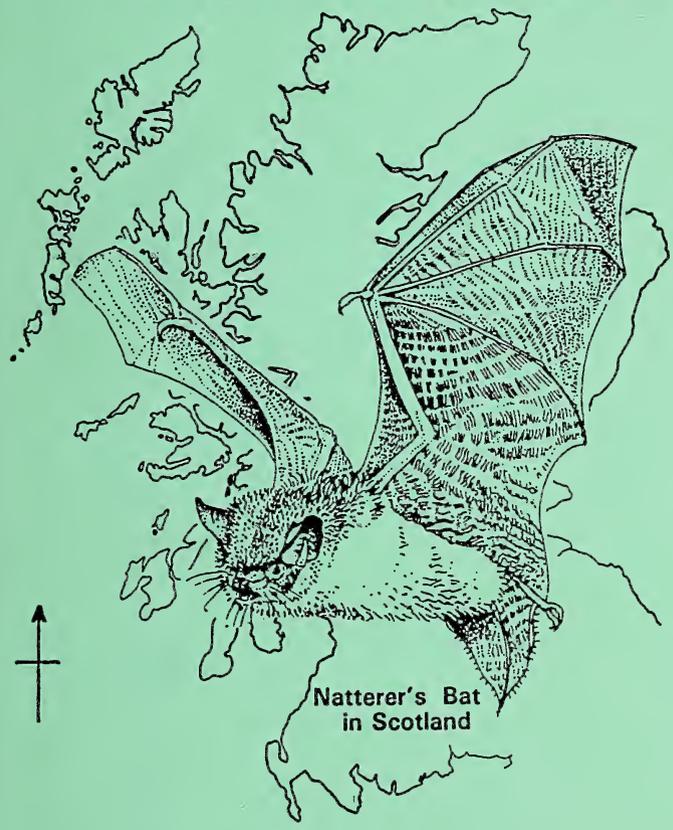
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# *The Glasgow Naturalist*



Natterer's Bat  
in Scotland

## Volume 21

Part 2  
1986



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### **The Glasgow Naturalist**

Published by the Glasgow Natural History Society  
ISSN 0373-241X

December 1986  
Price £4.00

Edited by R. M. Dobson  
with the assistance of J. H. Dickson, A. McG. Stirling and I. C. Wilkie.

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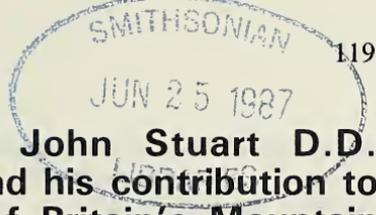
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**The Reverend John Stuart D.D.  
(1743-1821) and his contribution to  
the discovery of Britain's Mountain  
Flowers**

**JOHN MITCHELL**

Nature Conservancy Council, 22 Muirpark Way,  
Drymen, by Glasgow

*Received March 1986*

Eldest son of the Rev. James Stuart, minister at Killin from 1737 to 1779, John Stuart was born on 31 July 1743. Following in his father's footsteps, the young Stuart trained for the church, being licenced by the presbytery of Edinburgh on 27 February 1771. Little is known of his awakening interest in the Scottish flora during those early years, but as a university student at Edinburgh it seems not unlikely that he would have gravitated towards the well attended botany classes of Professor John Hope. Evidence of this is to be found in a surviving note-book catalogue of Dr Hope's now lost herbarium, which lists 4 montane plants collected by Stuart in or before 1768 (Balfour 1907).

John Stuart's public emergence onto the scientific scene took place in the summer of 1772, when the opportunity arose of accompanying the celebrated English traveller and antiquary Thomas Pennant on his second fact-finding tour through Scotland (Pennant 1774). Although Stuart may well have been invited along primarily because of the practical advantages of having at least one member of the party familiar with the Gaelic tongue, it was as guide to Pennant's botanist companion, the Rev. John Lightfoot, that he was to leave his most enduring mark. In Lightfoot's *Flora Scotica* published 5 years after their journey together, special mention is made of Stuart's contribution, in particular for drawing attention to the hitherto unknown botanical riches of his native Breadalbane Hills (Lightfoot 1777).

As a novice minister, the Rev. Stuart was appointed to his first charge, the parish of Arrochar, Dunbartonshire, in October 1773, being ordained on 12 May 1774. Stuart was to officiate at Arrochar for less than 2½ years however, before transferring to Weem in Perthshire on 26 March 1776. After an even shorter term at Weem,

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he moved back to Dunbartonshire in July 1777. With the wide publicity John Stuart received following the appearance of *Flora Scotica* later that year, his new home at Luss on the west bank of Loch Lomond inevitably became a favourite stopping-off point for naturalists travelling to the north and west highlands. Of those who left a written account of their visit, more than one remarked on the fine collection of Scottish arctic/alpines being cultivated in the manse garden. During the Rev. Stuart's long residency at Luss, he painstakingly completed the task begun by his father many years before of translating the bible into Gaelic. In recognition of his service to Gaelic-speaking Scotland, he was awarded the degree of Doctor of Divinity by the University of Glasgow in 1795 (Garnett 1811; Scott 1920 & 1923).

The part played by John Stuart in the discovery of Britain's montane flora is equally acknowledged, although 'first records' of plants are notoriously difficult to ascribe to a particular person or time with absolute certainty. This is especially so with Stuart, who published virtually nothing on his own account concerning his botanical activities. Such matters he left to his correspondents and companions in the field, and as a result relatively few of his records which have appeared in print can be precisely dated.

The short list of flowering plant discoveries originally attributed solely or in part to John Stuart had to be revised with the publication of the already mentioned note-book which catalogued the contents of Prof. John Hope's herbarium (Balfour 1907). A number of first reports of Scottish mountain flowers are contained in its pages, in particular from Dr Hope's protégé James Robertson, who travelled extensively throughout the northern counties between 1767-1771 on behalf of the Commissioners of the Annexed Estates (Horn 1966). But the few deletions from Stuart's string of credits were more than offset by the inclusion in Hope's herbarium of a specimen of *Erigeron borealis* (Vierh.) Simmons, the Boreal Fleabane, gathered by Stuart on Ben Lawers, Perthshire, in 1787. Not only was this an exceptionally good 'first' for Britain, the collection of the plant in 1787 pre-dated the widely accepted first-known botanical exploration of Ben Lawers by Covent Garden nurseryman James Dickson (see Raven & Walters 1956) by 2 years. Yet even 1787 was not the first time Stuart had set foot on this now famous mountain, for Prof. Hope's herbarium catalogue shows that about 20 years earlier he had donated a specimen of *Saxifraga nivalis* L., the Alpine Saxifrage, from the 'Hill of La(u)rs' (see spelling of Lawers in Pennant 1774).

As well as *E. borealis*, John Stuart is believed to have added the following 6 montane plants to the British Flora:

*Salix myrsinites* L. Whortle-leaved Willow

Prof. Hope's herbarium catalogue of 1768 (Balfour 1907). Because of the confusion at the time between this mountain willow and the closely allied *S. arbuscula* L., the identity of the missing herbarium specimen (together with Stuart's named localities given in Lightfoot's *Flora Scotica*) has been open to question. However, from Stuart's observations on *S. myrsinites* confirmed occurrence on Schiehallion in Perthshire (Stuart 1777), it would seem that his identification of the species was correct.

*Juncus castaneus* Sm. Chestnut Rush

Ben Challum, Perthshire (Bicheno 1818). George Don, the forerunner of the next generation of Scottish mountain botanists, claimed the first record of *J. castaneus* in 1794 (Druce 1904). James Edward Smith (founder and first president of the Linnean Society of London), on the other hand, initially attributed the discovery of the rush to James Dickson and fellow nurseryman John Mackay (Smith 1800). Later however, in Vol. 2 of his *English Flora* published in 1824, Smith followed *Juncus* specialist J. E. Bicheno in recognising Stuart as the plant's true discoverer in Britain.

*Juncus biglumis* L. Two-flowered Rush

Prof. Hope's herbarium catalogue of 1768 (Balfour 1907). Meall Ghaordie and Beinn Heasgarnich, Perthshire (Lightfoot 1777).

*Carex capillaris* L. Hair Sedge

Meall Ghaordie and Beinn Heasgarnich, Perthshire (Lightfoot 1777).

*Carex atrata* L. Black Sedge

Meall Ghaordie, Beinn Heasgarnich, Meall nan Tarmachan, etc., Perthshire (Lightfoot 1777). From the Breadalbane localities cited, these unacknowledged records in *Flora Scotica* are without doubt attributable to Stuart.

*Carex saxatilis* L. Russet Sedge

Schiehallion, Perthshire (Stuart 1777). Included in an unpublished list of plants compiled by John Stuart in September 1776 as a follow-up to a geophysical investigation of Schiehallion undertaken by Dr. Nevil Maskelyne, the Astronomer Royal (see Barton 1976). Some 20 years later, James Dickson and George Don independently laid claim to the discovery of the sedge under its synonym *C. pulla* (Good.), although Don cautiously noted on the annotated specimen label in his *Herbarium Britannicum* that the Rev. Stuart was reputedly already acquainted with the species (Druce 1904).

In addition to the 7 species already mentioned, there are at least 4 other first records of mountain flowers which Stuart shared with other botanists, in particular with the Rev. John Lightfoot during his visit to Scotland with Thomas Pennant in 1772. Botanical historians have generally assumed the reverend pair jointly explored a number of Perthshire's Breadalbane Hills during the course of the tour, but examination of Pennant's crowded itinerary (see Pennant 1774) clearly shows their only botanising opportunity in the area was limited to a few hours late on 16 August following their arrival at Stuart's home in Killin. As Pennant took a leisurely stroll up the lower slopes of Stròn a' Chlachain to take in the view of Loch Tay, several of the records contained in *Flora Scotica* strongly suggest that Lightfoot and Stuart made a hurried visit to Creag na Caillich, the nearest good hill to Killin and one which James Robertson and Stuart had botanised together the previous year (see Robertson 1771). In their keenness to examine at least one of the more productive Perthshire hills known to Stuart, the two clerics were obviously prepared to risk the very real possibility of local disapproval for their apparent flagrant disregard of what was the Sabbath day.

*Salix reticulata* L.

Reticulate Willow

Creag na Caillich, Meall Ghaordie, etc., Perthshire (Lightfoot 1777). If the first record was obtained from Creag na Caillich, it could equally have been with James Robertson on 22 August 1771 (Robertson 1771) or Lightfoot on 16 August 1772 (Pennant 1774).

*Luzula spicata* (L.) DC.

Spiked Woodrush

Beinn Sgritheall, Inverness-shire (Lightfoot 1777). The ascent of Beinn Sgritheall was made on 6 August 1772. Before setting off, their hostess at Arnisdale generously plied them with several glasses of rum cordialized with bilberries, with the effect (as Pennant observed) that Messrs Lightfoot and Stuart sallied out to botanise the hill 'in high spirits' (Pennant 1774).

*Carex pauciflora* Lightf.

Few-flowered Sedge (Fig. 1)

Goatfell, Buteshire (Lightfoot 1777). The Rev. John Lightfoot and Stuart collected this hitherto undescribed sedge while ascending Goatfell, Isle of Arran, on 21 June 1772 (Pennant 1774).

Before moving on from the Lightfoot – Stuart partnership, it is worth mentioning another first British record made during their 1772 tour of the Highland and Islands, *Juncus trifidus* L., the Three-leaved Rush. Although there is no reason to believe that Stuart was not present when the plant was first found in West Ross, Lightfoot rather strangely credits only himself with its discovery (Lightfoot 1777).

*Carex bigelowii* Torr.

## Stiff Sedge

Ben Lomond, Stirlingshire (Smith 1804; Smith & Sowerby 1809). Under its synonym *C. rigida*, this sedge was first described as a species new to Britain by the Rev. Samuel Goodenough in his classic paper on the genus *Carex* read at a meeting of the Linnean Society of London held on 3 April 1792 (Goodenough 1794). Goodenough's announcement of *C. rigida*'s occurrence in Scotland was based on material gathered by James Dickson, presumably during his plant-hunting visit to the Highlands in 1789 (see Dickson 1794). However, this was not the first occasion the sedge had been seen in Scotland, for J. E. Smith subsequently produced a specimen which he and John Stuart had collected on Ben Lomond in 1782. At that time Smith was a 22-year old medical student at the University of Edinburgh, his course of study including botany under Prof. John Hope. Anxious to be awarded the medal presented each year by Dr. Hope for the best collection made of Scottish plants, Smith, together with a few of his fellow students, set out from Edinburgh for the West Highlands via Glasgow and Dumbarton on 20th August. The ascent of Ben Lomond was undertaken on 23 August under the personal guidance of the resident Rev. Stuart.



Fig. 1 *Carex pauciflora*, the Few-flowered Sedge (from Lightfoot, 1777. *Flora Scotica* Vol. I.)

Despite poor weather a good collection of montane plants was made (Smith correspondence – Lady Smith 1832), including what eventually proved to be the first British record of *C. bigelowii*.

From the published correspondence of a relative, Dr William Wright, it is evident that Stuart was still scouring the Scottish mountains for the rarer arctic/alpines until well into his sixties (Anon 1828), although no record appears to have survived of any of the plants he found during these later explorations.

The Rev. John Stuart D.D. died in post at Luss on 24 May 1821. A distinctive and well preserved memorial stone is still to be seen in the village kirkyard, where, on 8 October 1978, members of the British Lichen Society gathered to mark John Stuart's early contribution to Scottish lichenology . . . but that is another story waiting to be told.

### Acknowledgments

It gives me a particular pleasure to thank Dr Brian Coppins, Dr Jim Dickson, Mr Allan Stirling and the staff of the Nature Conservancy Council's library service for their assistance and continued interest throughout the preparation of this account. The acknowledgment would not be complete without mention of W. A. Clarke's *First Records of British Flowering Plants* (2nd ed. 1900), London, an invaluable source of information on the discovery of the British Flora.

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## A HUNDRED YEARS AGO

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R. SUTCLIFFE

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T. & A. D. Poyser, 1986, 382pp., many black & white photographs, line drawings, maps of distribution, bibliography.

Hardback, ISBN 0 85661 0402, £24.00.

Valerie Thom has written this most comprehensive and informative publication which is now the major statement on the birds of Scotland for the foreseeable future. In 1953 Baxter & Rintoul published, in 2 volumes, *The Birds of Scotland* which until now has been the authoritative work on Scottish ornithology.

*Birds in Scotland* encompasses these earlier records and updates them with current information made available by the *Scottish Ornithologist's Club*.

The species account, which forms the major element of the book, reviews the period 1950-1983 and is adequately complemented by 173 distribution maps and many tables and diagrams. The accounts are surprisingly well updated giving, for instance an account of the White-tailed Eagle chick being reared in spring 1985.

Donald Watson is responsible for the 129 species drawings which were prepared by a team of artists under his editorship. There are also 32 scenic photographs which illustrate the effects of the changing Scottish habitats.

It is only when you read this book that you start to realise the effect on ornithology of the profound changes in Scottish habitats brought about by the development, afforestation and drainage schemes.

The individual accounts are preceded by 11 chapters. The first deals with the Scottish physical environment and the next 6 with the various habitats. The remainder cover major wetland sites, land-use changes, developments, protection, conservation, status and distribution.

Slight criticism could be made of the lack of coloured photographs and the way in which peak count figures are presented, but overall the book is an excellent buy at £24.00.

IAN C. McCALLUM

## Supralittoral Lichens as a Habitat for Tardigrades

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*Received January 1986*

The Tardigrada are small, multicellular animals, between 50 microns and 1200 microns long, which inhabit the surface water film of many mosses, lichens, liverworts, and angiosperms (Morgan and King, 1976a). They are immediately identifiable by their four pairs of stumpy legs usually terminated by claws, and a lumbering, bear-like gait – hence the common name of water bears.

Two basic types are recognisable. The Eutardigrada lack cephalic appendages and have two bifurcate claws per leg (Figs. 1B-D, 2A-C) while the Heterotardigrada may have a combination of characters which includes: cephalic appendages; four single claws, none, or more than four per leg; well-defined dorsal armour plating; lateral and/or dorsal spines and/or filaments; a bright colour derived from carotenoid pigments in their diet (Ramazzotti and Maucci, 1983) (Fig. 1A).

The eight legs of tardigrades suggests an affinity with mites and spiders (Arthropoda). The Tardigrada, however, have a sufficiently distinctive assemblage of characters to warrant placing them in a phylum of their own. They have a mucus coat to the body and a ventral ladder-like nervous system (like primitive annelids), a chitinous cuticle (in common with insects), and a fixed cell number (they grow by cell enlargement) together with a feeding apparatus capable of piercing cell walls and sucking out cell contents (like nematodes).

Tardigrades share their specialized habitats with various other organisms, including Protozoa, rotifers, nematodes, mites, copepods, and certain Collembola. Tardigrades, however, are considered as only a minor component of the lichen fauna; Gadea (1964) stated that, numerically, they accounted for only 0.5% of the Mediterranean lichen microfauna which he studied.

The literature relating to lichen-inhabiting tardigrades, up to

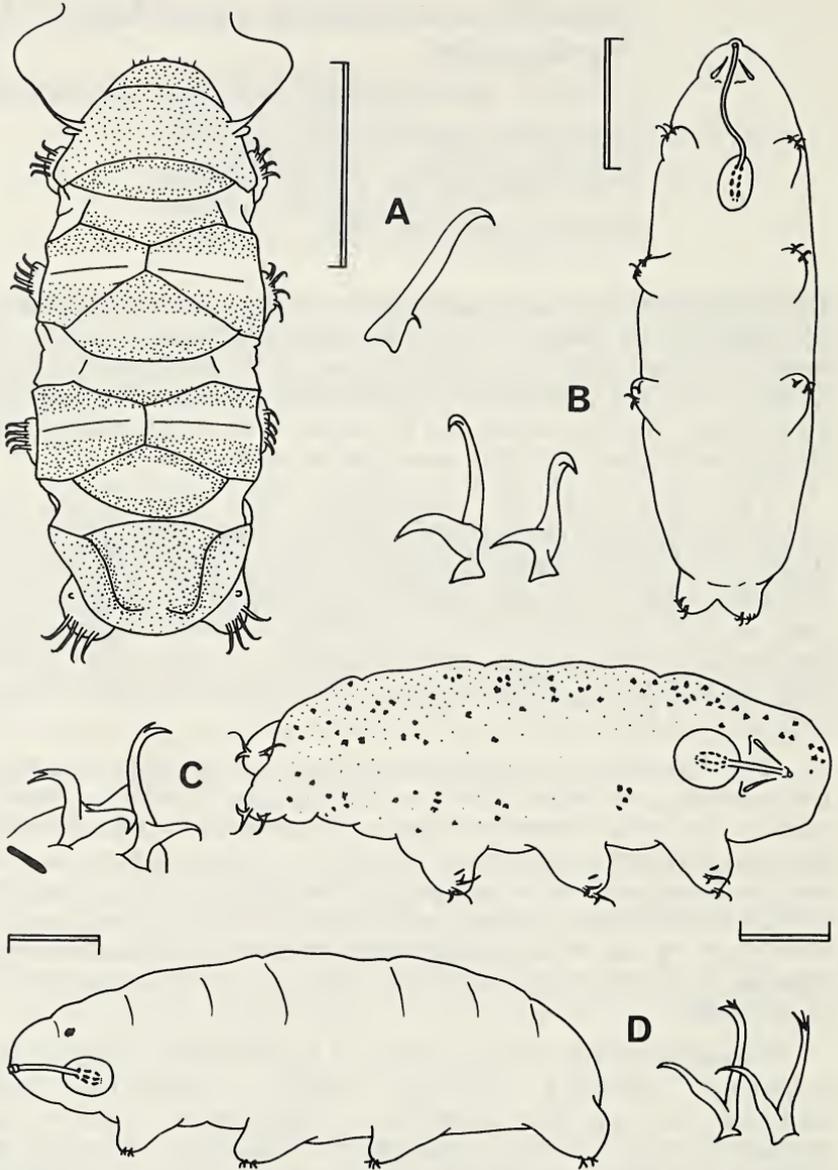


Figure 1 Clyde tardigrades. Drawings of whole specimens (dorsal or lateral views) and terminal claws of (A) *Bryodelphax parvulus*, (B) *Diphascon chilense*, (C) *Isohypsibius prosostomus* var. *cambrensis*, (D) *Macrobiotus echinogenitus*. Scale lines 50 microns.

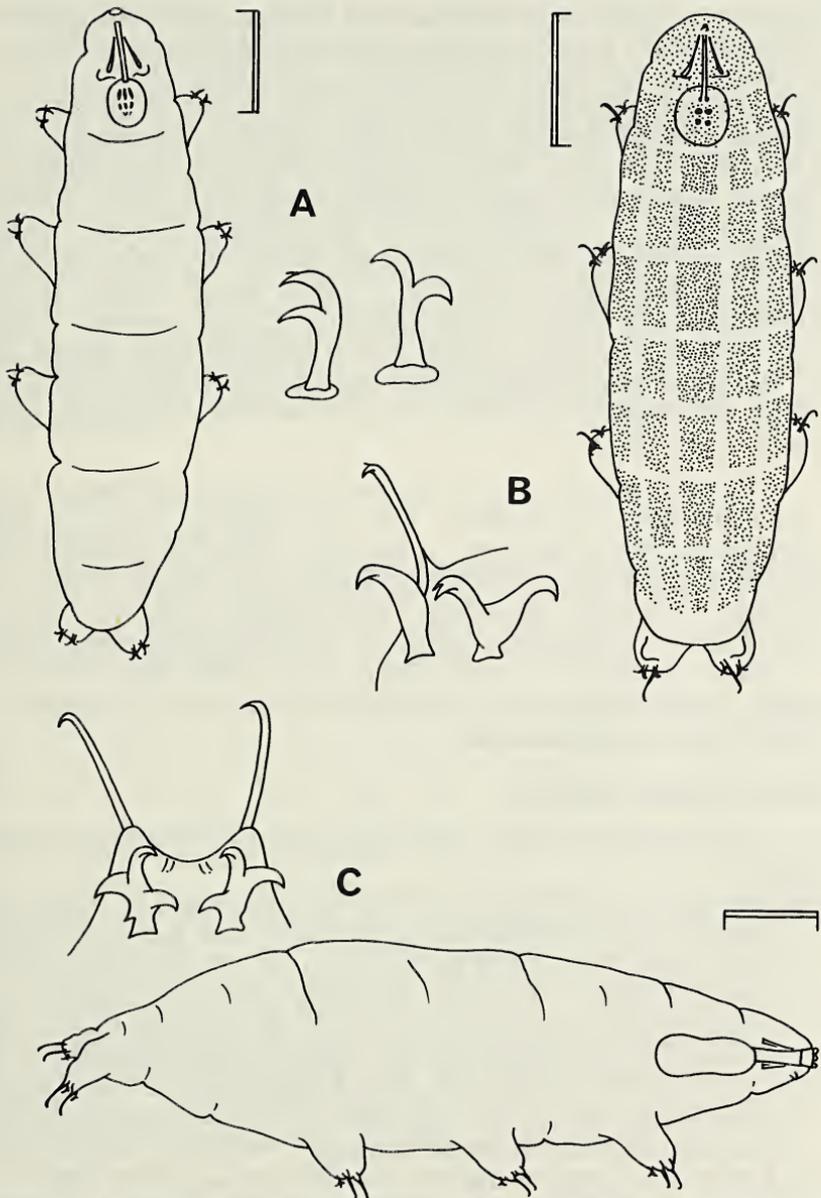


Figure 2 Clyde tardigrades. Drawings of whole specimens (dorsal or lateral views) and terminal claws of (A) *Macrobiotus hufelandi*, (B) *Hypsibius oberhaeuseri*, (C) *Milnesium tardigradum*. Scale lines 50 microns.

and beyond that reviewed by Gerson and Seaward (1977), indicates that numerical data are sparse. Barrett and Kimmel (1972) noted variation in the density and diversity of tardigrades from lichens (*Physcia* spp.) growing on American Elm, with the large predatory species *Milnesium tardigradum* Doyère occurring at densities of up to 11/dm<sup>2</sup> (100 cm<sup>2</sup>). This is considerably lower than estimates of various moss dwelling species recorded by Morgan (1974): *Echiniscus testudo* Doyère, 21,389/dm<sup>2</sup>; *M. tardigradum* 589/dm<sup>2</sup>. Morgan (1976), in a study of the population dynamics of a mixed assemblage of tardigrade species from roof moss, noted highest monthly population estimates of 22,870/dm<sup>2</sup>, with lowest monthly estimates of 1,320/dm<sup>2</sup>. These lowest monthly levels exceed many of the previous estimates for soil populations (Hallas and Yeates, 1972) and suggest that moss could be the most favourable habitat for tardigrades.

Most attention to date has been directed to investigations of moss dwelling tardigrades. The only British study of lichen tardigrade faunas has been qualitative rather than quantitative. Morgan and King (1976b) examined supralittoral lichens from Jersey, recording *Hypsibius oberhaeuseri* (Doyère) and *M. tardigradum* in *Ramalina* holdfasts, with *Isohypsibius prosostomus* Thulin, *Isohypsibius schaudinni* (Richters), *Macrobiotus intermedius* Plate, *Macrobiotus hufelandi* Schultze, and *E. testudo* in *Ochrolechia* and *Xanthoria*.

## Materials and Methods

The data presented in this paper relate to tardigrades extracted from:

- a) systematic collections of *Xanthoria parietina* (L.), *Anaptychia fusca* (Huds.), *Parmelia sulcata* (T. Tayl), and *Ramalina siliquosa* (Huds.) growing in the supralittoral on the northern shores of Great Cumbrae Island in the Firth of Clyde. Samples were collected from the top and bottom of the zone on the shore occupied by each lichen species. Zones were designated according to Ferry and Sheard (1969), with *Xanthoria* and *Ramalina* (zone 2 species) occupying a lower position on the seaward side of the supralittoral than *Anaptychia* (zone 3 species) or *Parmelia* (zone 4 species) at higher stations towards the landward side of the supralittoral. All samples of encrusting lichens were sub-divided into inner (near centre) and outer (near edge) thallus fractions.
- b) general collections of supralittoral lichens from the shores of Great and Little Cumbrae with the addition of eider (*Somateria*

*mollissima* (Linnaeus)) and rabbit (*Oryctolagus cuniculus* (Linnaeus)) droppings overlying lichens from Little Cumbrae.

Extraction of tardigrades followed the methodology of Morgan and King (1976a). Samples were soaked in tap water for 24 hours. This allowed encysted and cryptobiosed (dormant) individuals to recover. To the volume of sample and water was added an equal volume of 4% acetic acid or 20% ethyl alcohol for 10 minutes. This narcotized the tardigrades, causing them to relax and fall away from the plant material. Tardigrades were recovered by agitating the sample and, after allowing for precipitation of the larger particulate debris, decanting the supernatant through a 60 microns mesh nylon membrane. Tardigrades were washed from the membrane into a Petri dish and sorted under a binocular microscope at x35 magnification.

## Results and Discussion

### a) Systematic collections

Seven species of tardigrade occurred in samples of the four species of lichen from the northern shores of Great Cumbrae. The distributions and abundance of these tardigrades, both within the lichen and down the shore, are shown in Table 1.

*Anaptychia* yielded the highest numbers and greatest species diversity, including the only records of *Bryodelphax parvulus* Thulin (Fig. 1A); however, population densities (expressed as numbers per dm<sup>2</sup>) are still much lower than those recorded for mosses. No figures are provided for *Ramalina* due to difficulties in estimating sample area; the three species of tardigrade found inhabiting this fruticose lichen are confined to the basal holdfast portion. Morgan and King (1976b) recorded *H. oberhaeuseri* (Fig. 2B) and *M. tardigradum* (Fig. 2C) in *Ramalina* holdfasts from Jersey and the two species have been recorded frequently in association in both mosses and lichens. During the systematic survey the carnivorous *M. tardigradum* always co-existed with tardigrade species other than *H. oberhaeuseri*, and in particular with *Isohypsibius prosostomus* Thulin var. *cambrensis* Morgan (Fig. 1C), *Macrobiotus echinogenitus* Richters (Fig. 1D) and *M. hufelandi*. (Fig. 2A).

The position of a lichen on the shore appears to exert some influence on tardigrade fauna. Thus, *H. oberhaeuseri* is confined to *Ramalina*, *Xanthoria*, and *Anaptychia* taken from the top of their respective zones in the supralittoral, while *I. prosostomus*, although occurring in the same lichen species, is restricted to samples

LICHEN	Seaward side of supralittoral						Landward side of supralittoral											
	Zone 2 species						Zone 3 species						Zone 4 species					
	Xanthoria			Ramalina			Anaptychia			Parmelia								
TARDIGRADA	Bottom		Top		Bot	Top	Bottom		Top		Bottom		Top					
	Inner	Outer	Inner	Outer			Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer				
<i>Bryodelphax parvulus</i>																		
<i>Diphascon chilense</i>															4			
<i>Hypsibius oberhaeuseri</i>			114	62		X			209	119								
<i>Isohypsibius proostomus</i> var. <i>cambreensis</i>	86	96				X	123	238										
<i>Macrobiotus echinogenitus</i>								16	261	316			115					
<i>Macrobiotus hufelandi</i>											31	5		29				
<i>Milnesium tardigradum</i>			41			X		95			10	1	23					

TABLE 1 Distribution and abundance of tardigrades in lichens from the supralittoral at the north end of Great Cumbrae. Population estimates (aggregate samples) expressed as numbers per dm<sup>2</sup>. X denotes presence.

	Little Cumbrae						Great Cumbrae Lichens
	<i>Anaptychia</i>	<i>Parmelia</i>	<i>Ramalina</i>	<i>Xanthoria</i>	Rabbit dung	Eider dung	
<i>Hypsibius oberhaeuseri</i>	X			X	X		X
<i>Isohypsibius prosostomus</i>				X		X	X
<i>Macrobiotus echinogenitus</i>							X
<i>Macrobiotus hufelandi</i>	X	X		X	X		X
<i>Miinesium tardigradum</i>	X		X	X	X	X	X

TABLE 2 Summary of the results from the general collections. X denotes presence.

from the bottom of a lichen zone. Similarly, while *oberhaeuseri* is more abundant in the inner thallus fraction of *Xanthoria* and *Anaptychia*, it is the outer thallus fraction of the same lichen species which supports consistently higher numbers of *prosostomus*. This unusual pattern of distribution and abundance of the two tardigrade species could indicate important differences in tolerance to environmental factors in the supralittoral, in addition to reflecting subtle changes in the microhabitat offered by the host lichen species, either within a single thallus or down the shore.

*Parmelia sulcata*, occupying zone 4 in the supralittoral, supports four species of tardigrade, only one of which, *M. echinogenitus*, occurs in significant numbers. However, the distribution and abundance of tardigrades within this lichen conforms with the pattern described for *Xanthoria*, *Anaptychia*, and *Ramalina*. *Parmelia sulcata* also supports a population of the ubiquitous *M. hufelandi* in addition to small numbers of *Diphascon chilense* Plate (Fig. 1B), a typical soil species. It is likely that, because of its growth form, *Parmelia* supports more detritus than the other lichen species. Consequently it provides a more suitable habitat for detritus feeding forms.

### b) General collections

The tardigrade fauna of lichens collected from sites other than at the north end of Great Cumbrae revealed interesting differences (Table 2). *Bryodelphax parvulus* and *D. chilense* were absent from all collections while *M. echinogenitus* was found only rarely elsewhere on Great Cumbrae. *Xanthoria* displayed greatest species diversity on Little Cumbrae, supporting *M. hufelandi*, *I. prosostomus*, *H. oberhaeuseri* and *M. tardigradum*. The co-existence of the latter two species, not found together on Great Cumbrae, was also a feature of *Anaptychia* collections from Little Cumbrae.

There are only two literature references to tardigrades in animal droppings. Richardson (1970) noted an unknown *Macrobiotus* species in sheep dung from the Pentland Hills while Morgan (1982) recorded *Hypsibius dujardini* (Doyère) in ptarmigan (*Lagopus mutus* (Montin)) droppings and *Microhypsibius truncatus* Thulin, *Isohypsibius tuberculatus* (Plate) and *I. prosostomus* in sheep droppings from northern Iceland. The collection of rabbit and eider droppings overlying supralittoral lichens was a fortuitous event, since they contained, collectively, the four species of tardigrade also harboured by Little Cumbrae lichens themselves. It is reasonable to assume that tardigrades colonise dung from the substrate below.

In conclusion, the results of this limited survey indicate that lichens growing in the supralittoral on Great Cumbrae and Little Cumbrae support large and diverse populations of tardigrades. Lichens offer a range of microhabitats for colonisation, as reflected in the distribution and abundance of tardigrades within them. This is certainly one feature of lichen/tardigrade associations worthy of further investigation. The identification of rabbit and eider dung overlying supralittoral lichens as a novel substrate for tardigrades is noteworthy.

### Acknowledgements

The authors gratefully acknowledge the use of facilities at the University Marine Biological Station, Millport. Much of the fieldwork that forms the basis of this paper was completed during the tenure of a grant to study Scottish Tardigrada from the Natural Environment Research Council.

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## Book Review

### **Otters: ecology and conservation**

C. F. MASON and S. M. MACDONALD

Cambridge University Press, 1986, 236 pp., many black and white photographs, maps & line drawings, bibliography.

Hardback, ISBN 0 521 30716 3, £15.00.

Although the book deals mainly with the European Otter (*Lutra lutra*), which ranges from Ireland to Japan and from the Arctic to N. Africa, a chapter is devoted to other otter species world-wide.

This account describes the life history, includes details of survey methods and the state of populations throughout the range, and will appeal as much to the amateur naturalist as to the professional biologist.

The authors cover foraging, diet, activities, breeding, vocalisation, distribution, status, conservation, factors affecting survival, captive breeding and reintroductions.

This publication underlines the philosophy that the successful conservation of the otter depends on public education and sympathy as much as upon detailed ecological knowledge.

The book, while showing that otters have decreased substantially in numbers and range during the present century due to a combination of pollution, habitat destruction and direct persecution, explains that conservation measures involving captive breeding and introduction could help to redress the balance.

For those wishing to watch this elusive and mainly nocturnal mammal there is much helpful advice on what to look for and where to look.

There are more than 100 sketches, maps and graphs which are easily understood and there is evidence throughout the book of extensive research (25 pp. of references).

This book is well worth £15.00 in spite of the lack of colour in sketches and diagrams.

IAN C. McCALLUM

## **The Distribution of Natterer's Bat, *Myotis nattereri* (Kuhl), in Scotland**

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*Received April 1986*

Natterer's bat, *Myotis nattereri* (Kuhl), occurs throughout the temperate Palaearctic northwards to Finland. In Scotland, the few published records suggest the species has a wide distribution, with the majority of records coming from the southern half (Corbet & Southern, 1977; Arnold, 1984). Within the last five years, the growing interest in bats has paralleled an increase in the number of Natterer's bat records from Scotland. These records do not figure on the latest distribution map produced by the Biological Records Centre (Arnold, 1984), which includes only those records up to 1976.

Prior to 1972, there were only four records of Natterer's bat in Scotland, three of which are from the 19th century. Placido (1972) summarised the available information and noted that none of the three early reports was sufficiently detailed as to locality or certain identification to warrant inclusion as records. His own records (Placido, 1972, 1973), and one from 1953, were thus the first definite ones for Scotland. At the time, Placido suggested that Natterer's bat was probably more widespread in Scotland than the few records suggested and that the paucity of information was due to the dearth of observers. With the current interest in bats, and the recent formation of five Scottish Bat Groups (Haddow, 1986), records of the species are likely to increase in frequency. In this note, we describe the present distribution of Natterer's bat in Scotland based on an examination of all the records up to January, 1986.

Records of Natterer's bat were obtained from the Biological Records Centre, museums and individual observers. The enquiry resulted in a total of 35 certain records since 1953 (Table 1) in 23 locations (Fig. 1). The majority of records were from south of the Great Glen with a concentration in Central and Tayside Regions. Whilst this distribution to some extent reflects the distribution of observers, it is significant that there are few records from Grampian Region, which has been a centre of bat research for many years and in which there is a Bat Group. This suggests that Natterer's bat is rare in north-east Scotland, with the exception of the Moray Firth area.

Based on the records available, Natterer's bat in Scotland is found mainly in well wooded areas of river valleys or loch sides. Three records are from large coniferous plantations, Murray's Monument (Central Galloway Forests), Tentsmuir Forest and Ardross Forest, indicating that these can be a suitable habitat for the species. A similarly large coniferous forest just south of the Scottish border, Kielder Forest, has also yielded Natterer's bat (Stebbing & Walsh, 1985). Thus the extensive coniferous forests in the south, south-west and west of Scotland may provide suitable habitat for the species, especially those planted in river valleys at low altitude where there may also be deciduous trees.

To date only four nursery roosts have been found, all in buildings (Table 1). It is possible that Natterer's bat roosts in natural sites more frequently than do either the Pipistrelle, *Pipistrellus pipistrellus* (Schreber), or the Brown Long-eared bat, *Plecotus auritus* (L.), and has consequently been overlooked more often than the other species. Also, some records may be of bats that were migrating or were windblown. Provision of bat boxes and mist-netting have been useful in detecting Natterer's bat and these may prove to be the most efficient methods of finding it in woodlands. Only two hibernacula are known in Scotland; one is a disused mine shaft (Placido, 1973), and the other is an underground stone quarry (T. McOwat, pers. comm.).

We hope that publication of this note will alert observers to the wide distribution of Natterer's bat in Scotland and to the fact that its apparent rarity is probably more related to lack of observers and a preference for woodland as habitat than other factors.

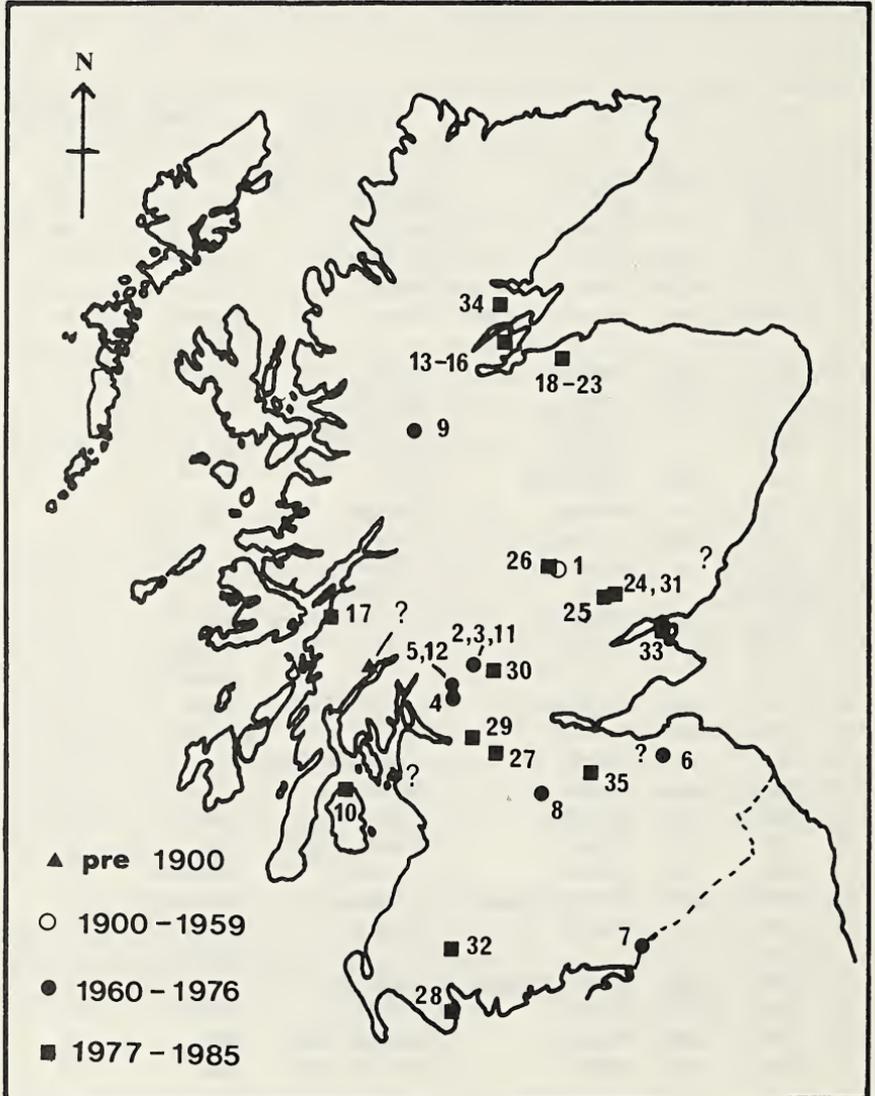
**Table 1**

Summary of records of Natterer's bat in Scotland. "Nursery" indicates females plus juveniles. References: 1 – Placido 1972; 2 – Placido 1973; 3 – Biological Records Centre; 4 – H. Arnold pers. comm.; 5 – S.M. Swift pers. comm.; 6 – M.A. Taylor pers. comm.; 7 – D. Prestwell pers. comm.; 8 – authors' data; 9 – R. Collier pers. comm.; 10 – A. Panter, pers. comm. "( )" indicates uncertain record.

YEAR	MONTH	LOCATION	RECORDER	AGE/SEX	REFERENCE	
?	(1858)	August	Inverary	George, Duke of Argyll	–	1,3)
?	(1880)	–	Dalkeith	Robert Gray	–	1)
?	(1895)	–	Montrose	Coward (T.A.?)	–	1)
1	1953	August	Pitlochry	K. M. Berry	Male	3
2,3	1972	Jan/Feb	Aberfoyle	C. Placido	Male	1
4	1973	June	Milton of Buchanan	C.Placido	Female	2
				(parous)		
5	1973	July	Balmaha	C. Placido	Nursery	2
6	1973	Nov.	Pathhead	T. McOwat	Male	3
7	1974	–	Canonbie	R. E. N. Smith	–	3
8	1976	–	Corehouse	C. Placido	Nursery	3
9	1976	Sept.	Glenmoriston	J. Harris	–	3
10	1976	–	Lochranza	D. McNicol/C. Placido	Male	8
11	1980	March	Aberfoyle	J. F. Haddow	–	3
12	1980	–	Balmaha	J.F. Haddow/C. Placido	–	3
13-16	1980/81/82	–	Ardross	R. E. Stebbings	–	4
17	1983	Nov.	Ardentallan	D. McVean/C. Placido	Male	4
18-23	1984/85	May-Aug.	Darnaway	P. A. Neville	Males/parous	3,8
				Females		
24	1984	August	Blairstown	S. M. Swift	Female	5,6
25	1984	Sept.	Drumore	S. M. Swift	Male	5,6
26	1984	August	Strathhtay	D. Prestwell/M. Taylor	–	6,7
?	(1985)	October	Saltcoats	M. Hughes	–	3,4)
27	1985	June	Strathblane	J. F. Haddow	Nursery	3
28	1985	Nov.	Whithorn	C. Sydes/C. Placido	Male	4
29	1985	July	Callander	J. F. Haddow	Males (juv.)	3
30	1985	August	Milton of Campsie	J. F. Haddow	Male (juv.)	3
31	1985	–	Drumore	S. M. Swift	Female	5
				(parous)		
32	1985	April	Murray's Monument	D. A. Clugston	–	3
33	1985	May-July	Tentsmuir	D. J. Bullock	Nursery	8
34	1985	June	Munlochy	R. Dennis/R. Collier	Male	9
35	1985	May	Carlops	M. Jones/A. Panter	Male	10

**Figure 1**

Map showing the localities of the records of Natterer's bat in Scotland. Records, numbered as in the left hand column of Table 1, are separated into the same groups of years as for Biological Records Centre distribution maps.



## Acknowledgments

We thank the many people who responded to our enquiry, and especially Henry Arnold, Sue Swift and Michael Taylor.

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## Book Review

### Hoverflies

FRANCIS S. GILBERT

Cambridge University Press, 1986. 66 pp., colour figures and line drawings. Paperback, ISBN 0 521 27701 9, £4.50; hardback, ISBN 0 521 25766 2, £15.00.

This is the fifth title in the well-known Naturalist's Handbook series devoted to entomological topics. In this instance, basic information is supplied on the structure and life histories of some of the more easily observed hoverflies, and numerous suggestions are made which might encourage the reader to undertake further research. The text is written in clear, unambiguous English, free from technical jargon, and is a pleasure to read. There is a chapter on the techniques of collecting, recording, marking, dissecting and rearing; also on writing papers. An appendix lists useful addresses, and books and articles for further reading. The chapter on identification is perhaps less useful, since only one-sixth of the British species are covered, and the illustrations by Stephen Falk, borrowed from another book, are smaller and less clearly reproduced than the originals. The enthusiast will surmount this difficulty by acquiring that title also: *British Hoverflies* by A. E. Stubbs and S. J. Falk (1983). Equipped with both books, the student and amateur will be well-placed to tackle this most interesting family.

I. C. CHRISTIE

## Book Reviews

### **The Atlantic Alcidae**

DAVID N. NETTLESHIP and TIM R. BIRKHEAD (eds.)

Academic Press, 1985, 574 pp.

Hardback, ISBN 0 12 515670 7, £33.50; paperback £17.00.

The Auks of the Arctic and northern waters are really the equivalent of the penguins of the Antarctic; seabirds which can fly underwater. The puffin seems to be included in most people's list of favourite birds, and along with the guillemot, razorbill and the other four species, it occurs in staggering numbers among the rich fishing grounds of the north Atlantic. Many of the species have total populations of many millions of individuals. As befits a group of birds which play such an important role in the ecosystem of the northern oceans, there has been a great deal of research into this group of birds. This book is a review of the biology of auks and has collected contributions from nine authors who are all authorities in their subject. It will undoubtedly be the definitive study on these birds for many years. Although it is not intended as a popular account, it is written in a particularly clear and readable style, and would be of interest to anyone looking for detailed information. The book contains good factual accounts for each species, on distribution, population sizes, breeding biology, food selection, activities at sea and conservation problems. But it also has several review chapters that would be of interest to any serious ornithologist: particularly on the function of coloniality in birds and ecological adaptations for breeding. The book also summarises what little is known about the extinct great auk.

*DAVID C. HOUSTON*

### **The Natural History of Orkney**

R. J. BERRY

Collins, London, 1985, 304 pp., 20 colour plates, illustrations, maps, tables.

Hardback ISBN 0 00 219062 1, £20.00;

Paperback ISBN 0 00 219406 6, £9.95.

This book is a welcome addition to the New Naturalist series and covers in detail all aspects of natural history in Orkney. Man's relationship with the land and his effect on the habitat is emphasised and is treated in historical, geological and climatic contexts. There is also a fascinating chapter on Orkney naturalists.

The flora and fauna of Orkney are discussed and useful tables of their distribution are given throughout the text, while the wealth of bird life is described, again noting problems of conservation.

The appendices listing all the species recorded in Orkney and the bibliography are very useful tools but it is a pity, however, that the colour illustrations are disappointing in both quality and quantity.

This book is essential reading for anyone visiting Orkney.

*MARGARET M. H. LYTH*

## A New Species of Scuttle Fly (Diptera: Phoridae) from Scotland

R. H. L. DISNEY

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Received March 1986

Following the report of seven species of scuttle fly from Scotland which were new to the British List (Disney, 1984) I am now able to add an undescribed species. This came to light during a recent revision of the *Megaselia dahli* (Becker)-complex (Disney, in press).

*Megaselia horsfieldi* n.sp.

*Male:*

Head: Frons dark and clearly broader than high. Antials more or less equidistant from antero-laterals and upper supra-antennals, and these bristles all situated approximately at the same level. The upper supra-antennals are slightly closer together than the pre-ocellars. The lower pair are more approximated and a little shorter and not so thick. Third antennal segment and arista dark brown. Palps paler brown with 6-8 bristles. Labrum dusky and relatively narrow. Labella simple.

Thorax: Very dark, particularly on top. Mesopleuron with 6-24 hairs, all of about the same length. Scutellum with an anterior pair of short hairs and a posterior pair of bristles. Notopleuron with three bristles.

Abdomen: All tergites dark with the hairs strongest postero-laterally. Hypopygium as fig. 1. Epandrium, hypandrium and anal tube all dark. Hypandrium without posteriorly directed lobes and hairless apart from a single pair of hairs. Venter pale brownish grey, with hairs on segments 3-6.

Legs: All dark, but fore tibiae may be a little paler. Fore metatarsus of *M. dahli* type, i.e. somewhat swollen and ventrally with several rows of hairs reduced to short blunt spines. Hairs beneath basal half of hind femur about the same length as the hairs of the antero-ventral row of the apical third. Hind metatarsus with the hairs of the basal section of the ventral hair palisade with recurved tips. (Fig. 2).

Wings: Length 1.5-1.9mm. Costal index 0.47-0.50. Costal ratios 2.4-3.5:1.2-1.6:1. Costal cilia 0.10-0.12mm in length. Thick veins brown. Thin veins paler, particularly vein 7. Vein Sc does not quite reach vein 1. Axillary ridge with 3-4 bristles. With 0-2 minute hairs at base of vein 3. Membrane greyish. Haltere dark.

Glasg. Nat. 21 part 2 (1986)

*Female:*

Very similar to male. Costal index tends to be near 0·5 or a little more. The costal section 2 tends to be relatively longer (1·4-1·8 : 1). The hairs of the basal section of the ventral hair palisade of the hind metatarsus are only very slightly recurved (in some cases evident for two or three hairs only). Abdominal tergites 5-8 as fig. 3.

Material examined: ♂ holotype in author's collection. SCOTLAND: Fannich Hills, West Ross (Grid ref. 28/179726). 7 June/11 July 1982, D. Horsfield.

Paratypes: 5 ♂ 6 ♀ same data as holotype except some from nearby site (Grid ref. 28/185731). 1 ♂ 3 ♀ Scotland, Flanders Moss (Grid ref. 26/623976) June 1981, J. M. Nelson. 9 ♂ England, Malham Tarn, North Yorkshire, (Grid. ref. 34/889672) June 1984, R. H. L. Disney. All in author's collection.

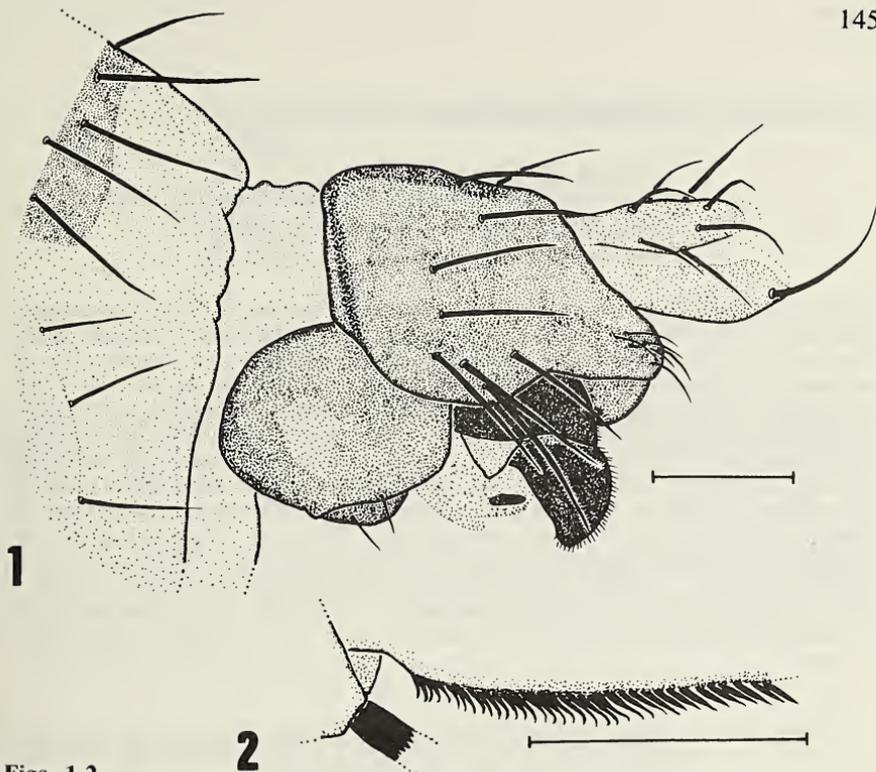
## Affinities:

*Megaselia horsfieldi* will key out to couplet 14 of "Abteilung IV, Erste Reihe" in Schmitz (1958). It is immediately distinguished from *M. digitalis* Schmitz and *M. trichorrhoea* Schmitz by the presence of bristles, as opposed to hairs, on the epandrium.

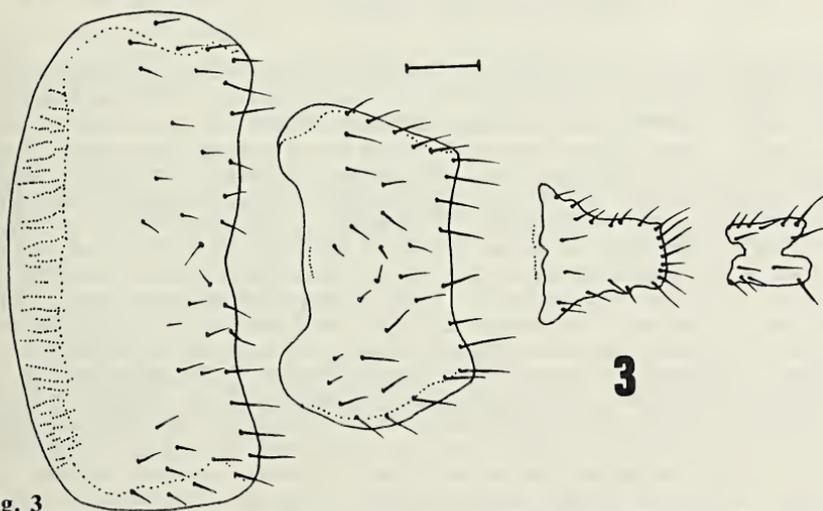
Specimens with longer costal cilia would key out to couplet 42 or 55 of "Abteilung IV, Zweite Reihe" in Schmitz and Beyer (1965). The recurved hairs at the base of the ventral hair palisade of the hind metatarsus, along with the details of the hypopygium, will distinguish *M. horsfieldi* from *M. valvata* and *M. hyalipennis* (Wood). Revisionary notes on these two species are reported elsewhere (Disney, in press).

## References

- DISNEY, R. H. L. 1984. Seven species of scuttle fly (Diptera:Phoridae) from Scotland - new to the British List. *Glasg. Nat.* 20: 415-419.
- DISNEY, R. H. L. In press. New synonyms in the *Megaselia dahli* complex (Diptera:Phoridae) and two species new to the British List. *Entomologist's Rec. J. Var.*
- SCHMITZ, H. 1958. In Lindner, E. (Ed.). *Die Fliegen der Palaearktischen Region* 33. *Phoridae*. Lief. 202: 465-512.
- SCHMITZ, H. and BEYER, E., 1965. *Ibid.* Lief 258, 260: 513-608.



**Figs. 1-2**  
*Megaselia horsfieldi* n. sp. male. 1 - Hypopygium viewed from left side. 2 - Anterior face of basal section of ventral hair palisade of hind metatarsus. (Scale bars = 0.1mm).



**Fig. 3**  
*Megaselia horsfieldi* n. sp. female - abdominal tergites 5-8. (Scale bar = 0.1mm).

## Book Reviews

### **Trees in the 21st Century**

A. B. Academic Publishers, Berkhamsted, 1983. 133p., monochrome plates, maps & line drawings. Paperback, ISBN 0 907360 01 7, £12.75

The first International Arboricultural Conference, sponsored by the Arboricultural Association and the International Association of Arboriculture, was held in the University of Sussex during August 1980. Contributions to the conference by various international experts are brought together in this publication. The title is somewhat misleading, in that past and present aspects of the subject are covered, rather than probable future developments. Of the twelve chapters, five deal with forest cover and evolution of landscape, four with trees in towns, and one each with arboricultural training, decay in trees, and reclamation of deserts. Little of the content is of direct concern to the situation in Scotland, but several of the chapters are of interest as background reading. The best of these is the first, in which the evolution of the British (mainly English) landscape is skilfully condensed into twenty pages – no mean feat. The book is illustrated with various diagrams, maps and black-and-white photographs, and it is unfortunate that the reproduction of some of these leaves much to be desired.

*IAIN C. CHRISTIE*

### **Collins Guide to the Birds of Prey of Britain & Europe, North Africa and the Middle East**

BENNY GENSBOL

Collins, London, 1986, 384 pp., many colour photographs and line drawings, maps  
ISBN 0 00 21976 8, £14.95.

There have been so many good books published on the birds of prey recently that one rather wonders if there is a need for yet another addition to the bookshelves. This Collins' guide does not add any new information – which is not expected in a guide – but it does condense much of the recent work on raptors in an admirable way. The book was originally published in Danish. The publishers have learnt from mistakes they made in other translated texts, and this one has been adapted well for British readers by Chris Mead. It covers all the birds of prey to be found in Europe, North Africa and the near East. There are good general introductory chapters on birds of prey, covering subjects such as migration, breeding and conservation problems. This is followed by species accounts, which are generally excellent. They include particularly clear distribution maps, summaries of past and present population sizes, habitat requirements, breeding biology and feeding techniques. A particularly attractive feature is the large number of photographs of birds in the wild, about half of them in colour, and some of which are quite outstanding. A final section gives a series of very good line drawings by Bjarne Bertel of birds in flight, and text to help with flight identification. The book is worth having for this section alone. In general this book provides an excellent summary and quick reference guide. It is a good buy for anyone wanting to have a handy general reference book on birds of prey. *DAVID C. HOUSTON*

## Lepidoptera in the West of Scotland 1985

Compiled by I. C. CHRISTIE

Gartlea, Caldervan by Alexandria

*Received September 1986*

The extraordinary pattern of weather experienced in the West of Scotland during 1985 was evident to the most casual observer. Stated briefly, and based on observations 13 miles N.W. of Glasgow, January, February and March each had a rainfall of less than 50mm, to give a 3 month total of only 131mm. April was wet during the first week, but thereafter mostly showery and cool, as were May and June. Rainfall for these 3 months totalled 215mm. After a dry start, July turned wet on the 5th, and from then until 11th October a continuous series of depressions crossed the country, giving 844mm of rain (over 33 inches) in 99 days. There were only 17 dry days, and the monotony was broken by little other than a spectacular thunderstorm and two spectacular floods. Much of the period was windy and cool, though warmer after mid-September. The remainder of October was anticyclonic and completely dry.

Following the dry summers of 1983 and 1984, and the very favourable first quarter of 1985, insect populations were at high levels in early summer, and prospects had seldom looked better for a coming season. However, the cool second quarter delayed development, so that by 5th July the season was running about 10 days later than usual, and after that date there was a rapid deterioration in conditions for all species requiring sunshine and warmth. Larval mortality was unusually great, and adults were deprived of food by sodden flowers and leaves washed clean of honeydew. At best, several favourable years will be required to restore populations to 1984 levels.

In this list of records, specific names and reference numbers are as in Bradley J.D. and Fletcher, D.S. 1979. *A Recorder's Log Book or Label List of British Butterflies and Moths*. Curwen Books, London.

Delete from 1984 list: 1193 *Eucosma tripoliana* (Barr.). examination of genitalia has shown this to be a misidentification.

- 38 *Ectoedemia subbimaculella* (Haw.), Garscadden, Drumchapel, V.C. 99, 16/11/85, (mines in oak leaves), RKJ.
- 48 *Trifurcula cryptella* (Stt.), Cathkin Braes, Glasgow, V.C. 77, larva collected 18/7/84, emerged May 1985, RKJ.
- 82 *Stigmella paradoxa* (Frey), Cart and Kittoch S.S.S.I., Glasgow, V.C. 77, 14/9/85, (vacated mine in Hawthorn leaf), RKJ.
- 129 *Incurvaria pectinea* Haw., Carnwath, Lanark, V.C. 77, 12/5/85, RKJ; Gartlea, Loch Lomond, V.C.99, 13/5/84, ICC.
- 163 *Adscita statices* (L.), (The Forester), Colony at Inver on Sound of Islay, Isle of Jura, V.C. 102, June 1985, NT. Other colonies have recently been found near the north tip of Jura, and on Garbh Eilach, V.C. 102; on the Isle of Mull, V.C. 103; and at three sites in the vicinity of Loch Feochan, V.C. 98.
- 179 *Solenobia lichenella* (L.), Kenmuir Bank, Glasgow, V.C. 77, 21/10/85, RKJ.
- 180 *Diplodoma herminata* (Geoff.), Black Lochs, Oban, V.C. 98, 5/7/85, (three), KPB.
- 229 *Monopis ferruginella* (Hub.), Possil, Glasgow, V.C. 77, 3/7/85, RKJ.
- 231 *Monopis imella* (Hub.), Pollok, Glasgow, V.C.76, 4/7/85, RKJ.
- 266 *Bucculatrix nigricomella* Zell., Rotten Calder, Glasgow, V.C. 77, 18/5/85, and Cowglen, Glasgow, V.C. 76, 26/5/85, (mines in Marguerite), RKJ.
- 267 *Bucculatrix maritima* Stt., Old Kilpatrick, V.C. 99, 23/6/85, (vacated mine in Sea Aster), RKJ.
- 274 *Bucculatrix ulmella* Zell., Bull Wood, Glasgow, V.C. 76, 27/10/85, (mines in oak leaves), RKJ.
- 351 *Phyllonorycter lautella* (Zell.), Paisley, V.C. 76, bred, emerged 17/4/85, JM; Bull Wood, Glasgow, V.C. 76, bred, emerged 26/5/86, RKJ.
- 395 *Glyphipterix haworthana* (Steph.), Meall nan Uan, Isle of Coll, V.C. 103, 22/7/85, (larvae in cottongrass), KPB.
- 416 *Argyresthia glaucinella* Zell., Rotten Calder, Glasgow, V.C. 77, collected 11/5/85, emerged 31/5/85, (three infected oak trunks found), RKJ.
- 470 *Orthotaelia sparganella* (Thun.), Carsluith, Wigtown Bay, V.C. 73, 27/7/83, RKJ.
- 517 *Coleophora frischella* (L.), Mugdock, Glasgow, V.C. 86, 8/7/83, RKJ.
- 518 *Coleophora spissicornis* (Haw.), Glasgow Zoo, V.C. 77, 8/7/83, (genitalia slide), RKJ.
- 526 *Coleophora laricella* (Hub.), Gartlea, Loch Lomond, V.C. 99, 19 and 23/6/85, ICC; Rowardennan, Loch Lomond, V.C. 86, 18/10/85, (larvae), ICC.

- 553 *Coleophora striatipennella* Nyl., Pollok Park, Glasgow, V.C. 76, 4/7/85, RKJ; Rotten Calder, Glasgow, V.C. 77, 13/7/84, (genitalia slides), RKJ.
- 565 *Coleophora saxicolella* Dup., (*benanderi* Kan.), Old Kilpatrick, V.C. 99, 28/7/85, RKJ; Yoker, Glasgow, V.C. 76, 24/7/84, RKJ; Dowanhill, Glasgow, V.C. 77, 26/7/81, RKJ.
- 578 *Coleophora murinipennella* (Dup.), Cart and Kittoch S.S.S.I., Glasgow, V.C. 77, 1/6/85, RKJ; Gartlea, Loch Lomond, V.C. 99, 12/6/79, ICC.
- 583 *Coleophora tamesis* Waters, Pollok Park, Glasgow, V.C. 76, 6/7/83, RKJ.
- 593 *Elachista regificella* Sirc., Gartlea, Loch Lomond, V.C. 99, larvae plentiful in *Luzula pilosa*, emerged 5/7 to 7/8/85, ICC.
- 624 *Biselachista trapeziella* Stt., Gartlea, Loch Lomond, V.C. 99, larvae in *Luzula sylvatica*, emerged 26/5 to 14/6/85, ICC; larvae at the following Glasgow sites in April 1985:— Waulkmill S.S.S.I., V.C. 76; Cart and Kittoch S.S.S.I., V.C. 77; Rotten Calder, V.C. 77, RKJ.
- 632 *Cosmiotes consortella* Stt., Ailsa Craig, V.C. 75, one during period 13/8 to 12/9/85, RKJ.
- 696 *Agonopterix propinquella* (Treit.), Ballantrae, V.C. 75, larvae on *Cirsium arvense*, emerged 3 to 8/9/85, RKJ; Oldhall, Paisley, V.C. 76, 30/10/85, JM.
- 704 *Agonopterix scopariella* (Hein.), Paisley, V.C. 76, 5/4/85 & 6/9/85, JM; Gartlea, Loch Lomond, V.C. 99, 9/3/78 & 7/11/83, ICC.
- 789 *Bryotropha domestica* (Haw.), Paisley, V.C. 76, 21/7/85, JM.
- 794 *Lita virgella* (Thun.), Cononish, Tyndrum, V.C. 87, 15/6/85, RKJ.
- 817 *Scrobipalpa clintoni* Pov., pupae were found in stems of *Rumex crispus* at the following sites during Spring 1985:— Kennedy's Pass, Girvan, V.C. 75; Old Kilpatrick and Cardross, V.C. 99; Erskine, V.C. 76; Southend, Kintyre, V.C. 101; all RKJ; Isle of Muck, V.C. 104; Kilmory, Ardnamurchan, V.C. 97, both RMD; also Carrick, Loch Goil, V.C. 98, 29/4/86, ICC.
- 826 *Caryocolum vicinella* (Dougl.), Bennane Head, Ballantrae, V.C. 75, 24/7/85, ICC; Ailsa Craig, V.C. 75, 11/9/82, RKJ.
- 843 *Approaerema anthyllidella* (Hub.) Cornaigbeg and Hogh Bay, Isle of Coll, V.C. 103, larvae collected 19 & 23/7/85, later emerged, KPB; Botanic Gardens, Glasgow, V.C. 77, 12/8/82, RKJ.
- 856 *Anarsia spartiella* (Schr.), Old Kilpatrick, V.C. 99, 23/7/84, RKJ; Carmyle, Glasgow, V.C. 77, 23/7/86, RKJ.
- 866 *Brachmia blandella* (Fab.), Dowanhill, Glasgow, V.C. 77, 15/7/82, RKJ.
- 893 *Mompha epilobiella* (D. & S.), Old Kilpatrick, V.C. 99, larva

- 28/7/85, emerged 31/8/85, RKJ; Cowglen, Glasgow, V.C. 76, pupa 28/8/85, emerged 17/9/85, RKJ.
- 898 *Limnaecia phragmitella*, Stt., Paisley Moss, V.C. 76, 12/7/85, (three), JM.
- 921 *Hysterosia inopiana* (Haw.), Possil, Glasgow, V.C. 77, 3/7/85, RKJ.
- 928 *Phalonidia permixtana* (D. & S.), Black Lochs, Oban, V.C. 98, 5/7/85, PB.
- 930 *Phalonidia alismana* (Rag.), Colony at Old Kilpatrick, V.C. 99, 1985, RKJ; also taken at Dawsholm, Glasgow, V.C. 99, 21/6/85, RKJ; Paisley, V.C. 76, 21/8/84, JM; Downahill, Glasgow, V.C. 77, 5/8/82, RKJ.
- 964 *Cochylis dubitana* (Hub.), Barrhead, Renfrewshire, V.C. 76, 4/6/85, JM.
- 1059 *Acleris abietana* (Hub.), Brodick, Isle of Arran, V.C. 100, 1985, (one), Derek Warner per RKJ.
- 1120 *Ancylis mitterbacheriana* (D. & S.), Carsluith, Wigtown Bay, V.C. 73, 7/7/84, RKJ; Gartlea, Loch Lomond, V.C. 99, 1/6/78 & 29/5/82, ICC.
- 1161 *Griselda stagnana* D. & S., Mull of Kintyre, V.C. 101, 2/6/85, RKJ.
- 1162 *Griselda myrtillana* (H. & W.), colony at Barrhead, Renfrewshire, V.C. 76, 4/6/85, JM.
- 1189 *Eriopsela quadrana* (Hub.), Bennane Head, Ballantrae, V.C. 75, 7/6/85, ICC; Glen Nant, Taynuilt, V.C. 98, 14/7/85, (larvae), ICC; Little Cumbrae, V.C. 100, 23/6/84, (larvae), ICC.
- 1236 *Pammene fasciana* (L.), Dawsholm, Glasgow, V.C. 99, 4 & 31/7/85, RKJ.
- 1286 *Dichrorampha sedatana* Busck, Rotten Calder, Glasgow, V.C. 77, 18/5/85, RKJ; Old Kilpatrick, V.C. 99, 23/6/85, ICC.
- 1287 *Dichrorampha aeratana* (P. & M.), Barrhead, Renfrewshire, V.C. 76, 4/6/85, (several), ICC.
- 1341 *Eudonia lineola* (Curt.), Bennane Head, Ballantrae, V.C. 75, 24/7/85, (two), ICC.
- 1348 *Parapoynx stratiotata* (L.), Black Lochs, Oban, V.C. 98, 6/7/85, (pupa, emerged late July), KPB.
- 1358 *Evergestis pallidata* (Huf.), Brodick, Isle of Arran, V.C. 100, 1985, (two), Derek Warner per RKJ.
- 1426 *Achroia grisella* (Fab.), Pollok Park, Glasgow, V.C. 76, 4/7/85, RKJ.
- 1434 *Cryptoblades gnidiella* (Mill.), Gartlea, Loch Lomond, V.C. 99, larva in pomegranate obtained locally, emerged 18/12/85, ICC.
- 1473 *Ephestia elutella* (Hub.), Gartlea, Loch Lomond, V.C. 99, one at light 5/7/85, several in outbuildings 9 to 17/8/85, ICC.
- 1476 *Ephestia cautella* (Walk), Paisley, V.C. 76, 29/3/85, two in food store, JM.

- 1510 *Pterophorus tridactyla* (L.), Craigton, Fintry, V.C. 86, 30/6/85, (two), RKJ.
- 1522 *Leioptilus tephradactyla* (Hub.), Bennane Head, Ballantrae, V.C. 75, 21/5/85, three larvae, emerged 22/6/85, ICC; Glen Nant, Taynult, V.C. 98, 11/10/85, two larvae, ICC; Rowardennan, Loch Lomond, V.C. 86, 25/7/79, ICC.
- 1754 *Eulithis prunata* (L.), (Phoenix), Barcaldine, Oban, V.C. 98, 24/8/85, JCAC.
- 1801 *Perizoma taeniatum* (Steph.), (Barred Carpet), Barcaldine, Oban, V.C. 98, 29/7 to 24/8/85, (eleven), JCAC.
- 1804 *Perizoma bifaciata* (Haw.), (Barred Rivulet), colony at Old Kilpatrick, V.C. 99, 1985, RKJ; colony at Meadowside, Glasgow, V.C. 77, 1985, RKJ; Barcaldine, Oban, V.C. 98, 8/8/82, JCAC.
- 1821 *Eupithecia valerianata* (Hub.), (Valerian Pug), Gartlea, Loch Lomond, V.C. 99, 22/6 to 4/7/85, (three at light), ICC.
- 1833 *Eupithecia expallidata* Doubl., (Bleached Pug), Glen Nant, Taynult, V.C. 98, 11/10/85, (several larvae), ICC.
- 1922 *Ourapteryx sambucaria* (L.), (Swallow-tailed), Barcaldine, Oban, V.C. 98, 25 & 28/7/85, JCAC.
- 1931 *Biston betularia* (L.), (Peppered Moth), Gartlea, Loch Lomond, V.C. 99, 3/7/85, one melanic male, and previously one on 17/6/77, out of many hundreds examined, ICC.
- 1992 *Deilephila porcellus* (L.), (Small Elephant Hawk), Gartlea, Loch Lomond, V.C. 99, 20/6 to 4/7/85, (three), ICC.
- 2047 *Eilema complana* (L.), (Scarce Footman), Mull of Kintyre, V.C. 101, larva taken 2/6/85, emerged 10/7/85, ICC.
- 2137 *Eurois occulta* (L.), (Great Brocade), Barcaldine, Oban, V.C. 98, 23/7/85, JCAC; Taynish, Knapdale, V.C. 101, larva eating Bog Myrtle, emerged 14/7/83, ICC.
- 2164 *Hecatera bicolorata* (Huf.), (Broad-barred White), Old Kilpatrick, V.C. 99, July 1985, many larvae on composite flowerheads, ICC.
- 2203 *Mythimna unipuncta* (Haw.), (White-speck), Barcaldine, Oban, V.C. 98, 16/10/85, JCAC.
- 2205 *Mythimna comma* (L.), (Shoulder-striped Wainscot), Gartlea, Loch Lomond, V.C. 99, 3 to 11/7/85, (eight), ICC.
- 2270 *Omphaloscelis lunosa* (Haw.), (Lunar Underwing), Torastan, Isle of Coll, V.C. 103, 8/9/85, ICC.
- 2288 *Acrionicta euphorbiae* (D. & S.) (Sweet Gale), Torastan and Greshipol, Isle of Coll, V.C. 103, (several larvae on *Salix aurita*), ICC; Barcaldine, Oban, V.C. 98, 30/5/81, JCAC.
- 2331 *Apamea unanimitis* (Hub.), (Small Clouded Brindle), Barcaldine, Oban, V.C. 98, 1/7/85, (two), JCAC.
- 2369 *Nonagria typhae* (Thun.), (Bulrush Wainscot), Black Lochs, Oban, V.C. 98, 6/7/85, (larvae in *Typha angustifolia*), ICC.
- 2391 *Chilodes maritimus* (Tausch.), (Silky Wainscot), Gartlea, Loch

Lomond, V.C. 99, 5/7/85, (one male at light), ICC.

### Contributors: –

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## Book Review

### Wildlife for Man

RICHARD FITTER

Collins, London, 1986. 223 pp., 20 colour plates, line drawings, glossary, bibliography. Hardback, ISBN 0 00 219442 2, £14.95.

This is a serious text dealing with the conservation of animals and plants throughout the world and, by means of numerous examples, illustrates the threats to wild-life in the present era. The approach is practical, not sentimental, and the importance of conserving wild-life not only for its own sake but also as a utilisable resource for mankind is fully stressed.

The book falls into two parts. Part I discusses the past and present of genetic resources under the following (abbreviated) headings: (1) Wildlife as a genetic resource, (2) Diversity of life, (3) Depletion, endangerment & extinction, (4) Assessment & monitoring, (5) Causes of depletion etc., (a) Overexploitation, (b) Habitat destruction. Part II deals with the future of genetic resources; topics are: (1) Maintaining ecosystems, (2) Maintaining stocks, (3) Sustainable utilisation of resources, (3) People & conservation, (4) Success stories of rebuilt stocks.

There is a useful glossary of International Institutions and of their hideous acronyms and a select bibliography. This reviewer would have welcomed text references to facilitate following up individual case histories and suspects that the excellent colour plates, which bear no real relation to the text, and the neat marginal drawings serve merely as window dressing. The space could have been utilised more usefully by using a larger font for the text.

All in all the book presents an overwhelming case for wild-life resource conservation and aspiring politicians and planners could, with profit, be given a copy and be required to pass an examination on its contents before being allowed to take office.

*RONALD M. DOBSON*

## **A Marine Survey of Loch Nevis and Loch Hourn, Western Scotland**

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*Received May 1985*

### **Introduction**

The shallow sublittoral waters of western Scotland have been the subject of a number of recent surveys which are contributing towards an evaluation of the conservation requirements of this marine environment. These surveys have been carried out by the Nature Conservancy Council, the Marine Conservation Society and individual universities. Most of this effort has centred around the Hebrides, whilst some parts of the mainland coast remain unexplored due to their inaccessibility from land. Loch Nevis and Loch Hourn are such areas and were chosen by the Biological Society of Queen's University, Belfast for an expedition undertaken between 8-19 July 1984, based on the MV "Tornamona".

Previous work in the area by McIntyre (1961) provides much useful hydrographic information from an investigation of the benthos at a single station at 100-120m in Loch Nevis. The present survey explores the shallower parts of the lochs, down to a maximum depth of 50m.

### **Survey area**

Both lochs are typically fiordic, share similar orientations (Figs. 1 and 2), and in common with most Scottish sea lochs, are supplied by no major rivers. In Loch Nevis a constriction of the sides and bottom divides the loch into deep inner and outer basins, joined by a shallow "narrows". Similar constrictions in Loch Hourn separate the outer basin from four smaller, inner basins.

The outer basins of both lochs and the inner basin of Loch Nevis have depths in excess of 100m. The inner basins of Loch

Hourn are all less than 50m deep. Across the mouth of Loch Nevis, but not Loch Hourn, lies a threshold bar, which rises to within 10m of the surface.

The sublittoral topography consists mainly of steep, sedimentary slopes. The sediment ranges from fine, soft mud in the upper reaches through to mixtures of muddy sand and gravel towards the mouths. Broken shell and shell gravel are common in many areas. These sediment slopes are frequently interrupted by extensive outcrops of bedrock, which are heavily silted unless near regions of appreciable current. Bedrock also outcrops to form islets and submerged pinnacles throughout the lochs. Boulder slopes are infrequent, though boulders, cobbles and pebbles are scattered over the surface of many sedimentary slopes.

The high hills surrounding the lochs, and the Isle of Skye to the west, shelter the lochs, especially the inner basins, from strong wave action. Tidal streams are generally weak, except over the threshold bar of Loch Nevis, and in the narrows of both lochs where currents of up to two knots occur. McIntyre (1961) found that bottom salinities at his Loch Nevis station ranged from 33·68 to 34·33‰. Salinities in the inner basins probably fall well below this during periods of heavy precipitation. Water temperatures during the survey ranged from 9°C at 50m to a maximum 16°C at the surface, with a distinct thermocline.

### Survey methods

Surveying was by SCUBA diving. Sites were selected to include as wide a range of environmental conditions and substrata as possible. Site records were made on Ulster Museum dive site record cards, each site being described in terms of topography, substrata, major biological features and the species present.

A number of shore sites along Loch Nevis were also briefly investigated.

### Results

The location of the sites surveyed is shown in Figures 1 and 2. A description of each site is given below. All depths are in metres below Chart Datum, and the figures in parentheses indicate the depth range surveyed. The numbers in the species list (S = shore of Loch Nevis) indicate the sites at which they were found. Voucher specimens are held by the Ulster Museum.

## Site descriptions

## Loch Nevis

- 1. Headland W. Eilean Maol.** 56°59.8' N 5°32.6' W  
Boulders to 2m with *Laminaria saccharina*, then a shallow slope of soft mud with some pebbles, shell debris and outcropping bedrock. *Amphiura filiformis* and *Philine aperta* common. (1-26m).
- 2. Bogha an Tachard.** 56°59.25' N 5°35.45' W  
Submerged rugged rock, with a few boulders and patches of muddy sand. *Ophiothrix fragilis* and *Ophiocomina nigra* common. (4-29m).
- 3. Bay S. of Bogha an Tachard.** 56°58.95' N 5°35.65' W  
Shallow slope of soft mud, with boulders and outcropping bedrock. *Turritella communis* and *Ophiocomina* very common. (3-29m).
- 4. Narrows.** 56°59.05' N 5°36.0' W  
Coarse shell sand/gravel with *Ensis arcuatus*. Occasional boulders and pebbles with many algae, particularly *Ulva lactuca* and *Porphyra miniata*. Bedrock bar across part of the narrows supports a dense growth of *Laminaria saccharina* and *L. hyperborea*. (1-8m).
- 5. Tarbet Bay.** 56°58.3' N 5°38.1' W  
Shallow slope of muddy sand grading into mud. (5-10m).
- 6. N.W. Eilean Beithe.** 56°59.3' N 5°38.25' W  
Shallow slope of muddy sand; shell debris and outcropping bedrock. *Turritella* frequent. Occasional *Nephrops norvegicus*, *Funiculina quadrangularis* and *Virgulina mirabilis*. (12-27m).
- 7. Braomisaig.** 56°59.5' N 5°38.7' W  
Boulder slope, with outcropping bedrock and patches of shell sand. *Clavelina lepadiformis* very common, *Protanthia simplex* and *Munida rugosa* frequent. (0-20m).
- 8. Creagan Eilean.** 57°01.14' N 5°41.15' W  
Boulders to 8m with *L. saccharina*; steep bedrock to 24m, then steep muddy gravel slope with occasional *Funiculina*. (3-38m).
- 9. Sgeir a'Ghail.** 57°00.85' N 5°43.20' W  
Steep bedrock slope, with some boulders and coarse shell gravel between boulders. *Munida* and *Asterias rubens* frequent. (3-31m).
- 10. S. Sgeirean Glasa.** 57°01.8' N 5°43.25' W  
Bedrock to 11m, with muddy gravel below. *Funiculina* and *Pennatula phosphorea* present. (10-26m).
- 11. S.E. Bogha Don.** 57°01.6' N 5°43.7' W  
Shallow gravelly sand slope with abundant shell debris. Gravelly mud and bedrock at 27m. *L. saccharina* to 14m, echinuran worms, *Amphiura filiformis*, and *Antedon bifida* frequent. (7-27m).
- 12. S. Rubha Raonuill.** 57°01.5' N 5°44.4' W  
Steep bedrock outcropping from a sandy gravel slope, with *Schizotricha frutescens*, *Crania anomala* and *Munida*. (13-27m).

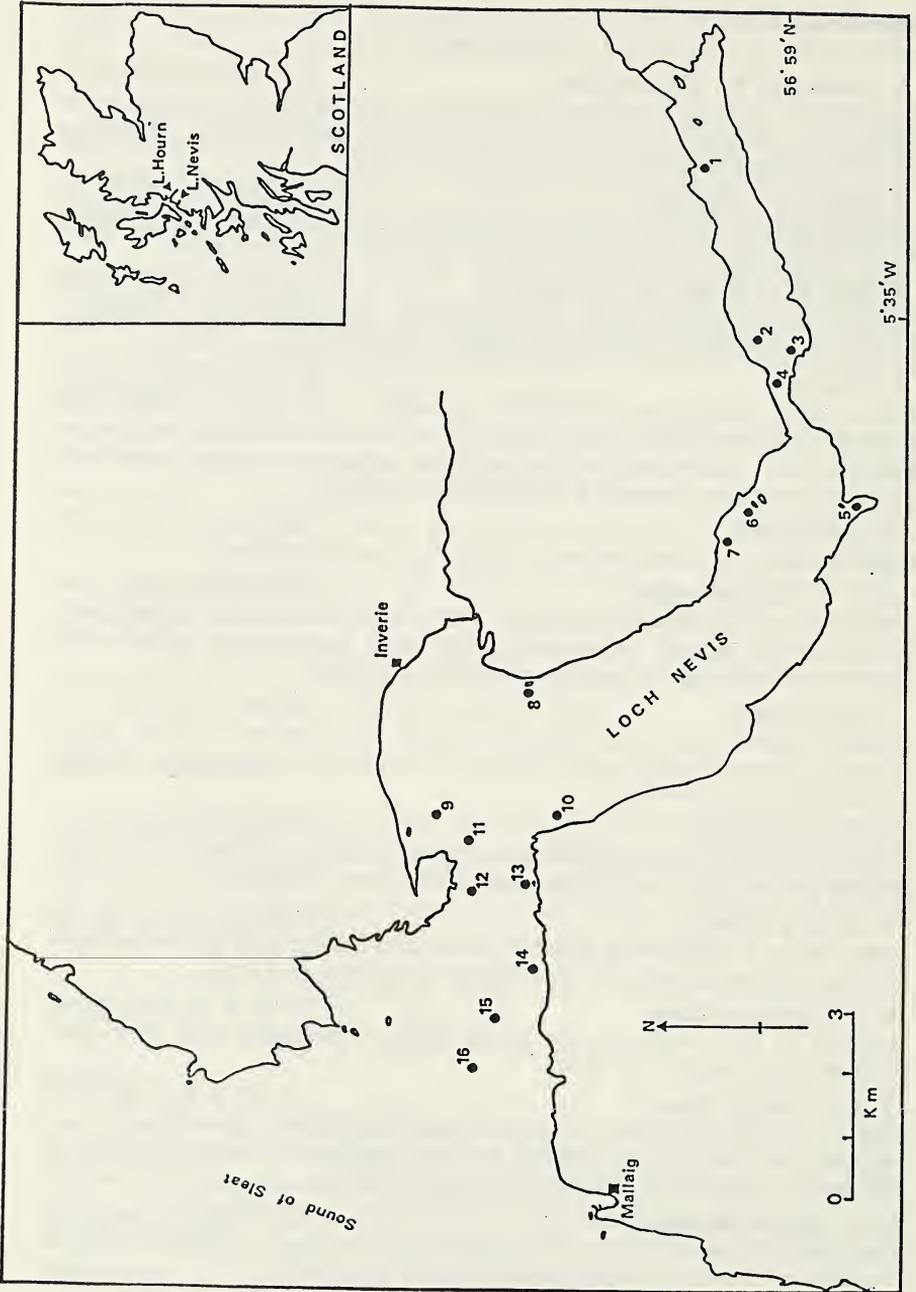


Figure 1: Location of the sites surveyed in Loch Nevis. Inset shows the position of Loch Nevis and Loch Hourn in Western Scotland.

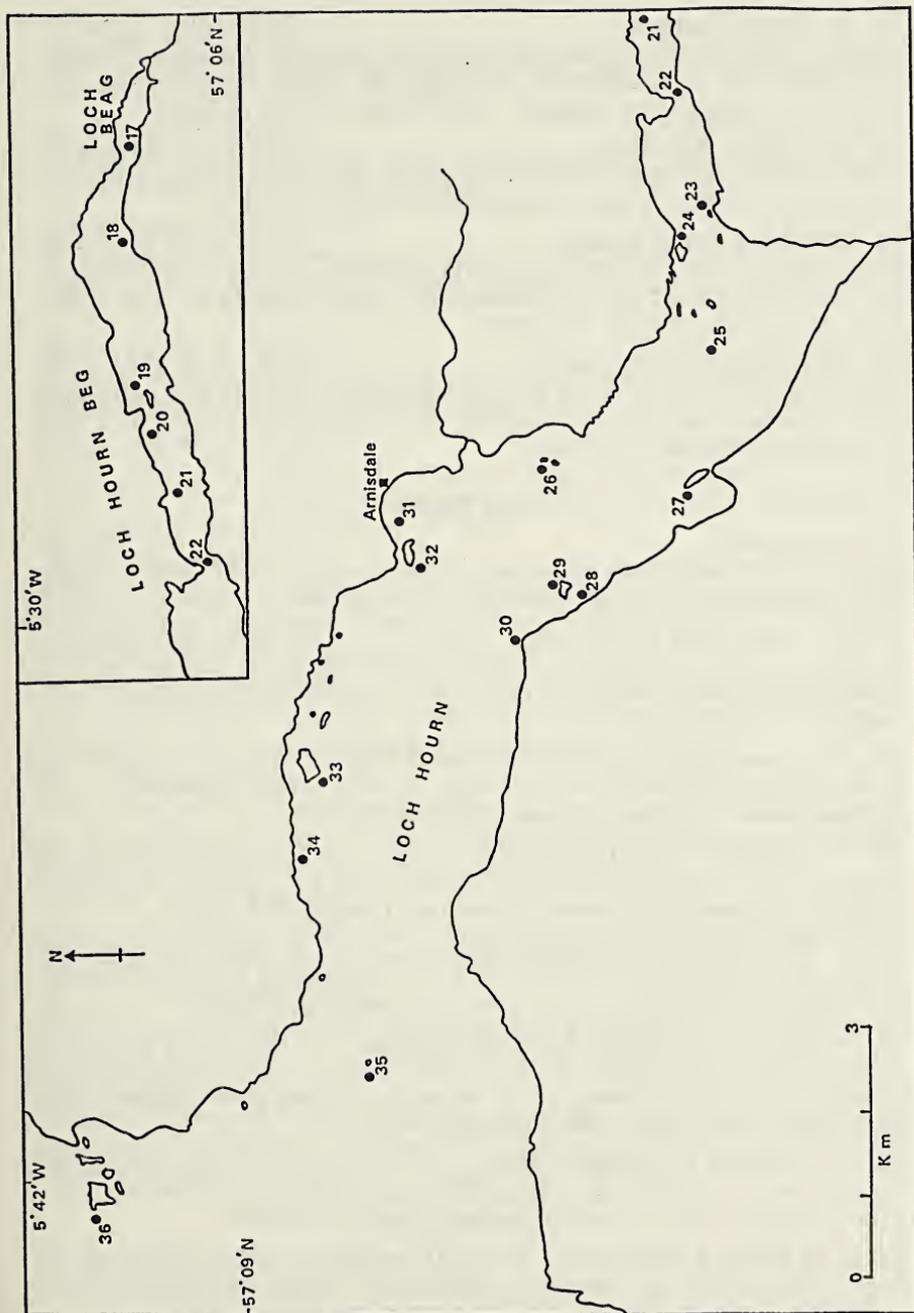


Figure 2: Location of the sites surveyed in Loch Hourn.

- 13. N. Eilean Giubhais.** 57°01.12' N 5°44.4' W  
Shallow slope of gravelly sand, with bedrock outcrop. *Cerianthus lloydii*, *Virgularia* and *L. saccharina* common on sand, *Ophiocomina* and *Ophiothrix* dominating bedrock. Noticeable current. (8-26m).
- 14. E. of Sròn Raineach.** 57°01.0' N 5°46.2' W  
Steep muddy sand slope with some shell gravel. Foliaceous algae to 16m. *Virgularia*, *Pennatula* and *Funiculina* present. (9-29m).
- 15. Threshold bar at mouth.** 57°01.43' N 5°46.3' W  
Rock sloping east and west from 10m to 23m, with gravel below. *L. saccharina* on top of bar; *Ophiothrix* and *Ophiocomina* on rock below kelp. Noticeable current. (10-23m).
- 16. Submerged rock at mouth.** 57°01.6' N 5°47.25' W  
Steep sloping rock, with top at 16m, and with boulders and cobbles in clefts. *Swiftia pallida* and *Axinella infundibuliformis* present; *Ciona intestinalis* common. (16-28m).

### Loch Hourn

- 17. Loch Beag.** 57°06.57' N 5°24.1' W  
Steep rock to 6m, with abundant *Mytilus edulis*. Soft mud to 18m; *Psammechinus miliaris* and *Echinocardium cordatum* common. (0-18m).
- 18. E. Upper Loch Hourn Beg.** 57°06.63' N 5°25.27' W  
Sandy mud at 1m, becoming soft mud deeper; bedrock and broken bedrock outcropping to 6m. *Amphiura filiformis* in mud and *Psammechinus* very common. (1-15m).
- 19. N. Island Rock, Upper Loch Hourn Beg.** 57°06.46' N 5°26.95' W  
Steep, rugged bedrock with fissures; heavily silted. *Ophiothrix* and *Ophiocomina* abundant, *Crania* common. (2-35m).
- 20. N.E. Middle Loch Hourn Beg.** 57°06.43' N 5°27.5' W  
Slope of fine mud, with steep rock walls near the narrows. *Amphiura chiajei* common; *Leptopentacta elongata* present. (1-15m).
- 21. N. side Middle Loch Hourn Beg.** 57°06.27' N 5°28.2' W  
Steep sandy mud slope with bedrock outcropping at 18m. *Ophiothrix*, *Cerianthus* and *Ascidia mentula* very common. (10-20m).
- 22. Narrows Caolas Mór, Loch Hourn Beg.** 57°06.05' N 5°29.0' W  
Rugged bedrock with a few pockets of shell gravel. Anthozoa and Bryozoa dominate the richly covered rock. *Metridium senile* very common. Red algae confined mainly to kelp stipes. (4-8m).
- 23. S.W. Lower Loch Hourn Beg.** 57°05.9' N 5°30.5' W  
Steep slope of coarse sand, with pebbles and cobbles., *Carcinus maenas*, *Hyas araneus* and *Liocarcinus puber* common. (0-28m).
- 24. E. of Eilean a'Gharb-Làin, Loch Hourn Beg.** 57°06.1' N 5°30.84' W  
Steep bedrock to 8m, levelling below to a sandy gravel bottom. *L. hyperborea* and encrusting red algae cover the rock. (2-8m).

- 25. Near Ellice Shoal.** 57°05.9'N 5°32.1'W  
Shallow plain of mud with occasional cobble. *Ascidrella aspersa* common, *Turritella* very common. (9-15m).
- 26. W. Sgeir Leathan.** 57°06.97'N 5°33.45'W  
Isolated bedrock pinnacles. *Antedon*, *Munida* and *Eupolymnia nebulosa* common; ascidians diverse. (10-31m).
- 27. W. Eilean a'Mhuineil.** 57°06.07'N 5°33.78'W  
Steep rugged bedrock with many vertical walls. Rather barren mud slope below 9-12m. Rock heavily silted; benthos fairly rich, particularly in sponges and ascidians. (0-27m).
- 28. S. Eilean a'Phiobaire.** 57°06.73'N 5°34.9'W  
Slope of muddy sand; some shell gravel and boulders. *Enteromorpha* sp. and *Liocarcinus puber* common. (0-5m).
- 29. N. Eilean a'Phiobaire.** 57°06.95'N 5°34.9'W  
Cliffs with overhangs and small caves to 6m, boulder slope to 24m and mud plain below. Boulders covered with ascidians, mainly *A. mentula* and *A. aspersa*; *Munida* common. (0-28m).
- 30. Rubha Ruadh.** 57°07.2'N 5°35.55'W  
Cliffs to 3m, then steep bedrock to beyond 37m, with some large patches of shell gravel. *Anemonia viridis* frequent on kelp; *Axinella* and *Diazona violacea* present on deep rock. (0-37m).
- 31. W. side Camas Ban.** 57°07.92'N 5°34.22'W  
Horizontal plain of muddy sand; some shell sand and shell debris. Ascidians, notably *A. mentula*, very common. (12m).
- 32. S. Eilean Tioram.** 57°07.85'N 5°34.5'W  
Steep slope of shell gravel and muddy coarse sand with broken bedrock. To the west of the island bedrock outcrops from shallow water to 36m. *Crania* and *Terebratulina retusa* frequent. (20-48m).
- 33. S.W. Eilean Ràrsaidh.** 57°08.55'N 5°37.2'W  
Bedrock to 6m, then steep slope of boulders set in shell gravel. *Ascidrella scabra*, and *Corella parallelogramma* frequent. (4-41m).
- 34. W. of Eilean Ràrsaidh.** 57°08.6'N 5°38.2'W  
Bedrock to 1m, boulders and cobbles to 4m, then muddy shell gravel slope with shell debris. *A. mentula* very common. (0-36m).
- 35. W. Sgeir Ulìbhe.** 57°08.26'N 5°40.65'W  
Rugged submerged rock with fissures and gullies; many pockets of gravel and sand. *Antedon* very common and *Leptometra celtica* frequent. Slope of muddy sand with *Virgularia* below 22m. (8-23m).

#### Sound of Sleat

- 36. W. Eilean Mór, Sandaig Islands.** 57°10.05'N 5°42.35'W  
Shallow sandy plain with occasional cobble; some shell debris. *Ensis arcuatus* very common. (18-31m).

**Species recorded****PORIFERA**

<i>Clathrina coriacea</i> (Montagu)	1,2,19,29,32,S
<i>Leucosolenia botryoides</i> (Ellis & Solander)	1,2,3,7,9,17-23,25-27,29, 30,32-34
<i>Scypha ciliata</i> (Fabricius)	1,2,8,9,15,18,21,22,24-27, 29,30,32,34
<i>Grantia compressa</i> (Fabricius)	22
<i>Pachymatisma johnstonia</i> (Bowerbank)	27,29,30
<i>Suberites carnosus</i> (Johnston)	1,3,6-9,11-13,19-21,24-27, 29,30,36
<i>Suberites domuncula</i> (Olivi)	5,9,14-16,21,24,29
<i>Polymastia boletiforme</i> (Lamarck)	16,27,30,35
<i>Cliona celata</i> Grant	14,16,17,21,22,26,27, 29-31,33-35
<i>Axinella infundibuliformis</i> (L.)	16,30,32
<i>Stelligera rigida</i> (Montagu)	27,30
<i>Raspailia hispida</i> (Montagu)	26,27,30
<i>Halichondria panicea</i> (Pallas)	24,28,30,S
<i>Halichondria bowerbanki</i> Burton	27, 29,34
<i>Amphilectus fucorum</i> (Esper)	8,19,25
<i>Myxilla incrustans</i> (Johnston)	19,20,22,23,27,29
<i>Hymedesmia paupertas</i> (Bowerbank)	18,19
<i>Haliclona clava</i> (Bowerbank)	19,27
<i>Dysidea fragilis</i> (Montagu)	17
<i>Aplysilla rosea</i> (Barrois)	32

**CNIDARIA**

<i>Cyanea capillata</i> (L.)	Widespread and abundant.
<i>Aurelia aurita</i> (L.)	Widespread and abundant.
<i>Rhizostoma octopus</i> (L.)	27
<i>Scyphistoma larvae</i>	33
<i>Tubularia indivisa</i> L.	13
<i>Hydractinia echinata</i> (Fleming)	1,18
<i>Rhizocaulus verticillata</i> (L.)	21,27,30
<i>Obelia geniculata</i> (L.)	4,15,24,27,30,33
<i>Hartlaubella gelatinosa</i> (Pallas)	3,22
<i>Lafoea dumosa</i> (Fleming)	2,9
<i>Lafoea</i> sp.	2
<i>Halecium beani</i> (Johnston)	14,33
<i>Halecium halecinum</i> (L.)	2,3,7,9,11,13,19,22,26, 27,29,30-32,34
<i>Diphasia rosacea</i> (L.)	22
<i>Sertularella gayi</i> (Lamouroux)	16,21,22,29,32

<i>Sertularella polyzonias</i> (L.)	22,27,35
<i>Amphisbetia operculata</i> (L.)	22
<i>Sertularia argentea</i> L.	14
<i>Kirchenpaueria pinnata</i> (L.)	1,2,9,11-15,18,21,23,25, 27,29,30,32,33,35,36
<i>Plumularia setacea</i> (Ellis & Solander)	12
<i>Halopteris catharina</i> (Johnston)	2,9,14,25,29,30
<i>Schizotricha frutescens</i> (Ellis & Solander)	12,25,35
<i>Nemertesia ramosa</i> Lamouroux	3,6,9,12-15,21,23,25-27, 29-31,33-36
<i>Nemertesia antennina</i> (L.)	3,6,9,13,14,36
<i>Thecocarpus myriophyllum</i> (L.)	16
<i>Sarcodictyon roseum</i> (Philippi)	32,33
<i>Alcyonium digitatum</i> L.	1,2,7,9,10,12-14,17-22, 24,25,29,30,33,35,36
<i>Swiftia pallida</i> Madsen	16
<i>Funiculina quadrangularis</i> (Pallas)	1,6,8-10,14,33
<i>Virgularia mirabilis</i> (Muller)	6,8,12-14,20,23,25,29,30, 33-35
<i>Pennatula phosphorea</i> L.	10,14
<i>Cerianthus lloydii</i> Gosse	1-3,5,6,8-11,13,14,16-18, 20-23,25-36
<i>Epizoanthus couchii</i> (Johnston)	19,20,27,30,32,35
<i>Protanthea simplex</i> Carlgren	2,6,7,17,18
<i>Actinia equina</i> (L.)	34,S
<i>Anemonia viridis</i> (Forsk.)	7,13,18,27-30,33
<i>Urticina felina</i> (L.)	22
<i>Urticina eques</i> (Gosse)	3,13
<i>Aureliania heterocera</i> (Thompson)	9,21
<i>Metridium senile</i> (L.)	2,13,18-20,22,23,35
<i>Sagartia elegans</i> (Dalyell)	2,19,22,30,35
<i>Actinothoe sphyrodeta</i> (Gosse)	19
<i>Sagartiogeton laceratus</i> (Dalyell)	20
<i>Adamsia carciniopados</i> (Otto)	3,8-12,16,29,33
<i>Peachia cylindrica</i> (Reid)	11,13,25
<i>Edwardsia claparedii</i> (Panceri)	1
<i>Caryophyllia smithii</i> Stokes & Broderip	6-8,11,15,16,27,29,30, 32-35

## PLATYHELMINTHES

<i>Notoplana atomata</i> (O.F. Muller)	9,15,16
<i>Prostheceraeus vittatus</i> (Montagu)	13
<i>Oligocladus sanguinolentus</i> (Quatrefages)	14
<i>Stylostomum ellipse</i> (Dalyell)	3

## NEMERTINEA

<i>Tubulanus annulatus</i> (Montagu)	8,9
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<i>Lineus ruber</i> O. F. Muller	S
<i>Micrura</i> sp.	14
<i>Amphiporus pulcher</i> (O. F. Muller)	13,23

**SIPUNCULA**

<i>Golfingia vulgaris</i> (de Blainville)	1
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**ECHIURA**

Echiuran sp.	11,13,21
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**ANNELIDA**

<i>Chaetopterus variopedatus</i> (Renier)	2,4,6,8,14,17,18,20,25,36
<i>Arenicola marina</i> (L.)	14,28
<i>Lipobranchius jeffreysii</i> (McIntosh)	1
<i>Aphrodite aculeata</i> L.	10
<i>Eunoe nodosa</i> (M. Sars)	14
<i>Harmothoe extenuata</i> (Grube)	8,15,17
<i>Harmothoe imbricata</i> (L.)	22
<i>Harmothoe spinifera</i> (Ehlers)	35
<i>Adyte pellucida</i> (Ehlers)	8,17
<i>Lepidonotus squamatus</i> (L.)	17,29
<i>Alentia gelatinosa</i> (M. Sars)	12,23
<i>Notophyllum foliosum</i> (M. Sars)	17
<i>Eteone</i> sp.	8
<i>Ophiodromus flexuosus</i> (delle Chiaje)	25
<i>Nereis pelagica</i> L.	8,31,35
<i>Platynereis dumerilii</i> (Audouin & M.-Edwards)	35
<i>Spinther oniscoides</i> Johnston	21
<i>Amphitrite</i> sp.	1,3,14,18,20,23,26,28
<i>Lanice conchilega</i> (Pallas)	1,4,13,18,23,25,30,31,36
<i>Eupolymnia nebulosa</i> (Montagu)	1-3,7-10,14,16-18,20,21, 23,24,26,29,31-35
<i>Sabella penicillus</i> L.	7,8,14,18,19,23,25,32,35
<i>Branchiomma bombyx</i> (Dalyell)	3
<i>Myxicola infundibulum</i> (Renier)	11,14,17,20,25,32
<i>Pomatoceros triquestra</i> (L.)	1,2,9,13,14,17-24,26-30, 32-36
<i>Protula tubularia</i> (Montagu)	1,8,10,11,17-21,26,28,29, 32,33
<i>Spirorbis</i> sp.	22,29,S

**CRUSTACEA**

<i>Scalpellum scalpellum</i> (L.)	35
<i>Balanus crenatus</i> Brugiere	4,18,22,24,31,34-36
<i>Idotea</i> sp.	S

<i>Astacilla longicornis</i> (Sowerby)	14,36
<i>Jaera albifrons</i> Leach	S
<i>Ligia oceanica</i> (L.)	S
<i>Thoralus cranchi</i> (Leach)	26
<i>Pandalus montagui</i> Leach	24
<i>Nephrops norvegicus</i> (L.)	1,6,20
<i>Homarus gammarus</i> (L.)	9,17,33
<i>Palinurus elephas</i> Fabricius	27
<i>Munida rugosa</i> (Fabricius)	1,3,6-9,11-16,21,24-27, 29-35
<i>Galathea intermedia</i> Lilljeborg	9
<i>Galathea nexa</i> Embleton	2,9,19
<i>Galathea squamifera</i> Leach	1,14
<i>Galathea strigosa</i> (L.)	14,23,29
<i>Porcellana longicornis</i> (L.)	9,16,33
<i>Pagurus bernhardus</i> (L.)	1-11,13-23,25-29,32-34,S One crab occupying shell with <i>Adamsia</i> <i>carciniopados</i> .
<i>Pagurus cuanensis</i> Thompson	9,23,26,29
<i>Pagurus prideauxii</i> (Leach)	3,8-12,16,29,33
<i>Pagurus pubescens</i> Kroeyer	9,16 With <i>Suberites</i> <i>domuncula</i> on shell.
<i>Anapagurus hyndmanni</i> (Bell)	3,13
<i>Anapagurus chiroacanthus gracilis</i> Fenizia	26,27
<i>Anapagurus laevis</i> (Bell)	26
<i>Ebalia tumefacta</i> (Montagu)	14
<i>Liocarcinus puber</i> (L.)	1-6,9,11,13,14,17,22-24, 26-31, 34-36
<i>Liocarcinus depurator</i> (L.)	1,4-7,9,11,13,14,20,23-25, 27,28,32-35
<i>Carcinus maenas</i> (L.)	1,3-5,7,11,14,17-20, 22-24,26-29,32,34,S
<i>Cancer pagurus</i> L.	2-4,6,7,9,11-13,21-24,26, 28-34,36
<i>Hyas araneus</i> (L.)	1,2,5,17,19,20,22-24,27, 29
<i>Hyas coarctatus</i> Leach	8,12-14
<i>Inachus dorsettensis</i> (Pennant)	13,14,20,21,23,25,32,35,36
<i>Inachus phalangium</i> (Fabricius)	22
<i>Macropodia rostrata</i> (L.)	11,14,23-26,31,34

## MOLLUSCA

<i>Neomenia carinata</i> Tullberg	9
<i>Lepidopleurus asellus</i> (Gmelin)	8,9,12,18,19,21,29,32,36
<i>Tonicella marmorea</i> (Fabricius)	3,9,11,18,19,21,32
<i>Emarginula reticulata</i> Sowerby	16,36

<i>Acmaea testudinalis</i> (O.F. Muller)	3,9,11,17,20,26,35
<i>Acmaea virginea</i> (O.F. Muller)	21,25
<i>Patina pellucida</i> (L.)	28
<i>Patella vulgata</i> L.	S
<i>Calliostoma zizyphinum</i> (L.)	4,7,9-11,13-16,22-24,26, 28-30,32-36
<i>Gibbula cineraria</i> (L.)	1,2,7,9,11,13,14,16,18,19, 22,23,26-30,33,35,S
<i>Gibbula magus</i> (L)	9,11,23,35,36
<i>Gibbula tumida</i> (Montagu)	9,16,21,31
<i>Littorina littorea</i> (L.)	S
<i>Littorina littoralis</i> agg.	S
<i>Littorina saxatilis</i> agg.	S
<i>Turritella communis</i> Risso	1,3,6,10,14,25,26,29,32,34
<i>Aporrhais pespelecani</i> (L.)	8,9,20,26
<i>Capulus ungaricus</i> (L.)	11
<i>Velutina velutina</i> (O.F. Muller)	14,19,35
<i>Trivia arctica</i> (Pulteney)	7-9,12,16,22,27,30
<i>Nucella lapillus</i> (L.)	S
<i>Neptunea antiqua</i> (L.)	13,14
<i>Buccinum undatum</i> L.	5,6,10,12,13,17,18,20,24, 34,S
<i>Philine aperta</i> (L.)	1,5,20,21,25,29,31,34
<i>Philine pruinosa</i> (Clark)	8,14
<i>Aplysia punctata</i> Cuvier	8-11,15,29-31,34,35
<i>Stiliger bellulus</i> (d'Orbigny)	14
<i>Elysia viridis</i> (Montagu)	29,33
<i>Tritonia lineata</i> Alder & Hancock	35
<i>Dendronotus frondosus</i> (Ascanius)	13
<i>Doto coronata</i> agg. (Gmelin)	1,3,9
<i>Doto tuberculata</i> seg. Lemche	16
<i>Doto dunnei</i> Lemche	1,2,12,14,21,25,36
<i>Goniodoris castanea</i> Alder & Hancock	29
<i>Acanthodoris pilosa</i> (O. F. Muller)	17,29
<i>Onchidoris bilamellata</i> (L.)	1,3,9,12,14-16
<i>Diaphorodoris luteocincta</i> (Sars)	14
<i>Polycera quadrilineata</i> (Muller)	1
<i>Polycera faeroensis</i> Lemche	27
<i>Limacia clavigera</i> (O. F. Muller)	3,14,15,33,35
<i>Cadlina laevis</i> (L.)	15,19
<i>Archidoris pseudoargus</i> (Rapp)	1,3,9,35
<i>Antiopella cristata</i> (Chiaje)	7,9
<i>Coryphella pedata</i> (Montagu)	15
<i>Coryphella browni</i> Picton	32
<i>Facelina bostoniensis</i> (Couthouy)	18,20,23,S
<i>Eubranchus cingulatus</i> (Alder & Hancock)	1
<i>Eubranchus exiguus</i> (Alder & Hancock)	1

<i>Cuthona concinna</i> (Alder & Hancock)	2
<i>Cuthona caerulea</i> (Montagu)	3
<i>Nucula sulcata</i> Bronn	21,31
<i>Mytilus edulis</i> L.	17,20,22,S
<i>Modiolarca tumida</i> (Hanley)	21,29,31
<i>Modiolus modiolus</i> (L.)	19
<i>Pecten maximus</i> (L.)	1-3,7,8,11,13,14,16,20-23, 25-27,29-34,36
<i>Aequipecten opercularis</i> (L.)	2,3,8-13,17,18,20,22,23, 26,29,32,33
<i>Palliolum striatum</i> (Muller)	23
<i>Chlamys distorta</i> (da Costa)	2,8-10,14,15,23,28,29,33
<i>Chlamys nivea</i> (Macgillivray)	23,31
<i>Chlamys varia</i> (L.)	9,17,18,20,21,26,31,34
<i>Limaria hians</i> (Gmelin)	2,9
<i>Pododesmus patelliformis</i> (L.)	3
<i>Pododesmus squama</i> (Gmelin)	1,2,17-21,23,25,29,32-35
<i>Pododesmus squamula</i> (L.)	19
<i>Astarte sulcata</i> agg. (da Costa)	12,36
<i>Parvicardium ovale</i> (G. B. Sowerby)	35
<i>Ensis arcuatus</i> (Jeffreys)	4,13,18,23,33,36
<i>Arctica islandica</i> (L.)	3
<i>Circomphalus casina</i> (L.)	16
<i>Dosinia exoleta</i> (L.)	22
<i>Mya truncata</i> L.	5,13,14,20,23,29
<i>Hiatella arctica</i> (L.)	7,9,16,19-21,23,25,26,32
<i>Rossia macrosoma</i> (delle Chiaje)	6,14
<i>Eledone cirrhosa</i> (Lamarck)	Loch Nevis

## BRACHIOPODA

<i>Crania anomala</i> (O. F. Muller)	1,7-9,12,16,18,19,29,30, 32,33
<i>Terebratulina retusa</i> (L.)	8,16,26,27,29,30,32

## BRYOZOA

<i>Alcyonidium gelatinosum</i> (L.)	11,13,16,23,26,29,30
<i>Parasmittina trispinosa</i> (Johnston)	2,9,35
<i>Porella compressa</i> (Sowerby)	16,32
<i>Omalosecosa ramulosa</i> (L.)	8-10,12,14-16,33
<i>Membranipora membranacea</i> (L.)	22,23,26,28,31,33,35,S
<i>Electra pilosa</i> (L.)	17,22,23,26,28,33,35
<i>Scrupocellaria scruposa</i> (L.)	9,14,21-23,29,30
<i>Bugula avicularia</i> (L.)	2,9
<i>Bugula flabellata</i> (Thompson)	22

## ECHINODERMATA

<i>Antedon bifida</i> (Pennant)	1-3,6-9,11-16,21,23-27,29-35
<i>Leptometra celtica</i> (Barrett & McAndrew)	11,13,35
<i>Astropecten irregularis</i> (Pennant)	3,9,11,13,14,23,29,36
<i>Luidia ciliaris</i> (Philippi)	9,13-16,21,25,26,29,30,32-36
<i>Porania pulvillus</i> (O. F. Muller)	7,9,12,15,16,26,27,29-33,35
<i>Anseropoda placenta</i> (Pennant)	8,21,25
<i>Solaster endeca</i> (L.)	3,9,11,13,15,21,23-25,34
<i>Crossaster papposus</i> (L.)	2,3,6-9,13,15,16,19,21-23,25-27,29,30,32,35,36
<i>Henricia oculata</i> (Pennant)	1-3,6-9,11,13,16,18,19,21-23,25-30,32-35
<i>Asterias rubens</i> L.	1-14,16-20,22,23,25-30,32,33,35,S
<i>Leptasterias mulleri</i> (M. Sars)	S
<i>Marthasterias glacialis</i> (L.)	2,7-9,11,13,16,24,26-30,32-36
<i>Ophiothrix fragilis</i> (Abildgaard)	1-3,7-10,12-21,23,25,26,29,33,35
<i>Ophiocomina nigra</i> (Abildgaard)	2,3,8,10-13,15,19,21,24,26,34
<i>Ophiopholis aculeata</i> (L.)	7-9,14,16,29,33
<i>Amphiura chiajei</i> Forbes	3,20,35
<i>Amphiura filiformis</i> (O. F. Muller)	1,11,18
<i>Amphiura</i> sp.	17,25
<i>Ophiura ophiura</i> L.	Specimens not collected
<i>Ophiura albida</i> Forbes	5,17,18,20
<i>Ophiura affinis</i> Lütken	2-4,6,8,9,11,13,14,16-18,20,23,26,32,35
<i>Psammechinus miliaris</i> (Gmelin)	7,8,13,26
<i>Echinus esculentus</i> L.	9,10,17-21,23,26,36
<i>Echinocardium cordatum</i> (Pennant)	1-9,11,13,14,16,19,22-27,29,30,32-36
<i>Leptopentacta elongata</i> (Duben & Koren)	17
<i>Pawsonia saxicola</i> (Brady & Robertson)	20
<i>Ocnus brunneus</i> (Forbes M.S. in Thompson)	2,14,16,22,35
<i>Thyone roscovita</i> Herouard	27
	15,16

## TUNICATA

<i>Clavelina lepadiformis</i> (Muller)	2-4,7-9,12,14-20,22,24-30,32-35
<i>Polyclinum aurantium</i> M. – Edwards	2,26,27,29,30,32,35

<i>Aplidium nordmanni</i> (M.-Edwards)	35
<i>Aplidium punctum</i> (Giard)	2,4,26,30,35
<i>Didemnid</i> sp.	22,29,35
<i>Ciona intestinalis</i> (L.)	3,7,9,10,12,15-21,24,26, 27,29,30,32,33,35
<i>Diazona violacea</i> Savigny	15,16,27,29,30
<i>Corella parallelogramma</i> (Muller)	1,9,14,18-21,23,24,26,27, 29,30,33,35
<i>Asciidiella aspersa</i> (O. F. Muller)	1,2,5-7,9,11,20,25-29,31, 34,35
<i>Asciidiella scabra</i> (O. F. Muller)	18,21,23,25,27,29-33,35
<i>Ascidia mentula</i> O. F. Muller	1-3,5-14,16,18,19,21,24, 26,27,29-35
<i>Ascidia conchilega</i> O. F. Muller	2,9,11,13
<i>Ascidia virginea</i> O. F. Muller	2,8,9,12,14,15,17-21, 25-27,29,30,31,33,35
<i>Polycarpa pomaria</i> (Savigny)	3,6,9,19,25-27,29,30,32,33
<i>Polycarpa gracilis</i> Heller	27,29
<i>Polycarpa rustica</i> (L.)	9,29,33
<i>Dendrodoa grossularia</i> (van Beneden)	17,18,20,23,25
<i>Botryllus schlosseri</i> (Pallas)	9,13,15,16,22,26-30,33,35
<i>Botrylloides leachi</i> (Savigny)	2,3,10,12,14,15,17,18,20, 22,26,28,29,34
<i>Boltenia echinata</i> (L.)	27
<i>Pyura tessellata</i> (Forbes)	19,29,35
<i>Pyura squamulosa</i> (Alder)	2,9,17,29
<i>Pyura microcosmos</i> (Savigny)	35
<i>Molgula manhattensis</i> (De Kay)	9,30,32,33
<i>Molgula citrina</i> Alder & Hancock	14

## CHONDRICHTHYES

<i>Scyliorhinus canicula</i> (L.)	8,11,14,18,21,25,32,34
<i>Scyliorhinus stellaris</i> (L.)	31

## OSTEICHTHYES

<i>Anguilla anguilla</i> (L.)	S
<i>Diplecogaster bimaculata</i> (Bonnaterre)	12,23
<i>Lophius piscatorius</i> (L.)	17
<i>Gadus morhua</i> L.	28
<i>Trisopterus minutus</i> (L.)	24
<i>Pollachius pollachius</i> (L.)	9,17,29
<i>Pollachius virens</i> (L.)	14,29
<i>Zeus faber</i> L.	9
<i>Syngnathus acus</i> L.	14
<i>Myxocephalus scorpius</i> (L.)	14
<i>Taurulus bubalis</i> (Euphrasen)	18,22,28
<i>Labrus mixtus</i> L.	3,7,9,16,33

<i>Labrus bergylta</i> Ascanius	33
<i>Ctenolabrus rupestris</i> (L.)	22,29,33
<i>Crenilabrus melops</i> (L.)	28
<i>Chirolophis ascanii</i> (Walbaum)	13,18,21
<i>Pholis gunnellus</i> (L.)	1,7,9,17,18,21-26,30,33, 36,S
<i>Zoarces viviparus</i> (L.)	17
<i>Ammodytes tobianus</i> L.	11
<i>Callionymus lyra</i> L.	1,9,11,18,23
<i>Thorogobius ephippiatus</i> (Lowe)	18,29,30,33
<i>Gobiosculus flavescens</i> (Fabricius)	17,33
<i>Pomatoschistus pictus</i> (Malm)	1,4,5,18
<i>Pomatoschistus minutus</i> (Pallas)	1,17,18,20,23,26,31
<i>Pleuronectes platessa</i> L.	18,25,28
<i>Limanda limanda</i> (L.)	14

## RHODOPHYTA

<i>Bonnemaisonia asparagoides</i> (Woodw.) C.Ag.	4,14,23,25-27,32,35
<i>Trailiella</i> (tetrasp. <i>B.hamifera</i> Hariot)	4,22,27,32,35
<i>Halarachnion ligulatum</i> (Woodw.) Kutz.	25
<i>Polyides rotundus</i> (Huds.) Grev.	4,29,31
<i>Calliblepharis ciliata</i> (Huds.) Kutz.	25-27
<i>Plocamium cartilagineum</i> (L.) Dixon	4,22,25,32
<i>Phyllophora crispa</i> (Huds.) Dixon	10,21,25,26,31,32,35
<i>Corallina officinalis</i> L.	27-29
Coralline crusts	2,4,7,9,17,18,20,21,24, 27-30,32,35,S
<i>Phymatolithon calcareum</i> (Pall.) Adey & McKibbin	12,36
<i>Dilsea carnosa</i> (Schmidel) O. Kuntze	4
<i>Dudresnaya verticillata</i> (With.) Le Jol.	29
<i>Callophyllis laciniata</i> (Huds.) Kutz.	4,22,25,27,35
<i>Kallymenia reniformis</i> (Turn.) J.Ag.	9,22,25,29
<i>Palmaria palmata</i> (L.) O. Kuntze	4
<i>Lomentaria clavellosa</i> (Turn.) Gaill.	14
<i>Antithamnion plumula</i> (Ellis) Thur. in Le Jol.	4
<i>Antithamnion cruciatum</i> (C.Ag.) Näg.	22
<i>Griffithsia corallinoides</i> (L.) Batt.	14
<i>Ptilota plumosa</i> (Huds.) C.Ag.	4,22
<i>Cryptopleura ramosa</i> (Huds.) Kylin ex Newton	4,5,14,22,26,35
<i>Delesseria sanguinea</i> (Huds.) Lamour.	4,22,25,27,29,30,32,35
<i>Hypoglossum woodwardii</i> Kütz.	14,25
<i>Membranoptera alata</i> (Huds.) Stackh.	22
<i>Nitophyllum punctatum</i> (Stackh.) Grev.	4,9,25

<i>Phycodrys rubens</i> (L.) Batt.	14,17-19,22,23,25,35
<i>Heterosiphonia plumosa</i> (Ellis) Batt.	6,9,22
<i>Brongniartella byssoides</i> (Good.et Woodw.) Schmitz	14,22
<i>Polysiphonia elongata</i> (Huds.) Spreng.	14
<i>Polysiphonia lanosa</i> (L.) Tandy	S
<i>Polysiphonia nigra</i> (Huds.) Batt.	4
<i>Polysiphonia nigrescens</i> (Huds.) Grev.	4
<i>Polysiphonia</i> sp.	4
<i>Pterosiphonia parasitica</i> (Huds.) Falkenb.	22,26
<i>Porphyra miniata</i> (C. Ag.) C. Ag.	4

## PHAEOPHYTA

<i>Acrothrix gracilis</i> Kylin	1
<i>Spermatochnus paradoxus</i> (Roth) Kütz	32
<i>Asperococcus fistulosus</i> (Huds.) Hook.	1
<i>Desmarestia aculeata</i> (L.) Lamour.	4,8,9,14,23,27,35
<i>Desmarestia ligulata</i> (Lightf.) Lamour	14
<i>Desmarestia viridis</i> (O. F. Müll.) Lamour	23
<i>Sporochnus pedunculatus</i> (Huds.) C.Ag.	23
<i>Chorda filum</i> (L.) Stackh.	1,4,9,18,27,33
<i>Laminaria digitata</i> (Huds.) Lamour	S
<i>Laminaria hyperborea</i> (Gunn.) Fosl.	2,4,14,19,22,24,34,35
<i>Laminaria saccharina</i> (L.) Lamour.	1,4,6-9,11,13,15,17-20,23, 25,27-30,32-36
<i>Saccorhiza polyschides</i> (Lightf.) Batt.	13
<i>Dictyota dichotoma</i> (Huds.) Lamour.	1,4,6,8,9,27,29,30,32,33, 35
<i>Ascophyllum nodosum</i> (L.) Le Jol.	S
<i>Fucus vesiculosus</i> L.	S
<i>Pelvetia canaliculata</i> (L.) Dcne. et Thur.	S
<i>Halidrys siliquosa</i> (L.) Lyngb.	2,4,19,27,33

## CHLOROPHYTA

<i>Enteromorpha</i> sp.	4,28
<i>Ulva lactuca</i> L.	4,22
<i>Cladophora rupestris</i> (L.) Kutz.	S

## LICHENES

<i>Verrucaria maura</i> Wahlenb.	S
<i>Caloplaca marina</i> (Weddel) Zahlbr.	S
<i>Lecanora atra</i> (Hudson) Acharius	S

## Discussion

The survey records the benthic flora and fauna in the shallow sublittoral regions of Loch Nevis and Loch Hourn. Infaunal species, in particular the annelids and molluscs, though of importance to the ecosystem of the lochs, have received little attention here since they are best sampled by grab or dredge. Moreover this element of the benthos was investigated in a previous study of Loch Nevis (McIntyre 1961).

Communities on both soft and hard substrata, and on the shore, reflect the change from the extremely sheltered conditions in the upper basins through to the mouths where there is some, though still only moderate, exposure to wave action. This coupled with the lack of strong tidal currents throughout much of the two lochs results in a predominance of muddy sediments and silted rocks. The range of species present, and the paucity of epibenthos in some areas, reflect these low energy, silt dominated conditions.

In areas of fine mud, *Nephrops norvegicus* and the opisthobranch *Philine aperta* are found, whilst the coarser range of sediments support a variety of populations including the sea pens *Virgularia mirabilis* and *Funiculina quadrangularis*, the anemone *Cerianthus lloydii*, the scallop *Pecten maximus*, and the polychaete worms *Chaetopterus variopedatus* and *Lanice conchilega*. All areas of bedrock, particularly in the upper basins, are poorly colonised. However, certain species, notably the polychaete tube worm *Pomatoceros triquestra*, the saddle oyster *Pododesmus squama*, the brachiopod *Crania anomala* and the anemone *Protanthia simplex*, are characteristic of the otherwise barren bedrock. Towards the more exposed mouths small numbers of the sea fan *Swiftia pallida*, the sponge *Axinella infundibuliformis* and the ascidian *Diazona violacea*, are present on rock.

Increased water movement produces a noticeable change in the composition of the benthos. Where currents of about one knot occur, large populations of the brittle stars *Ophiothrix fragilis* and *Ophiocomina nigra* dominate the fauna (sites 2,13,15,19). In the narrows (sites 4,22) stronger currents and less silty conditions on the rocks give rise to a richer growth of epibenthos than is found elsewhere.

The level of turbidity in the water is probably important in influencing the lochs' algal communities. *Laminaria saccharina* is the predominant kelp, whilst *L. hyperborea* is found only at sites

exposed to some current or wave action. The diversity and abundance of foliaceous red algae is extremely low, increasing only slightly towards the loch mouths, and in the narrows. The algal component under the kelp consists mainly of brown algae, rather than red, the most common being *Desmarestia aculeata* and *Dictyota dichotoma*.

During the survey, several species of particular interest were found. The nudibranchs *Tritonia lineata*, *Doto tuberculata*, *Goniodoris castanea*, and *Coryphella pedata* and the saddle oyster *Pododesmus squama* have not previously been noted from the Minch Sea Area (Seaward 1982). The opisthobranchs *Stiliger bellulus* and *Philine pruinosa* are rather rare in the British Isles, though both are previously recorded from this Sea Area.

The feather star *Leptometra celtica* has been recently found in shallow water (<30m) in the Inner Hebrides (Picton *et al.* 1982). This survey confirms its presence in shallow water, where it may previously have been confused with the much commoner *Antedon bifida*. The anemone *Aureliania heterocera* and the sea cucumber *Thyone roscovita* have only recently been recorded from western Scotland (Mitchell *et al.* 1983). Records here extend the northern limit of their distribution.

The finding of *Pagurus bernhardus* in association with *Adamsia carciniopados* is extremely unusual as *Adamsia* normally lives in an obligatory association with *Pagurus prideauxii*. Also of interest are off-white slimy mats, up to 3cm in diameter, which are common on and under the mud's surface at a number of sites. These are thought to be of bacterial origin and have been reported from other lochs (C. Lumb pers. comm.).

The number and range of species found in each loch compare favourably with that from similar surveys in the Inner Hebrides (e.g. Mitchell *et al.* 1983, Picton *et al.* 1982), though the two lochs would appear to have fewer species of red algae, sponges and bryozoans.

## Acknowledgments

Our thanks to: Queen's University Belfast Biological Society members R. Breadon, D. Dunlop, N. Elliott, M. I. Marshall, T. McNally, M. Millar, C. O'Reilly and M. Roulston, for their enthusiastic contribution to the survey; the crew of the MV "Tornamona"; C. M. Howson, C. A. Maggs, R. L. Manuel and B. E. Picton for help with identification of specimens; Queen's

University Zoology Department and Sub-Aqua Club and the Ulster Museum for use of facilities, and Queen's University Games Fund for financial aid.

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## Book Review

### **Shorebirds: an Identification Guide to the Waders of the World**

PETER HAYMAN, JOHN MARCHANT & TONY PRATER

Croom Helm, 1986, 412 pp., 88 colour plates, line drawings, distribution maps. Hardback, ISBN 0 7099 2034 2, £19.95.

A most useful guide to the world's waders, covering all seasonal and age categories and, showing at a glance, distribution. Peter Hayman's skillfully and accurately drawn plates make this book easily the best available of its kind. The keen observer can now check his notes against waders seen anywhere in the world and this is important because waders are globetrotters and are liable to turn up in unexpected places. Identification notes face each plate along with the distribution maps of each species and these are broken into various age, sex and seasonal headings. The tricky points to note on the small stints are clearly set out as are other similar wader groups such as the small plovers. All in all the publishers are to be congratulated on producing a sister volume to the *Seabirds* guide which will fill a much needed gap in specialist ornithology. BERNARD ZONFRILLO

# The Natural History of the Muck Islands, North Ebudes

## 2. Spiders, Harvestmen and Pseudoscorpions

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*Received April 1986*

### Introduction

The Small Isles of Inverness-shire, V.C. 104, North Ebudes, have received very unequal attention from arachnologists. Rum and Eigg were visited by Bristowe in 1922 who recorded 16 species of spiders, 3 species of harvestmen and one pseudoscorpion from Rum and 11 species of spiders and one harvestman from Eigg (Bristowe, 1927).

Kevan (1940) added a further 7 species of spiders and 2 of harvestmen to the list bringing the totals for these groups to 18 and 3 species respectively.

In August 1964, Rum was visited for two weeks by Walker who added 43 species of spiders to the list (Walker, 1967) bringing the total for this island to 60.

Bertram (1939) recorded 41 species of spiders and 5 species of harvestmen from Canna and Sanday and a number of immature examples of other species were also taken.

The arachnids of Muck and its satellites Horse Island (Eilean nan Each), Lamb Island (Eilean Aird nan Uan) and Eagamol have not been recorded at all and the purpose of the present paper is to rectify this omission.

### Methods

From 1977 to 1986 extensive studies of the spiders and other invertebrates of the Muck islands were made, involving some 29 separate visits varying in duration from day trips to stays of up to 20 days. Most visits were made between the months of May and August, but a number of "out-of-season" visits were also made and all months of the year except October were covered at least once.

*Glasg. Nat.* 21 part 2 (1986)

All parts and habitats of Muck and Lamb Island, except private gardens, were examined repeatedly and Horse Island was visited whenever possible. Eagamol, accessible only by boat, was only visited briefly on three occasions.

Methods of collecting included sweep-netting of ground vegetation; beating of tree foliage; direct examination of tree bark, cliffs and rock faces; lifting stones, logs, driftwood, stranded seaweed etc.; extraction of moss, lichen and litter samples by Tullgren Funnel and pitfall trapping. The last-mentioned method produced the most data as traps, suitably protected from rain, flooding, wind and grazing animals, "loaded" with various mixtures of 5% formaldehyde and glycerol or commercial antifreeze could be left unattended from visit to visit and gradually accumulated material. Pitfalls were usually set in lines of 10 and during the course of the work 28 different localities were investigated. The total pitfall trapping operation amounted to something in excess of 90,000 trap/days.

Spiders were identified by means of the monographs of Locket and Millidge (1951, 1953), Locket, Millidge and Merrett (1974) and Roberts (1985). Only adult spiders were named and identifications were checked in almost every case by examination of the pedipalp in the male or the epigyne in the female. Doubtful cases and rarities were referred to recognised experts where necessary. Nomenclature follows the recent check-list of Merrett, Locket and Millidge (1985).

Harvestmen were identified by means of the keys of Todd (1948) and Sankey and Savory (1974) and pseudoscorpions with the key of Evans and Browning (1954).

## Results

The species found are listed below with details of their habitats, distribution and abundance on the Muck islands. Notes on the published records of their occurrence in V.C. 104 and on their distribution elsewhere in the Small Isles, on the adjacent mainland (Locket, Millidge and Merrett, 1974) and in the Outer Hebrides (Waterston, 1981) are also included. Of the 86 species of spiders found on the Muck islands, 64 had previously been recorded from V.C. 104 and 39, 31 and 12 had been recorded from Rum, Canna and Eigg respectively. Of the 22 species not previously recorded from V.C. 104, 18 occur on the adjacent mainland, V.C. 97, Westernness, the nearest parts of which are the Ardnamurchan Peninsula, North Argyll, 8km south, and the Moidart-Morar coastline of Inverness-

shire, 22 km east, and might well be expected to occur elsewhere in the Small Isles. Eleven of them can be found in the Outer Hebrides (Waterston, 1981).

The remaining four species, *Pelecopsis parallella*, *Mioxena blanda*, *Thanatus striatus* and *Sitticus pubescens* are new to the area and the last 3 may not previously have been recorded from Scotland. Sixteen of the 33 families of British spiders were represented on the Muck Islands and Linyphiidae predominated comprising 54% of the species found. Some interesting comparisons can be made with the faunas of the neighbouring islands. Of spiders not previously recorded from V.C. 104, *Walckenaeria antica*, *Dicymbium nigrum*, *Tiso vagans*, *Diplocephalus permixtus* and *Allomengea scopigera* were common and widely distributed, the last-named being exceptionally abundant on Horse Island, an area with a restricted number of habitats.

Of species previously recorded from V.C. 104, but not from the Small Isles, *Xysticus erraticus* was fairly common and widely distributed while *Erigone promiscua* was abundant locally on stranded seaweed on the beach.

*Walckenaeria acuminata*, recorded from the Small Isles on the basis of a single female from Canna (Bertram, 1939), was one of the commonest species on Muck and Horse Island being found at numerous sites ranging from the shore to Central Wood. *Centromerita bicolor*, previously recorded only from Rum (Bristowe, 1927), was also common and widely distributed, being especially abundant on Lamb Island.

Seven species of harvestmen were found. All were common species found also in Westernness and the Outer Hebrides. All but one of them had previously been recorded from V.C. 104.

Pseudoscorpions were represented by a single specimen taken in a pitfall trap.

#### List of species found in present survey

Place names are as in Dobson & Dobson, 1985; \* = new record for V.C. 104, M = Muck; L = Lamb Island; H = Horse Island; (C) = Canna; (E) = Eigg; Ea = Eagamol; (R) = Rum; (W,NA,WI) = Westernness, North Argyll & West Inverness; V.C.97; (OH) = Outer Hebrides, V.C.110; 37,38,47,48 = 10km National Grid square (NM).

**ARANEIDA (Spiders)****AMAUROBIIDAE**

*Amaurobius fenestralis* (Stroem) M; 47,48; at Bagh, under bark of dead birch in Port Mor Wood; (R,NA,WI,OH).

*Amaurobius similis* (Blackwall) M; 47; in house at Port Mor; (R,NA,WI,OH).

**DYSDERIDAE**

*Harpactes hombergi* (Scopoli) M; 37,38,48; common near N. coast; (NA).

*Segestria senoculata* (Linnaeus) M, H;38,47,48; common, in rock crevices and under stones; (C,E,R,NA,WI,OH).

**GNAPHOSIDAE**

*Drassodes cupreus* (Blackwall), M,H;37,38,47,48; common and widespread in grassland and in heath, but not in woods; (C,WI).

*Haplodrassus signifer* (C.L. Koch) M;38; one only on machair at Bagh; (R,NA,WI,OH).

**CLUBIONIDAE**

*Clubiona phragmitis* C.L. Koch M;37; few in grass just above high water mark; (C,OH).

**LIOCRANIDAE**

\**Agroeca proxima* (O.P. Cambridge) M;37,47; few in grass near high water mark and on heathery slopes; (NA,WI).

**THOMISIDAE**

*Xysticus cristatus* (Clerck) M,L,H,;38,47,48; widespread near shore (C,E,R,NA,WI,OH).

*Xysticus erraticus* (Blackwall) M,H;37,38,47,48; widely distributed, near shore and in heather; (NA,WI).

*Oxyptila trux* (Blackwall) M,H;38,47; few near shore and in heather; (R,WI,OH).

\**Oxyptila atomaria* (Panzer) M;47; few near shore and in heather; (NA,WI).

**PHILODROMIDAE**

\**Thanatus striatus* C.L. Koch H; 38; one immature male.

**SALTICIDAE**

*Euophrys frontalis* (Walckenaer) M,L,H;38,47,48; near high water mark; (C,R,WI).

*Euophrys* sp., possibly *erratica* (Walckenaer) M;37; one near high water mark; (WI).

\**Sitticus pubescens* (Fabricius) L;48; a single male on sea cliffs (confirmed by P. Merrett). New Scottish record.

## LYCOSIDAE

- Pardosa pullata* Clerck) M,L,H;37,38,47,48; widespread and abundant; (C,E,R,NA,WI,OH).  
*Pardosa nigriceps* (Thorell) M;47; infrequent, near shore and in heather; (C,R,NA,WI,OH).  
*Alopecosa pulverentula* (Clerck) M;47; locally common, in heather and near shore (R,NA,WI,OH).  
*Trochosa terricola* Thorell M,L,H;38,47,48; abundant, in woods, in heather and near shore (C,R,NA,WI,OH).  
*Pirata piratica* (Clerck) M;47,48; common, near shore and lochans (C,E,R,NA,WI,OH).

## AGELENIDAE

- Textrix denticulata* (Olivier) M,L,H;37,38,47,48; common in Central Wood and around coast; (C,R,NA,WI,OH).  
*Tegenaria domestica* (Clerck) M;47; in houses at Port Mor; (C,NA,WI,OH).

## HAHNIIDAE

- Antistea elegans* (Blackwall) M;47,48; few near coast, (R,NA).  
*Hahnna montana* (Blackwall) M;47; few in heather; (NA,WI,OH).

## MIMETIDAE

- Ero* sp., juvenile M;48; single specimen near shore.

## THERIDIIDAE

- Enoplognatha ovata* (Clerck) M;48; two females in swamp; (C,R,NA,WI,OH).  
 \**Enoplognatha thoracica* (Hahn) M;47; two males near shore; (NA,WI).  
*Robertus lividus* (Blackwall) M,L,H;37,38,47,48; common in woods and in heather; (E,R,NA,WI,OH).  
 \**Pholcomma gibbum* (Westring) M;37,47; few in heather; (NA,WI,OH).

## TETRAGNATHIDAE

- Tetragnatha extensa* (Linnaeus) M,H;38,47,48; abundant on long grass, rushes, etc. (C,E,R,NA,WI,OH).  
*Pachygnatha clercki* Sundevall M;48; one in long grass; (R,NA,WI).  
*Pachygnatha degeeri* Sundevall M;37,47; few, in heather and in a wood; (C,R,NA,WI,OH).  
*Metellina segmentata* (Clerck) M;37,47,48; abundant; (C,E,R,NA,WI,OH).,48;  
*Metellina mengei* (Blackwall) M;47; few in Central Wood amongst grass; (WI).  
*Metellina merianae* (Scopoli) M;48; few in Bagh and on cliffs of Aird nan Uan; (C,E,R,NA,WI,OH).

## ARANEIDAE

- Araneus diadematus* Clerck M,L,H,Ea;38,48; abundant on rock faces; (C,E,R,NA,WI,OH).  
*Araneus quadratus* Clerck M;37,48; few in grass; (R,NA,WI).  
*Larinioides cornutus* (Clerck) H;38; several immature females (checked by P. Merrett); (E,R,WA,WI,OH).

## LINYPHIIDAE

- Ceratinella brevis* (Wider) M;37;47; few, in Port Mor Wood, in heather and amongst grass; (C,NA,WI).  
*Walckenaeria acuminata* Blackwall M,H;37,38,47,48; abundant almost everywhere; (C,NA,WI,OH).  
*Walckenaeria antica* (Wider) M;37,47,48; frequent, in Port Mor Wood, in heather and near shore (confirmed by P. Merrett); (WI,OH).  
*Walckenaeria nudipalpis* Westring) M;47; few, in woods and in heather; (NA,WI,OH).  
*Dicymbium nigrum* (Blackwall) M,L,H;37,38,47,48; few, in long grass near shore and in Port Mor Wood; (WI,OH).  
*Hypomma bituberculatum* (Wider) M;47; few near shore; (NA,WI,OH).  
*Goniatium rubens* (Blackwall) M,H;37,38,47; common, in woods, in grass and in heather; (R,NA,WI,OH).  
*Peponocranium ludicrum* (O.P.-Cambridge) M;47,48; one in grass and one in heather; (NA,WI,OH).  
*Oedothorax fuscus* (Blackwall) M;37,48; few near shore and in stranded seaweed; (C,E,NA,WI,OH).  
 \**Oedothorax retusus* (Westring) M;37; one near shore; (NA,WI,OH).  
 \**Pelecopsis parallela* (Wider) M;47; one in plants on rocks above Port Mor.  
*Pelecopsis mediocris* (Kulczynski) M;47; one in moss in Port Mor Wood; (C).  
 \**Tiso vagans* (Blackwall) M,H;37,38,47,48; common near shore; (WI,OH).  
*Monocephalus fuscipes* (Blackwall) M,H;38,47; common in woods, in heather and near shore (female determined by E.A. Crowson); (R,NA,WI,OH).  
*Lophomma punctatum* (Blackwall) M,H;37,38,47,48; common in heather and near shore; (NA).  
 \**Mioxena blanda* (Simon) M;47; one in Central Wood (confirmed by P. Merrett).  
 \**Gongylidiellum vivum* (O.P.-Cambridge) M,L;47,48; few in wood near Square Park and near shore; (WI,OH).  
*Erigonella hiemalis* (Blackwall) M;47; few in heather; (R,WI).  
 \**Diplocephalus permixtus* (O.P.-Cambridge) M,L,H;38,47,48; common in Central Wood and near shore (confirmed by P. Merrett); (WI,OH).  
*Erigone dentipalpis* (Wider) M;47,48; widely distributed, in woodland litter, on machair and under stranded seaweed; (C,NA,WI,OH).  
*Erigone atra* (Blackwall) M,L;47,48; common in grass; (C,NA,WI,OH).  
*Erigone promiscua* (O.P.-Cambridge) M,L;48; abundant in stranded seaweed; (WI,OH).

- Erigone arctica* (White) M;47,48; common in stranded seaweed; (C,R,NA,WI,OH).
- \**Hilaira excisa* (O.P.-Cambridge) M;47; one in Central Wood (determined by P. Merrett); (NA,WI).
- \**Halorates reprobis* (O.P.-Cambridge) M,L;38,47; one on shore, one in stranded seaweed; (NA,WI).
- \**Mioxena blanda* (Simon) M;47; one in Central Wood (checked by P. Merrett).
- Porrhomma egeria* (Simon) M;37,47; one in Central Wood, one W. of Gleann Mhartein (checked by P. Merrett); (WI).
- Agyneta subtilis* (O.P.-Cambridge) M;47; one in Central Wood; (R,WI,OH).
- \**Agyneta decora* (O.P.-Cambridge) M;47; one in Central Wood; (NA,WI,OH).
- Meioneta saxatilis* (Blackwall) M;48; one in swamp; (C,OH).
- Microneta viaria* (Blackwall) M;47; two in Central Wood; (WI).
- Centromerus dilutus* (O.P.-Cambridge) M;37,47; in woods and amongst heather; (R,WI).
- Centromerita bicolor* (Blackwall) M,L,H;37,38,47,48; abundant and ubiquitous (R,NA,WI,OH).
- Saaristoe abnormis* (Blackwall) M;48; two in undergrowth above shore at Port nam Maol; (R,NA,WI,OH).
- \**Bathyphantes gracilis* (Blackwall) M;47,48; one in wood and one in swamp; (C,R,WI,OH).
- \**Kaestneria pullata* (O.P.-Cambridge) M;47; one in Central Wood; (WI,OH).
- Diplostyla concolor* (Wider) M;47; two in Port Mor Wood; (C,WI,OH).
- Bolyphantes luteolus* (Blackwall) M;48; one on machair and one in *Phragmites* swamp at Toaluinn; (NA,WI,OH).
- Lepthyphantes alacris* (Blackwall) M;47; three in Central Wood; (WI).
- Lepthyphantes tenuis* (Blackwall) M,H;38,47,48; few, in Port Mor Wood in heather and on machair; (C,R,NA,WI,OH).
- Lepthyphantes zimmermanni* Bertkau M;37,47,48; abundant in woods and in heather; (C,R,NA,WI,OH).
- Lepthyphantes mengei* Kulczynski M;37,47; few in heather; (R,WI,OH).
- Lepthyphantes tenebricola* (Wider) M;47; few in Central Wood; (NA,WI).
- Lepthyphantes ericaceus* (Blackwall) M;47; few in Central and Port Mor Woods; (E,R,NA,WI,OH).
- \**Allomengea scopigera* (Grube) M,H;37,38,47; common in woods and in heather, abundant in Horse Island; (WI).

## PHALANGIDA (Harvestmen)

### NEMASTOMATIDAE

- Nemastoma bimaculatum* (Fabricius) M,H;37,38,47,48; abundant and widely distributed; (C,E,R,NA,WI,OH).

*Mitostoma chrysomelas* (Hermann) M;47; one at Camas Mor; (C,NA,WI,OH).

#### PHALANGIIDAE

*Mitopus morio* (Fabricius) M,L,H;38,47,48; common and widely distributed; (NA,WI,OH).

*Oligolophus agrestis* (Meade) M,H;38,47,48; common and widely distributed; (C,W,OH).

*Phalangium opilio* (Linnaeus) M;47,48; common and widely distributed; (C,E,R,NA,WI,OH).

\**Platybunus triangularis* (Herbst) one at Camas Mor; (NA,WI,OH).

*Megabunus diadema* (Fabricius) M;37,47,48; few but widely distributed; (C,NA,WI,OH).

#### PSEUDOSCORPIONIDEA (Pseudoscorpions)

*Chthonius tetrachelatus* (Preyssler) M;47; one in Port Mor Wood.

#### Acknowledgments

I am grateful to Mr and Mrs Lawrence MacEwen for permission to work on the Muck Islands, to experts mentioned in the text for help with identifications and to Dr Gerald Legg for checking for records of pseudoscorpions.

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## Book Review

### **The Atlas of Wintering Birds in Britain and Ireland**

PETER LACK

T. & A. D. Poyser, Ltd., 447 pp., over 200 maps and drawings. Hardback, ISBN 0 85661 043 7, £19.00.

This, the much awaited companion volume to *The Atlas of Breeding Birds in Britain and Ireland*, comes up to all expectation, presenting the greatest overall knowledge yet of winter birds throughout the country in a similar format to its predecessor. As before it is the result of a survey by the British Trust for Ornithology and the Irish Wildlife Conservancy over three consecutive seasons involving over 10,000 observers co-ordinated by a team of regional organisers. The 192 full page maps show both the distribution and a measure of abundance of each species, while accompanying texts to each by 101 specialists greatly augment the information. The inset of "Breeding Birds" maps for comparison is a useful addition and the line drawings by 23 artists led by Robert Gilmour add greatly to presentation. The introductory chapters give details of the survey methods and general information about birds in winter.

This volume will be as significant a source of information for conservation as its companion has been and will provide a baseline for future studies.

RUTH H. DOBSON

## Book Review

### **A Field Guide to the Dragonflies of Britain, Europe and North Africa**

J. d'AGUILAR and J.-L. DOMMANGET

Collins, London, 1986. 336 pp., many colour plates and line drawings, keys, distribution maps. Hardback, ISBN 0 00 219436 8, £14.95.

The Dragonfly enthusiast, both at home and travelling in Europe, has long awaited a useful, pocketable identification book. This now exists in the latest Collins Field Guide which will further stimulate the growing interest in Dragonflies.

As one might expect from this series of Field Guides, this book is very comprehensive, covering every aspect of Dragonfly biology. The introductory chapters cover man's relationship with Dragonflies throughout the ages and discusses the origin and distribution of the Odonata. The following chapters deal with the morphology of both adult and larva. Line drawings are clearly annotated and include details of wing venation which is an important factor in separating families. The life cycle is then described and illustrated. There follows details of both adult and larval behaviour which helps the student to interpret the activities observed in the field. A brief description of suitable habitats and species likely to be encountered is included. A set of good quality colour photographs illustrate certain species, behavioural activities and suitable habitats – even parasites of the adults are depicted.

A detailed key to the adults and larvae is found at the front of the book. This key is very useful to the beginner since descriptive terms are illustrated making positive identification much easier.

If keys always cause headaches, the student can try to match a specimen with the many well-drawn colour plates which of necessity have been reproduced a little on the small side. Full information on each species is contained in the text. Minor criticism could be made of the Distribution Maps at the end of the book. They lack species names and are given only a text reference number which makes it difficult to quickly assess the species diversity likely to be found in a selected geographical area.

Although this is a somewhat expensive Field Guide, it is a most useful book for the beginner and serious student alike. *T. NORMAN TAIT*

# The Natural History of the Muck Islands, North Ebudes

## 3. Seabirds and Wildfowl

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*Revised to August 1986*

### Introduction

Information on the birds of the Muck Islands is fragmentary and mostly based on visits lasting no more than six days. The earliest published account is that of Harvie-Brown and Buckley (1892) and records up to 1 January 1951 are summarised in the monumental monograph of Baxter and Rintoul (1953). Evans and Flower (1967) bring together both published and unpublished records, including those of local residents, available to the end of 1966. Seabirds were counted between 10 and 13 June 1969 as part of the national census, "Operation Seafarer", carried out by the Seabird Group and the data are incorporated into a privately circulated report (which can be consulted on application e.g. to Nature Conservancy Council) and published in abridged form by Cramp *et al.* (1974). The results of this survey provide a useful baseline for comparison with later work. The status of wildfowl in the Inner Hebrides was reviewed by Ogilvie and Atkinson-Willes (1983). No additional data are given for the Muck Islands but the account facilitates comparison of data from the Small Isles with those from the Inner Hebrides as a whole.

The present studies were made between 1976 and 1986. At first only summer visits, lasting from one to almost three weeks, were made, but from 1981 the work was intensified and visits were made for periods of at least a week three or more times a year. Data were thus obtained for all months except October. Most observations were on Muck itself, but the tidal Horse Island was visited at least eight times for periods of about two hours each. The partially vegetation-covered rock, Eagamol, accessible only by boat, was

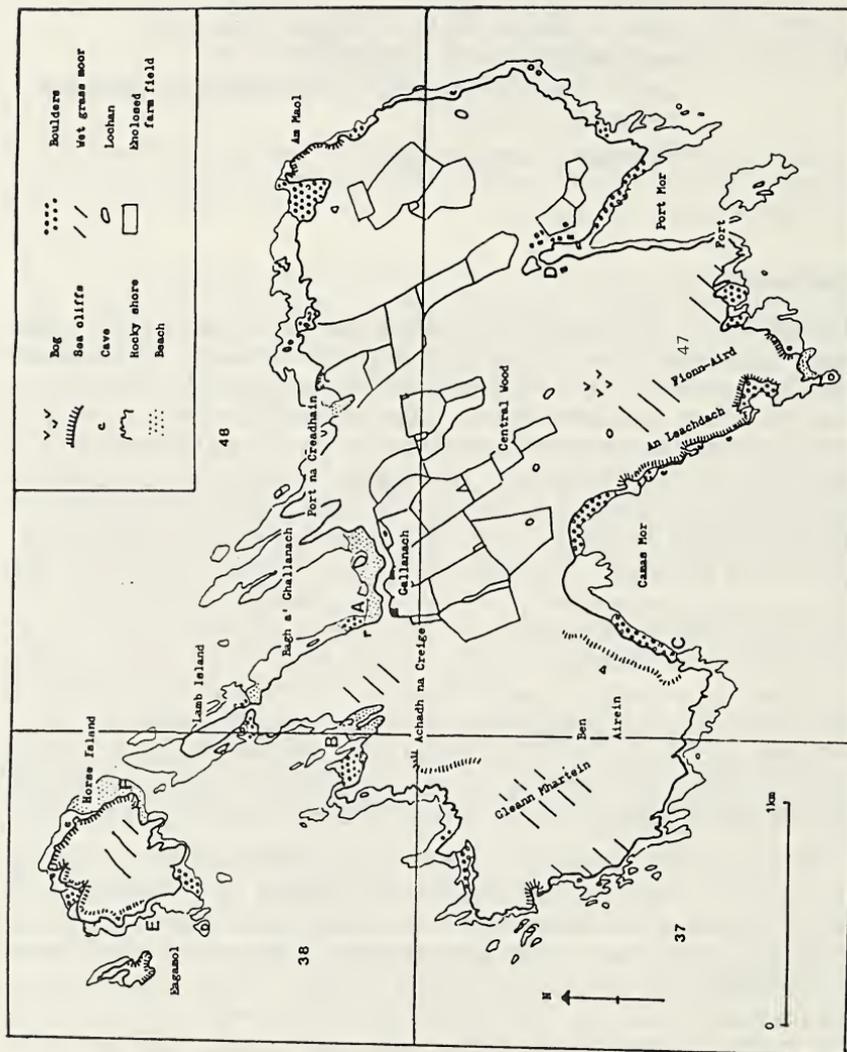


Figure 1 Map of the Muck Islands to show coastal and other features referred to in text.

visited three times but it was viewed closely from the sea and from Horse Island on several occasions.

The location and general topography of the Muck Islands have been described recently (Dobson & Dobson, 1985) and only additional features relating to the habitats of wildfowl and seabirds need be considered here (Fig. 1). Although the total area of the islands is only 540 ha the coastline, much indented and divided into small inlets and gullies separated by rocky headlands and dykes, has a total length of some 26 km. Much of the foreshore is rocky or boulder-strewn and is, in many places, backed by vegetation-covered talus slopes terminating in crumbling, plant-colonised cliffs which, though generally of modest height, attain an altitude of 100 m on Beinn Airein and 50 m on Horse Island. Sheer cliffs, much fissured and penetrated by shallow caves, occur round the southern half of Eagamol, on the N.E. face of Horse Island and, on Muck, at Am Maol and on the Fionn-Aird peninsula where, at An Leachdach they rise to 40 m. These areas of rocky foreshore and cliffs provide suitable nesting sites for seabirds and Eiders, none of which nest inland in these islands. Off-shore, numerous skerries provide safe resting and drying-off places and, acting as breakwaters, allow swimming birds to assemble in relatively calm waters.

Mallard and Greylag Geese nest away from the coast but otherwise spend most of their time in its vicinity. Fertile farm fields and closely-grazed coastal grasslands prove attractive to flocks of wintering geese.

## Methods

Many counts and data were obtained by direct observations while systematically patrolling the islands but special methods were adopted during the breeding season to assess the numbers of *Larus* gulls, which nest on the rocks of the foreshore and on the accessible cliffs. Complete searches of the shore of Muck were made during the second half of May in 1981, '84, '85 and '86 and all nests were recorded. Similar searches were made of Horse Island in 1981, '85 and '86 and Eagamol was visited in May 1982 and June 1986. Numbers in Eagamol and N. Horse Island were estimated in May 1985 but only by viewing through binoculars from the top of the Horse Island cliffs. In July of each year isolated pairs of alarming gulls seen at various points remote from the main colonies were taken

as indicating nests which had been overlooked in May. These were therefore added to the totals. In 1982 and '83, time permitted counts to be made only at the large colony on the rocky promontory south of An Leachdach. This, however, enabled an index of numbers to be obtained for these years.

As most of the sheer cliffs can not be viewed from the land, cliff-nesting species i.e. Shags, Fulmars, Guillemots, Razorbills and Kittiwakes, were counted from the sea between 15 and 19 June 1982 and 27 and 30 June 1986 when complete circumnavigations of Muck, Horse Island and Eagamol were made by small boat during fine, calm weather. All observations were made between 1000 and 1500 hrs. B.S.T. in conditions of good visibility but only a single count could be made on each occasion at each site. The units suggested by the Sea-bird Group in the *Auk Censusing Manual* and by Cramp *et al.* were used so that results can be compared directly. Guillemots and Razorbills were probably underestimated due to the difficulties of counting jostling birds on crowded ledges and those concealed within rock crevices. Puffins could not be assessed in this way because their colonies were usually inaccessible, and counts were made of adult birds on the water in both 1982 and '86. Also in 1986 occupied burrows were counted in Eagamol but their numbers in Horse Island could only be assessed by viewing them with binoculars. Black Guillemot nests were inaccessible and could not be counted, so estimates were made by counting the maximum numbers of birds on the water at each site before 1100 hrs B.S.T. or at dusk in March 1985 and before 1100 hrs in April 1986.

## Results

In the following list birds are presented in the order given by Thom (1986). The following special abbreviations are used: ABB – Sharrock, 1976; B&R – Baxter and Rintoul, 1953; E&F – Evans and Flower, 1967; HB&B – Harvie-Brown and Buckley, 1892; O&AW – Ogilvie and Atkinson-Willes, 1983; OS – *Operation Seafarer*, 1969; MB – migrant breeder; RB – resident breeder; (RB) – resident breeder in Small Isles but not in Muck Group; V – vagrant; WV – winter visitor.

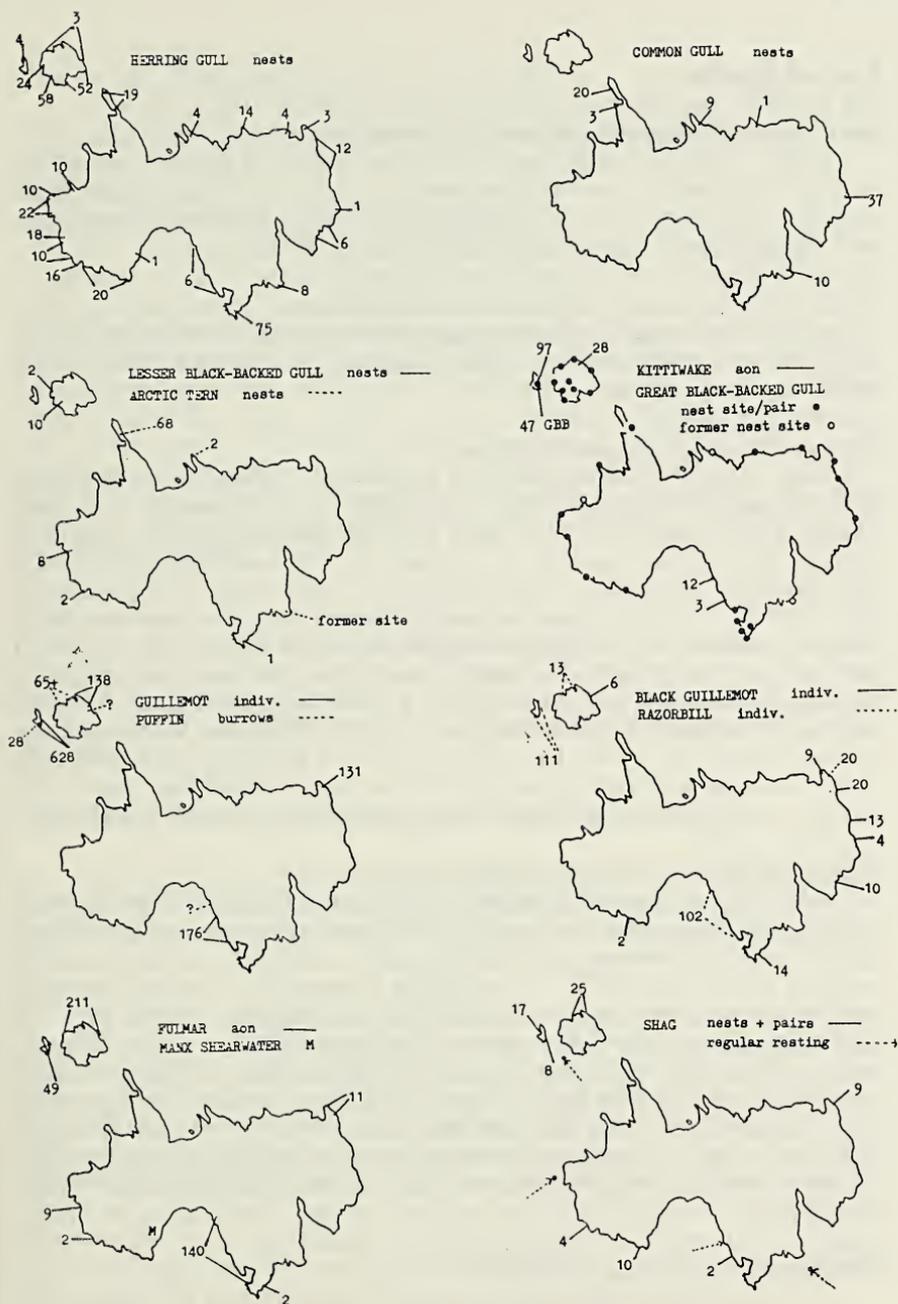


Figure 2 The distribution and size of breeding seabird colonies on the Muck Islands in 1986.

## List of Species

Red-throated Diver (*Gavia stellata* (Pontoppidan))

(RB) There are breeding records from Eigg and Rum but according to E&F the species is an offshore summer visitor to Muck. Single birds or pairs were seen in north coast bays of Muck occasionally in summer and there was one winter sighting (February 1984).

Great Northern Diver *Gavia immer* (Brunnich)

WV 2 to 3 single birds were seen each year off all the Muck Islands between November and May. E&F regard this as a regular winter visitor to all the Small Isles.

Fulmar *Fulmarus glacialis* (Linnaeus)

MB First colonizing Muck in the 1930's, Fulmars have increased from 6 pairs at Fionn-Aird (An Leachdach) in 1934 through c.100 pairs in late 1940's (E&F) to c.400 pairs by 1969 (OS). Complete counts of apparently occupied nest sites during June in 1982 and 1986 indicated 427 and 424 pairs respectively. Breeding birds occupy most of the available sea cliffs from May-August where they select and dominate the more eroded and somewhat vegetated sloping stretches which make up about half of their total length. They also occupy the uppermost parts of some sheer cliffs but have not yet colonised any inland ones (Fig. 2). In good weather in February the birds begin to visit the cliffs at first in the mornings only; all adults and young have left the cliffs by mid-September and none is seen on shore in winter. Recently birds have been seen flying round cliffs in the N. at Toaluinn and Achadh na Creige possibly prospecting new sites.

Manx Shearwater *Puffinus puffinus* (Brunnich)

MB Long known to frequent the waters off Muck (HB&B), rafts of up to 200 Shearwaters were seen off the east and south coasts of Muck in calm weather between July and September and birds were heard calling at night during July 1979, '80 and '81 at Camas Mor. A small breeding colony is now established in Camas Mor at the junction of the sheer cliffs and talus slopes below Ben Airein (Dobson, 1984). In July 1985 two occupied burrows (chick seen in one) and four other probably occupied ones were found at this site and 6 to 8 birds were seen on the sea nearby at 2100 hrs B.S.T. A similar number of occupied burrows was found in 1986 and a chick was seen in the same burrow as in 1985. The colony may be more extensive but the inaccessibility of the cliffs precluded further investigation.

Gannet *Sula bassana* (Linnaeus)

V A few were seen offshore both in autumn and in winter.

Cormorant *Phalacrocorax carbo* (Linnaeus)

V One or two were seen some years off the east coast of Muck and off Lamb Island in winter. One was in breeding plumage off Lamb Island in April 1986.

Shag *Phalacrocorax aristotelis* (Linnaeus)

RB Though only 4-6 pairs nested on Muck in 1934 (B&R), by 1963 there were about 70 nests on Horse Island, Eagamol and the cliffs of Fionn-Aird (An Leachdach) alone (E&F). By 1969 the numbers had been reduced to 46 (OS). Now Shags are always present. Out of the breeding season they fish off-shore or sit in large groups on the skerries and the winter population is over 100. In February they begin to return to regular breeding sites on the cliffs, where, sometimes interspersed between sea-bird colonies, they occur singly or in small groups, occupying wide ledges often in the protection of gullies or overhangs. Most young are fledged by mid-July but there are a few late broods. A complete count during June 1982 indicated 73 breeding pairs (Table 1) with a similar number, differently distributed in 1986.

Whooper Swan *Cygnus cygnus* (Linnaeus)

WV A passage bird which may overwinter in the Small Isles (E&F) and elsewhere in the Inner Hebrides (O&AW). Groups of 3-5 were seen between November and February most years from 1980-'85 either passing or staying for short periods in wet weather when standing water was plentiful.

Greenland White-fronted Goose *Anser albifrons flavirostris*

Dalgety & Scott

WV 20-43 overwintered regularly from November to April 1981-'86 feeding on the hills and farm fields of N.E. Muck and probably roosting on the bog area in the south. E&F noted that up to 20 occur most winters.

Greylag Goose *Anser anser* (Linnaeus)

RB & WV Regarded by E&F as an "occasional on passage or in winter" this is a recent addition to the breeding list for the Muck Isles (not in ABB). It was confined to Horse Island in 1981 but numbers increased there and in Muck each year. A single nest was found in Horse Island during May of 1981, '83, '84, '85 and '86 (no obs. made in '82) and on four occasions eggs and/or downy young were seen. Parties of 16-30 birds including several young on the sea during July and August 1982 and in July '84 suggested that greater numbers may be breeding. In 1984 the first pair was found breeding on Muck (Walters, pers. comm.) and other pairs were present in suitable habitat, i.e. wet grass moorland (Fig. 1).

TABLE 1 Counts of Cliff-nesting Birds in the Muck Islands

Species	Year	Place				Total
		<i>Am Maol</i>	<i>An Leachdach</i>	<i>Horse Island</i>	<i>Eagamol</i>	
Guillemot (individual)	OS	-	150	15	350	-
	1982	105	166	97	581	0
	1986	151	176	138	628	0
Razorbill (individual)	OS	-	50	4	150	-
	1982	22	64	20	122	0
	1986	20	102	13	111	0
Puffin (individual on water)	OS	-	10	60	10	-
	1982	0	6	75	0	0
	1986	0	16	200±	38	0
Fulmar (a.o.n.)	OS	-	86	280	19	4
	1982	15	143	218	33	18
	1986	11	140	211	49	13
Kittiwake (a.o.n.)	OS	-	15	0	95	-
	1982	0	28	35	132	0
	1986	0	15	28	97	0
Shag (nests)*	OS	-	10	12	24	-
	1982	19	12	16	19	7
	1986	9	2	25	25	14
Black Guillemot (individual on water)	OS	-	-	-	-	-
	1985	17	21	2	-	37
	1986	20	14	6	-	38

OS = Operation Seafarer counts, 1969

- = No data

\* = includes estimate of hidden nests based on adults seen

a.o.n. = apparently occupied nest sites

In 1986 a total of 3 breeding pairs with eggs or newly hatched young and 4 possibly breeding pairs was found throughout the islands. Also 14 non-breeding birds were based in Horse Island. In early July 80 to 100 moulting birds were seen on the sea in the vicinity of Eagamol on several occasions and there was a large roost site in S.W. Horse Island.

Each year up to 100 form one or more flocks from August feeding on short grass in outlying areas and damaging the oat crops. As winter advances they feed more on the grass fields and they break up into smaller flocks and single pairs by March. Large roosts were found first at Toaluinn and more recently in a field north of Central Wood with small ones on the islands in several of the small lochans.

#### Barnacle Goose *Branta leucopsis* (Bechstein)

WV Flocks of 34-58 were seen between December and April 1981-'86. They roost on Horse Island and feed on Lamb Island, in Gleann Mharteinn and in the fields near Toaluinn. E&F noted up to 24 as regular winter visitors and O&AW counted 55 in the Small Islands during an aerial survey in March and April, 1978.

#### Brent Goose *Branta bernicla* (Linnaeus)

V A party of up to 12 on passage remained on Muck for about a week in autumn 1985 (MacEwen and Walters, pers. comm.). Occasional sightings were noted by E&F.

#### Shelduck *Tadorna tadorna* (Linnaeus)

MB Long known from Muck (B&R); 5-6 pairs present in 1963 (E&F). Returning gradually from December, up to 8 congregate in Bagh 'a Ghallanaich in March with 2-5 pairs spreading to sheltered bays to breed in May. Few young are reared, these remaining after adults have left in late July. In 1982 a pair hatched 4 young in August but none remained by September.

#### Wigeon *Anas penelope* Linnaeus

WV One pair was present at Port na Creadhain in December 1982. E&F recorded 12+ pairs overwintering 1964-'65.

#### Teal *Anas crecca* Linnaeus

WV (RB) Up to 12 were seen during November to March each year 1980-'85 in sea-weedy pools near Port na Creadhain. E&F noted it as "an occasional winter visitor with up to 8; seen more often in recent years".

#### Mallard *Anas platyrhynchos* Linnaeus

RB & WV 1 or 2 pairs bred each year 1981-'83 on the permanent lochans with possibly others in Gleann Mharteinn. None was found

breeding in 1984-'85 when conditions were drier than usual. One nest was found in May 1986 with 7 newly hatched young but none was seen later. Up to 12 are seen on the sheltered coastal water in the north in winter with about 3 pairs remaining by March. First recorded nesting in 1934 (B&R), Mallard were breeding regularly with about 8 pairs in 1963 (E&F).

#### Eider *Somateria mollissima* (Linnaeus)

RB Common at all seasons, nesting on flat rocky or grassy places by the coast on all four islands, often near gull colonies. 12-18 nests were found in such localities on Muck at each gull count until 1986 when 38 nests were found. The contents of 23 of them averaged 4.2 eggs. Up to 50 females, some with half-grown young are seen each year in sheltered shallow water in early July along with a few later broods. Few survive but adult females remain near the shore until September.

40-60 males are evident offshore while females are sitting, but by July they move further away and are not much seen. A moulting flock of 280 was seen on Heisgeir, 29 km N.W. of Muck, in July, 1986; these may have been Small Isles birds (Swann, pers. comm.). In winter over 100 birds are present in mixed flocks on the sea at regular haunts off S. Muck and Lamb Island and pairs are established by February. Numbers were reduced to c. 60 in 1983-'84 after an oil-slick incident in October 1983.

E&F note that there were very few nesting on Muck in 1890 but by 1963 there were c. 30 pairs. By late 1940s they also nested on Horse Island and Eagamol.

#### Red-breasted Merganser *Mergus serrator* Linnaeus

WV (RB) Two pairs were regularly present, from November to May 1980-'86 (3 pairs in January 1985) and up to 4 non-breeding birds occurred in May. According to E&F often 2 pairs were present in winter but there are no breeding records from Muck.

#### Black-headed Gull *Larus ridibundus* Linnaeus

RB? Occasional in summer until 1985 when there were 2 present from March to May and 3 in July. At least 3 occurred in 1986 and, in July, a nest with one cold egg was found on Lamb Island. This is possibly becoming established as a breeding species. E&F regarded it as an occasional in winter and spring.

#### Common Gull *Larus canus* (Linnaeus)

RB & MB E&F refer to a possible nest in 1930 and state that small numbers breed around the coast and on Horse Island while OS found 12 nests on Muck. Now birds are present all the year with numbers slightly enhanced in summer. They assume summer plumage in April and move to

TABLE 2 Numbers of Breeding Pairs of *Larus* Gulls in Muck Islands

SPECIES	YEAR			1969 (OS)			1981			1984			1985			1986					
	CG	HG	LBB	CBB	CG	HG	LBB	CBB	CG	HG	LBB	GBB	CG	HG	LBB	GBB	CG	HG	LBB	GBB	
Muck	A - B	1	8	2	0	9	8	0	1	10	8	0	1	20	8	0	1	23	19	0	1
	B - C	6	18	0	1	7	68	6	8	0	56	8	4	1	80	7	15	0	106	10	5
	C - D	0	70	1	3	1	48	1	5	9	39	1	9	5	46	1	5	10	89	1	5
	D - A	5	10	0	0	23	25	0	4	19	18	0	4	22	19	0	3	47	45	0	5
Total	12	106	3	4	40	149	7	18	38	121	9	18	48	153	8	24	80	259	11	16	
Horse Island	South	0	170	10	0	0	43	3	4	-	-	-	0	41	6	4	0	109	10	5	
	North	0	170	10	0	0	(15)	0	(2)	-	-	-	0	(15)	0	(2)	0	28	2	4	
Eagamol	0	38	0	61	0	(5)	0	(25)	-	-	-	-	0	(1)	0	(35)	0	4	0	47	
Overall Total	12	314	13	20	40	212	10	49	48	210	14	65	80	400	23	72					

Estimates in brackets (a) for Eagamol 1981 from count during landing in May 1982 + view from Horse Island in May 1985  
 (b) for Horse Island 1981 from views from sea during cliff counts in June 1982 and from cliffs 1985

Sections of coast of Muck as used by Operation Seafarer (OS) 1969, (see Fig. 1):

- A - B Lamb Island + Aird nan Uan
- B - C Gleann Mharthein + SW
- C - D South Coast
- D - A Port Mor + East - North Coast to Gallanach

Sections of coast of Horse Island, (Fig. 1):  
 South - South of line E - F  
 North - North of line E - F

the breeding sites forming small colonies with fairly closely spaced nests on flatter rocky areas near the shore, sometimes accompanied by a few Herring Gulls. There are 4 regular and 3 occasional sites in Muck and Lamb Island but none in Horse Island now (Fig. 2). In most years a few young are fledged by mid-July and join the adults which regularly feed on grassy farm fields. In winter a flock of 50-60, increasing to c. 100 in spring and including a few immatures collects in Bagh a' Ghallanaich at dusk and roosts on the rocks of its eastern shore. A consistent increase in breeding numbers, now about 6 times the 1969 figure, may still be continuing (Table 2).

#### Lesser Black-backed Gull *Larus fuscus* Linnaeus

MB In the early 1960's this was the commonest gull in the Muck Islands. E&F recorded about 100 pairs on Eagamol and about 20 on Horse Island in 1963 and commented that in other recent years up to 100 pairs had occurred on Horse Island. They are now much diminished and, having forsaken Eagamol, breed only on the S.W. coast of Horse Island and in W. Muck (Table 2, Fig. 2). Their small colonies are often near but usually to landward of those of the Herring Gull and are sited on areas of tussocky grass. The gulls return to their breeding sites in April and, after the young are fledged in July, are seen feeding on the farm fields before leaving in early September. In 1985 two possible hybrids with backs darker than Herring Gulls were seen on the W. coast. One had pink and the other greenish legs.

#### Herring Gull *Larus argentatus* Pontoppidan

RB & MB B&R noted breeding in Muck and Horse Island but gave no indication of numbers. E&F added Eagamol and commented on a few pairs on Muck, chiefly at Camas Mor. This is now by far the commonest gull in the group (Table 2) and is present throughout the year with greatly increased numbers in the breeding season. Birds in breeding plumage begin to return to and roost at the breeding sites in February when they frequently feed on the farm fields or follow the plough. They breed at several small colonies around the coasts of all four islands or as lone pairs selecting flat rocky areas of low cliffs usually where sea pinks or other coastal plants grow. At the largest colonies, in S.W. Horse Island and at the tip of the An Leachdach promontory, nests also occur on shingle beaches. Young are fledged by early August with usually a good success rate. Flocks of non-breeding adults and immatures of all ages (but few 1st year) are present near the larger colonies. In autumn numbers decrease to c. 200 in September, c. 100 in November and c. 25 in December and January. They disperse during the day but congregate to roost at varying sites in the north.

Breeding numbers have fluctuated and distribution has changed since 1969. Then most nests were found in the same larger colonies as today

and in Eagamol. Now Eagamol has few and the others are relatively smaller but nests occur almost all round the coast. Up to 1984 few empty nests were found, but in 1985 37% of nests on the west coast were found empty or destroyed, possibly by the large number of Great Black-backs that year. In 1986 30% in S.W. Horse Island and 16% on the W. coast were empty, some probably destroyed by the prolonged stormy weather. Some idea of the annual fluctuations is given by the annual count of nests at the colony S. of An Leachdach *viz.* 1981,40; '82,54; '83,50; '84,37; '85,39; '86,83.

#### Great Black-backed Gull *Larus marinus* Linnaeus

RB & MB E&F noted one pair breeding in Eagamol in 1934 and there were 2 pairs on Muck and several on Eagamol in 1963. OS noted 20 pairs between all islands in 1969. Since then numbers have more than trebled (Table 2). Birds are present throughout the year with an increase in numbers in the breeding season. By February pairs of birds in breeding plumage are returning to the main colony in Eagamol and to regular breeding sites around the coasts of Muck and Horse Island (Fig. 2). These are mostly isolated on outlying rocks but sometimes occur amongst Herring Gulls. Many nest sites are re-occupied each year. Young are fledged in August with a high rate of success. About 30 birds, including some immatures, overwinter. These disperse during the day but collect at dusk to roost on Lamb Island or Eagamol.

#### Kittiwake *Rissa tridactyla* (Linnaeus)

MB HB&B noted a "fine" cave colony on Muck (? An Leachdach) and others on the N. coast of Muck and Horse Island. E&F found breeding on Eagamol only in 1963 but by 1969 some had returned to An Leachdach (OS). Now nesting colonies occur on Muck, Eagamol and Horse Island on almost sheer cliffs eroded to form small ledges usually around caves and protected inlets. They are placed about mid-way up the cliffs interspersed with Guillemots but lower than most Razorbills. The largest numbers occur in S.E. Eagamol with smaller colonies in N.E. Horse Island and in two shallow caves at An Leachdach (Fig. 2), the second of these being first occupied in 1981. Large parties of up to 300 are seen offshore in September, but there are very few in winter until March when they begin to return to the breeding sites. The June 1982 counts indicated some 60% increase since 1969, but numbers were lower in 1986 (Table 1).

#### Arctic Tern *Sterna paradisaea* Pontoppidan

MB In 1930's numbers varied greatly and breeding alternated irregularly between Sgaothaig (E. of Bagh a' Ghallanaich) and Lamb Island (E&F). In 1976 birds were nesting at Sgaothaig; now the principal site is Lamb Island with small numbers on the "Fort" promontory W. of Port

Mor in some years. Terns arrive during May and nest in June close together on flat rocks. Numbers vary greatly and, as June visits were generally impracticable, the following estimates for Lamb Island are based mainly on the numbers of individuals seen feeding fledged young in July: 1981, 30; '82, 12; '83, no obs.; '84, 50; '85, 75. These are likely to be underestimates but in 1986 68 nests were counted on Lamb Island and 2 were found near Port Chreadhain indicating a breeding population of 140 birds.

#### Guillemot *Uria aalge* (Pontoppidan)

MB Though only known to breed in Muck since 1934 (E&F) Guillemots are now by far the most abundant auks present and have possibly doubled in numbers since 1969 (Table 1). Colonies occur on rock ledges below overhangs and within shallow caves and crevices at An Leachdach and on the N. or N.E.-facing cliffs at Am Maol, Eagamol and Horse Island (Fig. 2). Birds in breeding plumage begin to return to the cliffs during the mornings in February. During counts in late June 1986 few were hatched; adults and young have left by late July. Bridled birds make up about 4% of the total. No marked change in numbers has occurred between 1982 and 1986.

#### Razorbill *Alca torda* Linnaeus

MB Breeding in Eagamol in 1889 and 1934, later spreading to An Leachdach (E&F) and to Horse Island (OS) Razorbills are now also breeding at Am Maol (Fig. 2). They are more widely distributed than Guillemots and for nesting select the fragmented upper parts of cliffs where there are many suitable holes. They begin to return to the breeding areas in the mornings during February and leave with the young during July. Counts of visible birds in June 1982 and 1986 suggested similar populations to those of 1969 (Table 1).

#### Black Guillemot *Cephus grylle* (Linnaeus)

RB E&F noted that from 2 pairs for many years numbers increased to more than 8 pairs in 1963. OS saw 14 individuals in 1969. Now birds are seen on the sea in small numbers all year on stretches of coast with boulder beaches and mainly low, or sometimes overhanging, cliffs (Table 1, Fig. 2). During the springs of 1985 and '86 high winds prevented accurate surveys and greater numbers seen at some sites during the ideal weather of June 1986 suggest that these birds may have been underestimated by 10-15%. Previous counts (E&F, OS) made in summer, may also have underestimated for this species.

#### Puffin *Fratercula arctica* (Linnaeus)

MB Long known from Eagamol and recently returned to An

Leachdach, the chief breeding site in the late 1960s was in Horse Island (E&F). In 1969 all three sites were still occupied but most occurred on Horse Island (OS). At present there are two small colonies on Horse Island, both in inaccessible grassy areas towards the tops of N.E.-facing cliffs. Remains of burrows were found on the grassy crown on Eagamol in 1982 but there were no signs of recent occupation. From 1976-'79 Puffins were present at the N. end of An Leachdach in decreasing numbers (max. 30) but none was seen in 1980 and in 1981-'82 less than 10 inhabited this cliff near the cave at its mid-point. Counts of individuals on the water in June 1982 suggested that populations were similar to those of 1969 (Table 1). In 1986 evidence of an increase in numbers was found. Over 200 were seen on the water around Horse Island and Eagamol and 16 at An Leachdach. 28 occupied burrows were found in Eagamol. An attempt to count occupied burrows on the Horse Island cliffs with binoculars showed at least 65; there were probably more out of view.

## Discussion

The numbers of most species of seabirds and wildfowl in the Muck Islands have either remained stable or have greatly increased since the 1930s, the only one to have decreased markedly being the Lesser Black-backed Gull. Numbers of these declined to the present level in the 1960s, probably when their stronghold in Eagamol was taken over by Great Black-backed Gulls. Similar replacements have been reported from N. Rona and the Flannan Isles (Thom, 1986).

The massive increase in Herring Gulls up to 1969, with the establishment of a large colony on Horse Island, may also have contributed to the decline of the Lesser Black-backs. This increase has now stabilised although, as in Canna (Swann & Ramsay, 1984) there are large annual fluctuations in numbers.

The increase in Great Black-backs continues and may affect the numbers and distribution of Herring Gulls, very few of which now nest on Eagamol. Abundant fish offal from the numerous fishing boats provides a good supply of food for both species.

The continuing increase in Common Gulls follows national trends; the possible colonisation by Black-headed Gulls follows a similar one at Kilmory, N. Ardnamurchan, about 7 years ago, where a few pairs now breed regularly.

Although single counts of auks on the cliffs should be treated with caution, it seems clear that Guillemots have greatly increased

in numbers since 1969, results in keeping with the national trend (Stowe & Harris, 1984). The numbers of Razorbills have changed little although considerable fluctuations have been reported elsewhere on the W. coast of Scotland (Stowe & Harris, 1984). At Canna, numbers increased up to 1979 but have since remained fairly stable (Swann, pers. comm.). The increase in Black Guillemots is also in keeping with the Scottish W. coast trend (Thom, 1986).

The decrease in Kittiwake numbers from 1982-'86 was similar to that noted for Canna (Swann, pers. comm.). The slow increase in Fulmar numbers from 1969 follows the national trend but since 1982 their numbers have stabilised. This has also occurred on Canna (Swann, pers. comm.).

It is noteworthy that neither E&F nor OS included any counts from Am Maol which may have been colonised since 1969 mainly by the increased numbers of Guillemots and Shags.

The increase in the numbers of wintering geese since the 1960s, which is continuing, is beginning to cause concern to farming interests. The wide areas of short grass, possibly increased by greater stocking in recent years, and the increased numbers of enclosed fields, some with corn and vegetable crops, provide a good food supply. In 1986 the Greylag Geese which collected on Horse Island to moult during July and were seen to graze on Muck in August outnumbered the regular summer population of the Small Isles (Swann, pers. comm.) and must have been drawn from a wider local area.

### **Acknowledgments**

We are grateful to Mr John Dobson for much help with observations and to Mr and Mrs Lawrence MacEwen for their generous hospitality, for permission to work on Muck and for many useful discussions. Valuable information on some of the birds and their nests was also provided by Mr and Mrs Bryan Walters and by Miss Annie Macrae. Mr R. L. Swann kindly read the draft of the manuscript and made useful suggestions for improvement. Many thanks are also due to all our friends in Muck who have made our visits so pleasurable.

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## Book Reviews

### **Collins Guide to the Insects of Britain and Western Europe**

MICHAEL CHINERY

Collins, London, 1986. 320 pp., many colour figures and line drawings. Paperback, ISBN 0 00 219137 7, £6.95; hardback, ISBN 0 00 219170 9, £10.95.

This book is essentially an annotated picture guide, although it does contain some text and a number of keys. It should not be confused with the earlier, and still available, 'Field Guide to the Insects of Britain and Northern Europe' which has the same author and publisher. The older book is a concise introduction to Entomology; the new one complements it.

Its stated purpose is to provide an introduction and general guide to the identification of insects and it should help considerably in this. Beginners, in particular, could save much time floundering through keys by early reference to the figures. However the author's contention that the reader ought to be able to place the insects he finds at least to their correct family is optimistic, to put it mildly.

Nevertheless, the book is a good buy if used judiciously and the colour plates, illustrating over 2,000 species, including some larvae and pupae and a selection of non-insects such as spiders and woodlice, are generally of high quality and are unequalled in their scope.

*RONALD M. DOBSON*

### **Woodlands of Britain: a Naturalist's Guide**

RON FREETHY

Bell & Hyman, 1986, 216 pp., many colour and black and white illustrations, map, gazetteer, bibliography. Hardback ISBN 07135 2608 4, £12.95

This is an interesting book suitable for the general reader and more experienced naturalist. As well as giving notes on all aspects of woodland wild life, it gives fascinating insights into natural history folk lore including the doctrine of signatures. Covered also are the uses to which wood has been put in the past as well as notes on its present uses.

This book is beautifully illustrated with high quality colour and black and white photographs. The line drawings by Carole Pugh are delightful. It is excellent value and is a useful addition to the bookshelf.

*MARGARET M. H. LYTH*

## **Plant Recording at the Tip of Lanarkshire's Nose**

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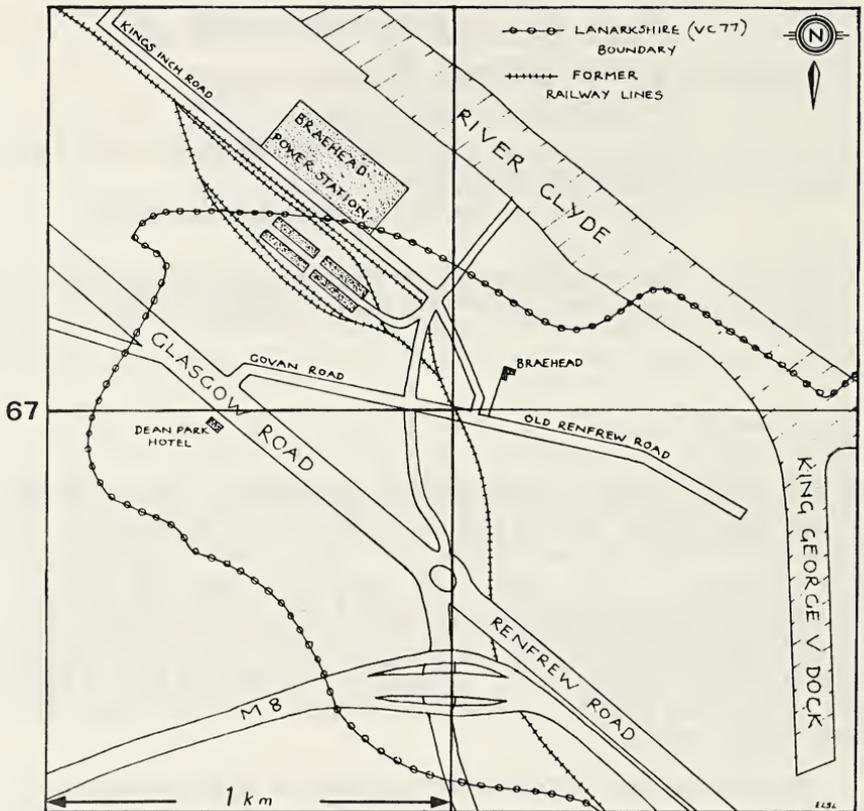
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*Modified Version of Presidential Address II  
delivered (by P.M.) on 14 October, 1986.*

In late 1983 we began intensive plant recording on the south side of the River Clyde and as one of us (P.M.) is the Recorder for Lanarkshire (V.C.77) we decided to start at the boundary with Renfrewshire (V.C.76) and work eastwards. For the National Recording Scheme, south of the river, Lanarkshire projects into Renfrewshire as a nose and a tip of the nose extends into the 1km square 26/51-67 (Fig. 1). By tracing the dimensions with a light-pen on a visual display unit we found that Lanarkshire occupies 39% of that square.

Armed with the Ordnance Survey map on which the boundary had been drawn, we went to this extremity, not expecting to find more than factories, roads and railway lines, but were pleasantly surprised both by the diversity of the habitat in such a small area, and with the number of records made by visits over a twenty-seven month period (July 1983 – September 1985).

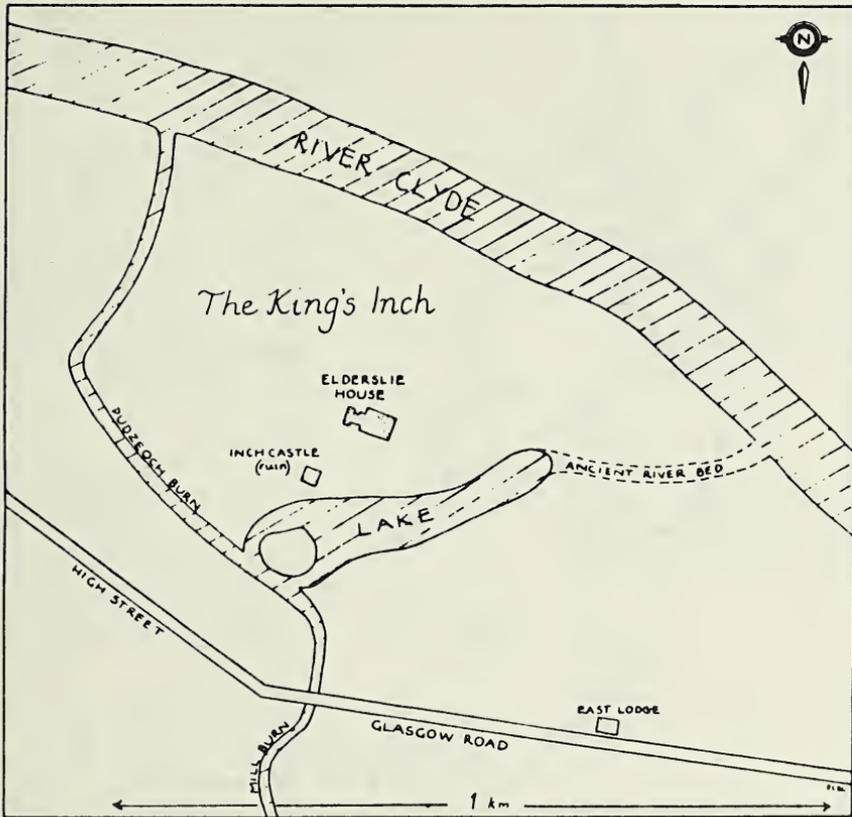
The area, which nowhere exceeds an altitude of 10m, is partially bounded to the west by a tiny stream. At this end there is heath, a work's football pitch with surrounding rough ground and a small part of a housing estate. Then further east factories, roads and woodland in which there are cuttings, the sites of the old railway from Glasgow to Renfrew with the side lines which at one time went to transit depots and the Braehead Power Station. North of this there is open waste ground and at the extreme east there is again a little stream in woodland.



**Fig. 1 Region of interest and adjacent topography**

Administratively the area is now within the Renfrew District. As one looks at the map to-day one is entitled to wonder at the siting of the boundary for the National Recording Scheme. Research has however revealed the reason. At one time there were six islands in the Clyde between the mouths of the Rivers Kelvin and Cart. The largest was King's Inch and the "arm" of the river which circled the island to the south, to where it was joined by the Mill Burn, formed the boundary between Lanarkshire and Renfrewshire.

Andrew Spiers (of Elderslie) purchased the King's Inch in 1760 and subsequently contiguous estates, including, within Lanarkshire, Deanside and Deansfield to the south and land between the Inch and the estate of Braehead to the East. By a Crown Charter in 1770 the estates were combined as the Barony of Elderslie. A palatial mansion was completed on King's Inch in 1782. An artificial serpentine lake was created at the site of the ancient "arm" of the

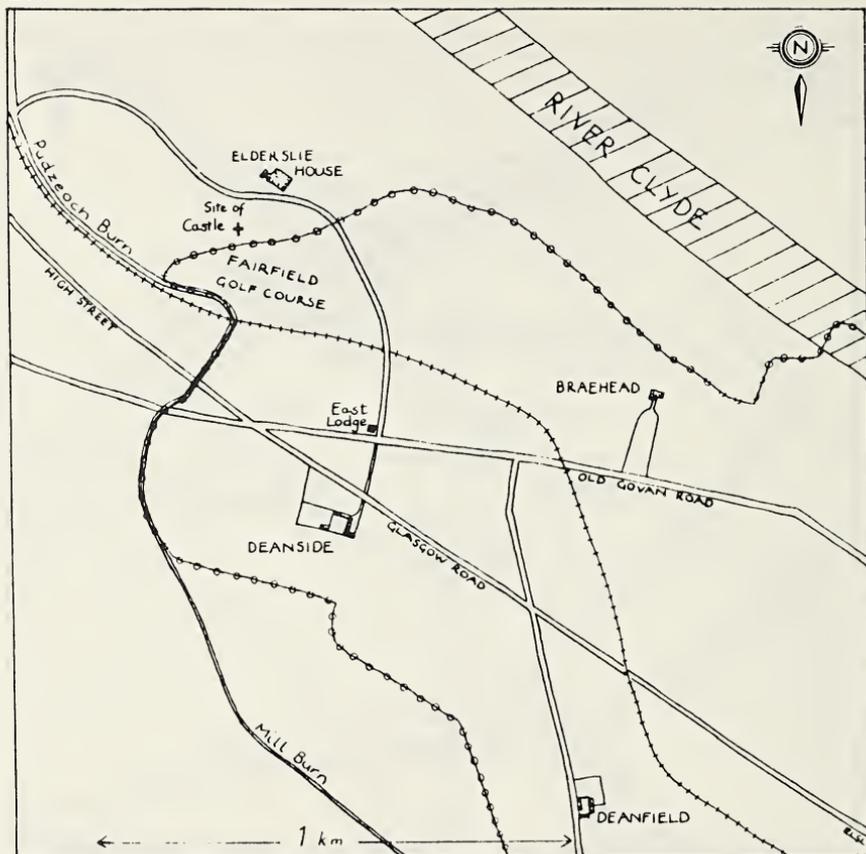


**Fig. 2** Region of interest and adjacent topography in the late 18th century

River Clyde. The east end was surrounded by shrubbery while to the west an island was constructed. This was planted with exotic trees and shrubs and became a bird sanctuary (Fig. 2). By 1840 the lake had been filled in.

The lands to the east of this lake, and lying within the County of Lanark were excluded from the areas proposed to be annexed to the City, by agreement with the Glasgow Corporation, County of Lanark and Mr Hagart Speirs (1869-1958). This was on account of the decision of Mr Speirs to have his lands included within the Royal Burgh of Renfrew with which his local interests were associated.

The Speirs family vacated Elderslie in 1869 and the house was let. After a while the property was turned into a large dairy farm and then in 1903 a full-length 18-hole golf course was constructed by



**Fig. 3** Region of interest and adjacent topography in the early 20th century

the Fairfield Golf Club in the extensive Elderslie parklands (Fig. 3). The course was considered to be excellent both as regards turf and layout, and existed until 1942. After being derelict for many years, the walls of Elderslie House were demolished in 1924 and the stone used for bottoming the new Glasgow-Renfrew road which had had to be re-routed when the King George V Dock was constructed (Dunn, 1972).

Transit depots were built during the Second World War. The site was purchased by Glasgow Corporation in 1942 and in place of the mansion house and grounds the gigantic Braehead Power Station and Factories were erected, the former being built in the late nineteen-forties and commissioned in 1950.

The first railway line to run through the site was the Glasgow & Renfrew District Railway. It branched from the Glasgow – Paisley

**Table 1 A & B** The number of species in the different habitats with the more interesting ones listed.

No. HABITAT		A. INTERESTING SPECIES	
51	Open Ground	<i>Arenaria leptoclados</i> ; (Slender Sandwort)	<i>Dipsacus fullonum</i> ; (Teasel)
35	Grassy	<i>Hieracia</i> 3 spp; (Hawkweeds)	<i>Senecio sylvaticus</i> ; (Heath Groundsel)
32	Roadside	<i>Lepidium heterophyllum</i> ; (Smith's Pepperwort)	<i>Linum catharticum</i> ; (Fairy Flax)
20	Old Railway	<i>Chaenorhinum minus</i> ; (Small Toadflax)	<i>Hypericum hirsutum</i> ; (Hairy St. John's-wort)
12	Wood	<i>Dactylorhiza fuchsii</i> ; (Common Spotted-orchid)	<i>Epipactis helleborine</i> ; (Broad-ldv Helleborine)
7	Bushy/Hedge	<i>Rosa</i> 2 spp; (Roses)	<i>Solanum dulcamara</i> . (Bittersweet)
6	Water-side	<i>Epilobium parviflorum</i> ; (Hoary Willowherb)	<i>Viola palustris</i> . (Marsh Violet)
5	Heath	<i>Calluna vulgaris</i> ; (Heather)	<i>Veronica serpyllifolia</i> . (Thyme-ldv Speedwell)
3	Water	<i>Callitriche stagnalis</i> ; (Cmn Water-starwort)	<i>Equisetum palustre</i> . (Marsh Horsetail)
1	Garden weed	<i>Solanum nigrum</i> (Black Nightshade)	
<b>No. PLANTS</b>		<b>B. SEPARATELY LISTED SPECIES</b>	
29	Grasses	<i>Vulpia myuros</i> ; (Rat's-tail Fescue)	4 agricultural - <i>Avena fatua</i> ; (Wild Oat)
20	Trees	<i>Salix</i> 5 spp; (Willows)	no exotics, all regenerating, or capable of doing so, except <i>Tilia vulgaris</i> . (Lime)
5	Rushes	<i>Juncus acutiflorus</i> ; (Sharp-flowered Rush)	<i>J. bufonius</i> ss; (Toad R)
4	Ferns	<i>Asplenium ruta-muraria</i> ; (Wall-rue)	<i>Dryopteris dilatata</i> ; (Broad Buckler-fern)
3	Sedges	<i>Carex flacca</i> ; (Glaucaus Sedge)	<i>C. ovalis</i> (Oval S)
2	Wood-Rushes	<i>Luzula campestris</i> ; (Field Wood-rush)	<i>Triticum aestivum</i> . (Bread Wheat)
		<i>Malva moschata</i> ; (Musk Mallow)	<i>Senecio squavidus</i> . (Oxford Ragwort)
		<i>Vicia tetrasperma</i> . (Smooth Tare)	
		<i>Taraxaca</i> 5 spp. (Dandelions)	
		<i>Rumex sanguineus</i> . (Wood Dock)	

Table II Alien/Exotic species, their habitat and Lanarkshire record status.

>5	<i>Aquilegia vulgaris</i> cv (Columbine)	Rw	3rd	<i>Geranium endressii</i> (French Cranesbill)	Rw	1st	<i>Philadelphus subcanus</i> (Mock Orange)	Gr
>5	<i>Aster novi-belgii</i> (Michaelmas-daisy)	Wg	>5	<i>Hesperis matronalis</i> (Dame's-violet)	Wd	1st	<i>Polygonatum x hybridum</i> (Garden Solomon's Seal)	Wd
1st	<i>Astilbe x aredensii</i> (Astilbe hybrid)	Rw	1st	<i>Hyacinthoides hispanica</i> (Spanish Bluebell)	Wd	4th 1st alb	<i>Ribes sanguinum (album)</i> (Flowering Currant (white))	Rw
1st	<i>Aucuba japonica</i> (Spotted Laurel)	Rw	2nd	<i>Ligustrum ovalifolium</i> (Garden Privet)	Wg	1st	<i>Rubus cockburnianus</i> (Whitewash Bramble)	Rw
1st	<i>Campanula trachelium</i> (Nettle-lvd Bellflower)	Rw	>5	<i>Lysimachia punctata</i> (Dotted Loosestrife)	Gr	1st	<i>Rubus laciniatus</i> (Parsley-lvd Bramble)	Wg
3rd	<i>Centaurea montana</i> (Perennial Cornflower)	Rd	2nd	<i>Meconopsis cambrica</i> (Welsh Poppy)	Rw	1st	<i>Sedum spurium</i> (Caucasian Stonecrop)	Rd
1st	<i>Cheiranthus x allionii</i> (Siberian Wallflower)	Rd	2nd	<i>Mentha x villosa</i> (Mint hybrid)	Gr	1st	<i>Solidago gigantea spp serotina</i> (Early Goldenrod)	Rd
2nd	<i>Chrysanthemum maximum</i> (Shasta Daisy)	Wg	1st	<i>Narcissus hybrid Div. 2</i> (Large-cupped Narcissus)	Wd	3rd	<i>Spiraea douglasii x salicifolia</i> (Bridewort hybrid)	Rw
4th	<i>Cicerbita macrophylla</i> (Blue Sow-thistle)	Rw	1st	<i>Narcissus hybrid Div. 3</i> (Small-cupped Narcissus)	Rw	>5	<i>Symphoricarpos rivularis</i> (Snowberry)	Rw
1st	<i>Cornus alba</i> cv (Tartarian Dogwood)	Rw	>5	<i>Papaver somniferum</i> (Opium Poppy)	Gr	1st	<i>Thalictrum aquilegifolium</i> (French Meadow-rue)	Rw
2nd	<i>Crocsmia x crocosmiflora</i> (Montbretia)	Rw						

Gr = Grassy area; Rd = Roadside; Rw = Railwayline; Wd = Woodland; Wg = Wasteground

line at Cardonald and had intermediate stations at Deanside and at King's Inch (Renfrew Central) before terminating at Renfrew Porterfield. This branch line opened to passengers in June 1903 but the Deanside Station closed in January 1905. In August 1906 control changed and it became part of the Glasgow & Paisley Joint Line. The passenger service was withdrawn in July 1926 and the line singled in 1936. Sidings were laid to the transit depots during the 1939-45 war and later also to the electricity generating station (Scottish Record Office 1986 – personal communication). The main line was closed to goods from July 1964. By 1971 all but two railway lines had been lifted when the Power Station converted to oil (it ceased to generate electricity in 1983). The remaining railway lines were lifted between 1980 and 1983.

There is now no trace of the former “glory” – or is there? Are some of the more exotic plants a relic of cultivation? The alien plants are, however, scattered all over the site with the greatest concentration on the banks and actually on the floor of the cutting of the former line to the most southern transit depot, a line lifted in 1967/68. Many of the plants recorded occurred in more than one habitat, but we have allocated each to its most common site. The trees, rushes, sedges and grasses have been listed separately as have the more exotic introductions (Tables 1 and 2). Where appropriate, nomenclature follows Clapham, Tutin and Warburg (1981), and Dony, Robb and Perring (1974).

The plants which we have recorded for V.C.77 will also be included in the projected “Flora of Glasgow” (Dickson 1984). For this work a rectangle based on the National Grid has been chosen, and records are being compiled in tetrads (four square km). Of the 90 tetrads, 41 are completely and 28 partly within V.C.77.

## NOTES ON SOME OF THE SPECIALLY MENTIONED PLANTS

(The additional Lanarkshire records which are quoted from J. H. Dickson's compilation for the “Glasgow Rectangle” are as at December 1985. The following abbreviations are used: J.H.D. – J. H. Dickson (personal communication); *Atlas* – see Perring and Walters, 1982; *Supplement* – see Perring and Sell, 1968.

### *Arenaria leptoclados*

Slender Sandwort

The more common species *A. serpyllifolia* (Thyme-leaved Sandwort) has been regarded as widespread but scarce in V.C.77. Hopkirk (1913) reported it on the walls of Craignethan Castle.

The plant however has probably been overlooked due to its diminutive size. During 1985 we saw it in four tetrads in V.C. 77 within the Glasgow Rectangle. As these two species are difficult to distinguish they were aggregated in the *Atlas*. We have however had our identification of *A. leptocladus* confirmed, and as there are no Lanarkshire records of it in the *Supplement* our finding has been notified as a new V.C. record.

*Calluna vulgaris*

Heather

This plant has previously been reported from the 10km square in which lies the area that we have been intensively recording. Perhaps surprisingly, we have found it in five other V.C.77 Glasgow tetrads, and so far it is known from 23 of the 90 tetrads (J.H.D.).

*Chaenorhinum minus*

Small Toadflax

Hopkirk (1813) knew this plant from sandy fields about Dalbeth and from old walls at Barncluith near Hamilton. In the *Atlas* there are a few records for V.C.77 but none in the Glasgow Rectangle. We have made four other tetrad records in the past few years, all along old railway lines, sites for which the plant has a particular propensity. There are two other rectangle records within V.C.77 (J.H.D.).

*Dactylorhiza fuchsii*

Common Spotted-orchid

This is another widely distributed orchid but in the *Atlas* there is only one Glasgow Rectangle record in V.C.77. We have however seen it in 17 further V.C.77 Glasgow sites and it actually occurs in 41 of the 90 Glasgow Rectangle tetrads (J.H.D.).

*Dipsacus fullonum*

Teasel

Regarded by Lee (1933) as being very rare in the Clyde area and no actual locations were given for Lanarkshire. The first localised record is from Cambuslang (Percy 1966). Our "Nose" site is the largest of the five V.C.77 tetrad sites known to us within the Glasgow Rectangle having an impressive colony of about 300 plants. During the Flora of Glasgow Survey it has been recorded from a further four tetrads (J.H.D.).

*Echium vulgare*

Viper's-bugloss

There are only two records for this species for V.C.77 in the *Atlas* and this is the only subsequent record we have made for this striking plant. It has however been seen in 10 other V.C.77 Glasgow Rectangle tetrads, on bings and other waste ground (J.H.D.).

*Elodea canadensis*

Canadian Waterweed

Nowadays a plant of wide occurrence but we were surprised to come upon it in a stagnant offshoot of the little stream within the wood at the east of our area.

*Epipactis helleborine*

Broad-leaved Helleborine

Regarded as frequent by Hopkirk (1813) and recorded also by Lightfoot (1777) and Balfour (1902). On the other hand Lee (1933) stated that it was not common and gave only the locality of Crossford. However we

agree with Dickson (1984) that it is of frequent occurrence. He reports that it has now been seen at least 40 times during the "Flora of Glasgow" recording (J.H.D.). There are four well separated colonies, including one at the extreme tip of the "Nose", and we have noted it in no less than 13 other 1km squares (11 tetrads) in Lanarkshire within the Glasgow Rectangle. It was in fact present in practically every wood surveyed.

*Equisetum variegatum* Variegated Horsetail  
The one previous county record from the sandy edge of Frankfield Loch dates back to 1865 (Hennedy). This second site is in sandy ground between the football pitch and the boundary stream to the west.

*Hypericum hirsutum* Hairy St John's-wort  
Reported by Ure (1793) from the banks of the rivers Clyde and Calder (where it may still be found) and from a wood near Hamilton by Hopkirk (1813). There are no previous records from the Glasgow Rectangle, but the plant was seen in the same tetrad as our record by J.H.D. in 1984.

*Lepidium heterophyllum* Smith's Pepperwort  
Although more common in Scotland than *L. campestris* it has been infrequently recorded. Lee (1933) regarded it as "not common" and gave one Lanarkshire record – Abington. There are four *Atlas* records for the species in the county, including one in the Glasgow Rectangle. We have seen it on four occasions within the rectangle in the past three years and twice elsewhere in the county. There are five further V.C.77 Glasgow records (J.H.D.).

*Linum catharticum* Fairy Flax  
A plant specially common and characteristic of calcareous grassland, though not confined to basic soil (Clapham et al. 1981). It has been recorded frequently in V.C.77 but only one of these previous records was within the Glasgow Rectangle. We have seen it in two, and J.H.D. has four other V.C.77 Glasgow records, the habitats including bings.

*Listera ovata* Common Twayblade  
A plant of common occurrence throughout V.C.77 but in the *Atlas* no records are given for that part which lies within the Glasgow Rectangle. We have seen it also in an adjacent tetrad, and there are two other records (J.H.D.).

*Malva moschata* Musk Mallow  
Only one Lanarkshire record is given in the *Atlas* though over the years it has been reported by Robertson (Herbarium specimen late 18th century), Hopkirk (1813), Scott (Lee 1953) and Birnage (Herbarium specimen 1967). This beautiful plant was seen in 1983 but has not re-appeared. There is a 1985 Glasgow record (J.H.D.).

*Rumex sanguineus* Wood Dock  
Reported from Bothwell by Hopkirk (1813) and regarded as common by Lee (1933) however only one record for Lanarkshire is given in the *Atlas*

though three others were included in the Master Cards. None of these records was within the Glasgow Rectangle. We have seen it in five other V.C.77 Glasgow tetrads and J.H.D. knows of another two.

*Sagina apetala* Annual Pearlwort  
There are three previous records from V.C.77 one of which was from the Glasgow Rectangle. This is another insignificant plant which is readily overlooked – in 1985 we recorded it from eight other V.C.77 Glasgow tetrads and it was seen also in a further six (J.H.D.), the habitats being rubbly waste-ground, including bings.

*Sagina ciliata* Fringed Pearlwort  
This is a new V.C. record. The BSBI referee has written “I agree that your specimen is what was formerly called *S. ciliata* but is now *S. apetala* ssp. *apetala*” (Hepper 1984 – personal communication).

*Senecio squalidus* Oxford Ragwort  
The earliest record of certain occurrence in Scotland was made by Richard Prasher in Fife (Kent 1966). In his vice-committal list, Kent did not include V.C.77, though one record for South Lanarkshire is given in the *Atlas*. The plant has spread quickly in the Glasgow Rectangle in the past few years especially in the neighbourhood of the Clyde. We have now seen it in 13 V.C.77 tetrads in the Glasgow Rectangle (J.H.D. knows of seven more) and we have recently also seen the hybrid between this species and *S. viscosus* (Sticky Groundsel) in the Meadowside area of the city.

*Senecio sylvaticus* Heath Groundsel  
Both Hopkirk (1813) and Lee (1933) reported the plant from Tollcross. In the *Atlas* there is one record for a 10km square which straddles the Lanarkshire/Renfrewshire boundary. The present record is actually within the same square.

*Silene alba* White Campion  
There are seven V.C. records in the *Atlas* one of which is within the Glasgow Rectangle, in which we have made five further and J.H.D. has noted six other V.C.77 records in the last three years.

*Solanum nigrum* Black Nightshade  
This was the one interesting plant seen as a garden weed in the small part of the Housing Estate which comes into our area. The *Atlas* gives one casual record for the same 10km square, a square which straddles the Lanarkshire/Renfrewshire boundary. We have seen it also in another Glasgow tetrad, but again within the same large square. There are two other records, in the Necropolis and at Uddingston (J.H.D.).

*Trifolium aureum* Large Hop Trefoil  
This species has not been included in either the *Atlas* or the *Supplement*. Clapham et al. (1981) state that the plant is scattered throughout the

British Isles while Butcher (1961) notes that it is found naturalised in a few places, especially in Scotland. Patton (1925) reported it from the railway at Symington, and Grierson (1931) stated that he had seen it occasionally at Newlands and Gartcosh. It has recently been seen on waste ground and pathsides at Hyndland Station (Macpherson and Stirling 1983) and at Frankfield Loch (Dickson 1985).

*Vicia sativa* Common Vetch  
Hopkirk (1813) reported that plants with white flowers had been found on the Cathkin Hills. Lee (1933) stated that the plant was cultivated as fodder and was frequently found on field borders. It was not included in the *Atlas* but we have found three records on the Master Cards obtained from Monkswood. We have not seen the plant elsewhere in the county so it must be much less common than in Lee's day.

*Vicia tetrasperma* Smooth Tare  
Lee (1933) regarded this four-seeded tare as a very rare casual and Patton (1925) had a record from the railway at Symington while two casual records are included in the *Atlas*. The only other recent record is that from waste ground adjoining the Bothwell Service Area (Smith 1979 – personal communication).

*Vulpia myuros* Rat's-tail Fescue  
This is the subject of a previous report (Macpherson and Lindsay 1985).

### Aliens/Exotic species

Fourteen of the 31 introductions were found in relation to old railway lines; five in woodland; and four each on grassy areas, roadsides and waste-ground. This distribution suggests that the plants are not relics (unless they have migrated over the years to safer habitats). Those at the road-side e.g. *Centaurea montana* (Perennial Centaury) and *Cheiranthus x allionii* (Siberian Wallflower) were probably dumped. We have checked with The Daffodil Society and been informed that the Narcissi hybrids were only developed in the 1920s and 1930s and were not generally available commercially until about 1950. Therefore they must also be of recent introduction. As to whether or not some species are relics, one can only speculate, certainly one cannot imagine such a remarkable assemblage as that which occurs in relation to the earliest lifted lines coming from a single source. *Acuba japonica*; *Aquilegia vulgaris* cv.; *Cicerbita macrophylla*; *Crocsmia x crocosmiflora*; *Cornus alba*; *Lysimachia punctata*; *Meconopsis cambrica*; *Rubus cockburnianus*; *Sedum telephium*; *Spiraea douglasii x salicifolia*; *Symphoricarpos rivularis*; *Thalictrum aquilegifolium* mixed in with *Circaea lutetiana*; *Dryopteris dilatata* and *D. filix-mas*; *Allium ursinum*.

## Historical discussion

The previous Recorder for V.C.77 gave as his Presidential Address to our Society, a talk entitled "Plant Recording in Clydesdale" (Mackechnie 1958). He commented that by this very appropriate name the County of Lanark was formerly known and that it was to that county that his remarks would chiefly apply. He traced the recording from the first Lanarkshire record by John Ray in 1661. There followed Dr. John Hope, James Robertson and the Rev. John Lightfoot in the eighteenth century. In the same century the Rev. David Ure published *The History of Rutherglen and East Kilbride*, (1793) which included the first plant list from a specific part of the county. In 1813 Thomas Hopkirk of Dalbeth published his *Flora Glottiana*. The Rev. William Patrick published *A Popular Description of the Indigenous Plants of Lanarkshire* in 1832. Important records were made by Professor J. H. Balfour in the middle of the 19th century. Professor R. Hennedy published the first edition of *The Clydesdale Flora* in 1865 and the fifth was published in 1891. Peter Ewing published in 1892 *The Glasgow Catalogue of Native and Established Plants*, listed on the vice-comital basis. The *Flora of the Clyde Area* by J. R. Lee was published in 1933 and "Additions" in 1953. From 1916 – 1928 Robert Grierson (1931) "combed the coups assiduously for alien species".

Local botanists participated in the Distribution Map scheme organised by the Botanical Society of the British Isles between 1954 and 1960 culminating in the publication of the *Atlas of the British Flora* in 1962 and based on the 10km square of the National Grid. Since then vice-county Recorders have continued this work. More recently our Society has been recording intensively for a "Flora of Glasgow" (Dickson 1984).

As Mackechnie (1958) wrote "There is no finality in biological recording; within the span of one human life, and the compass of one district, species flourish and decline – sometimes for reasons not at all obvious . . . it is just this slow change in our organic environment which makes the recording of it so fascinating, and so much worth while as a long-term policy".

In *The History of Rutherglen and East Kilbride*, Ure (1793) listed over 120 flowering plants while Hopkirk's *Flora Glottiana* (1813) contains the names of about 700 flowering plants and ferns. The district comprehended in this Flora embraced the valley of the Clyde from the falls above Lanark to the Clyde islands. The northern

boundary included the Campsie and Kilpatrick ranges with the lochs on the northern shores of the Firth. The southern boundary included the hills above Hamilton, the Cathkin and Gleniffer Braes, and the hills from above Greenock to above Portencross. Of those listed by Ewing (1899) in *The Glasgow Catalogue of Native and Established Plants*, 731 were from V.C.77, as were 737 of the wild or established plants and ferns in Lee's *Flora of the Clyde Area* (1933). In the Lanarkshire Card Index, compiled by one of us (P.M.), which includes all categories (native, established and casual) of flowering plants and ferns, 1383 are listed.

In general the results have shown how many more records can be made when recording is intensified. By the end of the 1985 recording season, between 251 and 300 species had been recorded from each of six of the 90 Glasgow Rectangle tetrads, though none had over 300. In particular, by intensive recording over the period July 1983/September 1985, we recorded a total of 266 species and sub-species in an area of only 39 hectares (96 acres).

Mackechnie (1958) commented on the varied flora of the Southern Uplands and the Clyde Valley and remarked that as the course of the river approached the city, the pastoral beauty gave way to a harsher and often squalid scene: for the botanist there remained little but the hardier species of road-side plant and the weeds of railway embankment. However, we have found that botanising in a tiny area like the tip of the Nose of Lanarkshire, in apparently unpromising habitats can be most interesting and rewarding both from the point of view of noteworthy native plants and of established introduced species.

### Acknowledgments

We are grateful for help received in various ways from E.J. Clement, J.H. Dickson, A.C. Leslie, E.L.S. Lindsay, D. McClintock, A.C. Macpherson, R.J. Pankhurst and A.McG. Stirling.

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## Records for "The Flora of Glasgow"

### 5. Deadly Nightshade

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*Received September 1986*

Deadly Nightshade (*Atropa belladonna* L.) is a large plant with a fleshy perennial rootstock and erect, branching annual stems. It shows an apparent preference for calcareous soils, in particular damp or shady places and disturbed woodlands. It is unusual to find it among grassland or other closed communities. It is widespread in Europe extending southwards to North Africa and east to the Ukraine (Butcher, 1947).

The British distribution of *A. belladonna* is correlated with predominantly chalk and limestone regions but other localities reflect its relic status due to former cultivation as a medicinal herb. This latter category is probably responsible for the rare sightings of Deadly Nightshade in Scotland, where it is mainly eastern with scattered occurrences from Edinburgh to Elgin. There are exceedingly few records from the west of Scotland where there is no evidence that the plant has persisted for long periods. However, because of the recovery of seeds from medieval layers by Miss Mary Fraser (1981) it is probable that Deadly Nightshade has persisted at Elgin for hundreds of years (Webster, 1978).

Hopkirk (1813) knew of Deadly Nightshade near Cathcart Mill and both Hooker (1821) and Henedy (1865) repeat the record. Neither Patrick (1831), Ewing (1899) nor Lee (1933) make any mention of it. Grierson (1930) did not find it on any Glasgow rubbish dumps. Smith (1896) lists two Ayrshire localities but we are unaware of any recent records.

These extremely infrequent records from west-central Scotland make all the more noteworthy the discovery of a plant at Maryhill

(Lanarkshire, V.C.77) in July 1986 by K. W., supervisor of the Community Programme "Botanical Surveys of Glasgow".

The Maryhill site is at the base of sheltered, south-east facing stonework leading to a tunnel entrance of a disused railway. There was only one large plant, approaching 2m high, consisting of many stems bearing flowers and immature fruits. It was growing among brambles and was very accessible to the public, including children who play at the site.

The massive spreading rootstock gave the impression that the plant had been present for several years. Comparison of root material with that of a 4-year-old plant grown in a south-west Glasgow garden showed the Maryhill plant to be much larger. Butcher (1947) discussing longevity says the oldest wild individual in the Chilterns died in its 8th year, while plants in cultivation are normally dug up after 4 years. However, plants can persist for many years in the same locality due to a combination of primarily seedling establishment with production of new plants from stolons or fragments of the tap root.

We know of no other occurrences in Glasgow this century apart from in the Botanic Gardens where it was formerly cultivated in an enclosed plot (a herb garden) close to the bandstand. This led to the death of a 7-year-old boy in 1919 and litigation which reached the House of Lords in 1921. The plant was destroyed.

Cases of poisoning by Deadly Nightshade are commonest in children who eat the attractive, glossy berries. Intake of the poisonous alkaloids can induce various symptoms ranging from dilation of the pupils to delirium and coma; death may result from respiratory or heart failure. Between 1967-1979, 34 incidents of poisoning were recorded at the Poison Information Unit; in each case more than 5 berries had been eaten (Cooper & Johnson, 1984).

There have been several discoveries of Deadly Nightshade in Edinburgh in the last quarter of a century. An Edinburgh lady made jam from the berries with the result that her family were admitted to hospital. They returned home better but not knowing what had caused the illness, only to be readmitted after eating more jam!

In October 1979 Mr E. W. Curtis, Curator of the Botanic Gardens, discovered one plant of *A. belladonna* growing on a bank in the Arboretum adjacent to the River Kelvin opposite Garrioch Swing Park. The plant, surrounded by long grass and nettles, was about 1 m high and in berry. A herbarium specimen was taken and

the remainder of the plant dug out and incinerated. The site of the plant was on the margin of an old coup which was used from the end of World War II until the late sixties. Prior to 1940 the area was parkland owned by the Botanic Gardens. After 1979 *Atropa* was found annually growing in the same spot in early summer until 1983 (from fragments of roots still in the soil?) but was always removed and never allowed to flower.

It is very unlikely that this recent finding has any connection with the cultivation of the plant over 60 years before. For this to have been the case, it would have to be envisaged that the plant grew undiscovered for 60 years or that seeds had germinated after being dumped with soil and stayed viable for this time. Although Butcher (1947) says there is some germination after 5 years, we know of no claims that *Atropa* seeds stay viable for decades though there is strong circumstantial evidence that seeds of the related Henbane (*Hyoscyamus niger* L.) have great longevity (Odum, 1978) and a sudden flourishing of *Atropa* at a locality in Norfolk (Butcher 1947) may be a hint that there had been a seed bank. Seed production by Deadly Nightshade can be prolific. Salisbury (1942) estimated the average number of seeds per plant per annum at 74,045.

The sites of the two recent findings at the Botanic Gardens and Maryhill are only 300 m apart. One may have arisen from the other by bird dispersal of seed – the only known mechanism of dispersal of Deadly Nightshade.

Even if that explanation is correct how did Deadly Nightshade get to the Botanic Garden and/or Maryhill in the last 10 years? It may be thought surprising that seeds of this very poisonous plant can be bought; they are on offer by a well-known seeds merchant. Therefore, one wonders if there are private gardens, from which our plants could have arisen in the city and especially in Maryhill, that are the sources of these wild occurrences in Glasgow.

The Maryhill plant was shown being cut down on the BBC *Reporting Scotland* television programme on 28 July 1986 and subsequently the site has been inspected by the Parks Department who will check the area for any recurrence in the spring of 1987.

A letter appealing for information on Deadly Nightshade in Glasgow gardens was published in the *Glasgow Herald* on 22 August 1986. It drew attention to ways of distinguishing Deadly from Woody Nightshade (*Solanum dulcamara* L.). The *Sunday Post* took up the matter on 31 August 1986. As a result of the media publicity 24 people responded, 20 claiming to have Deadly Nightshade. In 16

cases the plant was Woody Nightshade, a common plant in and around Glasgow, even growing in the heart of the city; the Flora of Glasgow Project (Dickson, 1984) so far has discovered it in 41 of the 90 tetrads. Of the 4 other claims one was Tutsan (*Hypericum androsaemum* L.), one was Great Hairy Willowherb (*Epilobium hirsutum* L.) one was Oregon Grape (*Mahonia aquifolium* (Pursh) Nutt.) and the last a cultivated rose (with very dark hips)!

We have, therefore, failed to discover any garden, other than the one mentioned above, in which Deadly Nightshade is grown.

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## Short Notes

COMPILED BY A. McG. STIRLING

### Fungi

#### A Giant Puff Ball

R. LAMBIE

On 2 January 1986, near Kittochside between Carmunnock and East Kilbride, I found the fruiting body of a very large Puff Ball fungus having the following approximate dimensions: — circumference 53 inches, diameter at the widest part 17 inches, and height 17½ inches. Its weight was estimated at about 2½ pounds. It was detached from the soil and had apparently rolled across a stubble field and come to rest against a fence. Only about a quarter of the outer skin remained, revealing the inner body which was of a mustard colour and in a powdery condition.

*Compiler's Note* This specimen was almost certainly an example of *Langermannia gigantea* (syn. *Lycoperdon giganteum*), a rather uncommon Puff Ball in the Glasgow area.

### Flowering Plants

#### Carmyle Past and Present

AGNES WALKER

A few members of the Society, Agnes Walker, Jean Millar, Irene Nove and Mike Jarvis, have been investigating the plants growing in the neighbourhood of the River Clyde near Carmyle in the light of old records from *Flora Glottiana* (Hopkirk, 1813), *Clydesdale Flora* (Hennedy, 1865) and *Flora of the Clyde Area* (Lee, 1933). We re-found many of the interesting plants of the area such as *Adoxa moschatellina* (which grows in some abundance in places), *Equisetum hyemale* (found by Mrs J. H. Dickson), *Geranium phaeum* and *Senecio fluviatilis*, but were unable to re-find some plants which were common at the time of Hopkirk and Hennedy, although we looked in the places mentioned in the old records. We hope to write a full account of our findings and would value any information on the plants of the area, in particular those we have not so far found. These are: — *Ranunculus aquatilis*, *auricomus*, *bulbosus* and *fluitans*; *Trollius europaeus*; *Thalictrum flavum*; *Primula vulgaris*; *Geranium sylvaticum*; *Potentilla reptans*;

*Prunus spinosa*; *Rosa arvensis* and *rubiginosa*; *Chrysosplenium alternifolium*; *Sanicula europaea*; *Scandix pecten-veneris*; *Carum carvi*; *Galium boreale*; *Doronicum pardalianches*; *Lysimachia vulgaris* and *Zanichellia palustris*.

***Limosella aquatica* L. in the Glasgow area** J. R. S. LYTH

In the summer of 1986, while recording for the Flora of Glasgow project with the extra-mural class of Glasgow University, I found about ten plants of Mudwort (*Limosella aquatica*) growing on the south bank of the River Clyde near Cambuslang (NS 644612). The plants were on a part of the river bank which would flood during spates. The bare patch of soil, a clayey silt about one metre square, supported the *Limosella* and some Blinks (*Montia fontana* agg.).

I note from *Watsonia* Vol.15, 118 (1984) that *L. aquatica* seems to be spreading in Fife, V.C. 85, and also that it can colonise rapidly on fresh exposed mud. The *Atlas of the British Flora* (1962) records it in only four sites in Scotland, all pre-1930. Lee's *Flora of the Clyde Area* (1933) records Mudwort in Ayr V.C.75 and Dunbarton V.C. 99 at the 'edges of lakes and ponds; very rare'.

The only other record in the Flora of Glasgow project area is from Balgray Reservoir, Barrhead, V.C.76, where *Limosella* has recently been found in great profusion.

It would appear that this is a new vice-county record for Lanarkshire V.C.77.

***Montia parvifolia* established in Lanarkshire** P. MACPHERSON

When wading along the Lanarkshire (V.C.77) side of the River Cart, east of Busby, in June 1985, a patch of *Montia* was found on a steep bank. Superficially the plant looked like a far-creeping Pink Purslane. It has been identified by Mr E. J. Clement as *M. parvifolia* (Moc. ex DC.) Greene. A return visit in June 1986 confirmed that the plant was well established and likely to remain a permanent component of the Scottish flora.

*M. parvifolia* is a native of North America, from Alaska south to California. It has a predilection for growing on damp rocks on river banks. A fuller account has been prepared for publication elsewhere.

## A Colony of the Green-winged Orchid on the Ayrshire coast

I. C. CHRISTIE

The ecology of *Orchis morio* in Ayrshire is discussed by A. McG. Stirling in the *Glasgow Naturalist* Vol. 21, 102 (1985). In May 1986 a colony was found in a situation materially different from those he examined.

Ninety-seven flowering plants were counted on the south side of a small pointed hillock, 50 yards inland from high tide mark. The underlying rock is volcanic, and the soil a well drained acidic sandy loam. Associated plant species include *Calluna vulgaris*, *Erica cinerea*, *Succisa pratensis*, *Polygala serpyllifolia*, *Plantago lanceolata*, *P. maritima*, *Lotus corniculatus*, *Hieracium pilosella*, *Scilla verna* and *Carex flacca*. The enclosure is heavily grazed and trampled, especially in the early part of the year, perhaps by overwintered cattle.

Flower spikes varied in height from 1½ inches to 5½ inches, and bore from 1 to 7 flowers. They were in full flower on 24 May, but soon after were wasted by salt spray during a westerly gale. Most withered at once, and by 25 June it was clear that less than 1% of flowers would produce seed. Since the species is thought to be monocarpic (V.S. Summerhayes, *Wild Orchids of Britain*, New Naturalist Series) it will be interesting to see how many spikes are produced in 1987.

## *Carex vulpinoidea* in Glasgow district

P. MACPHERSON

In July 1986 a single plant of the sedge *Carex vulpinoidea* was found on waste ground on the Ibrox district of Glasgow (V.C.77). The determination was made by Mr A. O. Chater, British Museum (Natural History).

This alien species, a native of North America, was previously reported from near Williamwood Station (V.C.76) by A. McG. Stirling, however the site was developed for housing the following year and the habitat was destroyed. (*Glasg. Nat.* 20: 88, 1980 & 20 : 184, 1981). It will be interesting to observe its future at Ibrox.

## Rowan and Hollies in 1986

I. C. CHRISTIE

June 1986 was noteworthy for the extraordinary amount of blossom produced by rowans, *Sorbus aucuparia*, in West and Central Scotland. Practically all trees were involved, whether large or small,

healthy or sickly, fully exposed or in shade, and to an extent which had certainly not been seen for many years. A large crop of berries followed.

Abundant blossom is usually thought to be associated with fine weather during the preceding summer, but that cannot have applied in this instance, since 1985 had one of the dullest and wettest summers on record. The most plausible explanation is that the phenomenon was due to the coincidence of three favourable factors. Firstly, though the trees were moderately flowery in 1985, very little fruit was set, and this concentrated energy in vegetative growth. Secondly, the leaves remained green on the trees at least ten days longer than usual in October, and thus were able to make maximum use of the third factor: a spell of very fine weather which commenced on 10 October.

Hollies, *Ilex aquifolium*, on the other hand, produced a huge crop of berries in 1985, and virtually no flowers and berries in 1986.

## Insects

### The Azure Damselfly in Ayrshire

R. SUTCLIFFE

Whilst identifying some insects collected from Hurlford, near Kilmarnock, I came across two specimens of the Azure Damselfly *Coenagrion puella* (L.). D. M. Bayne in *Glasg. Nat.* 21, 107 (1985), pointed out that this species is only recorded from fifteen 10 kilometre squares in Scotland. This new record appears to be additional to these. The two specimens, both males, were collected by Fred R. Woodward on 26 July 1984, from Hoodston Bridge, near Hurlford, beside the Cessnock Water approximately 500 m south of its junction with the River Irvine (NS 472368).

Examples of the Blue-tailed Damselfly, *Ischnura elegans* (Vander Linden) and of the Common Blue Damselfly, *Enallagma cyathigerum* (Charpentier) were also collected. These specimens are all now in the collections of the Art Gallery & Museum, Kelvingrove, Glasgow.

**Gold Triangle Moth**

R. SUTCLIFFE

A single specimen of the Gold Triangle, *Hypsopygia costalis* (Fabricius) came to a Robinson light trap in Newmilns, Ayrshire (NS 5337) on 28 July 1986. It was collected by Fred R. Woodward and is now in the Art Gallery & Museum, Kelvingrove, Glasgow.

According to Goater (*British Pyralid Moths*, 1986), this species is 'Locally common in England south of Durham and Lancashire . . .'. Mr I. C. Christie knows of no recent records of this pyralid for the West of Scotland.

**Two species of Cranefly new to Scotland** E. G. HANCOCK

*Dicranota gracilipes* Wahlgren is a distinctive member of the genus in having long, narrow wings. It was first recorded as occurring in the British Isles in 1959 in Westmorland and was subsequently recognised from North Cheshire and South Wales. All the dates of collection were from the third week in September. I found a single male of this species in Argyll by the side of the stream in Glen Stockdale, Appin (NM 93-47-) on 23 September 1978. As far as I am aware this species had not been taken before in Scotland. I have found another single male in Argyll. This example was found struggling in a spider's web by the side of Eas a' Ghail, Glen Orchy (NN 213264) on 19 September 1986.

*Dicranota robusta* Lundstroem is even more distinctive but more elusive in habit. It has short wings, being almost flightless, and is nearly black in colour. The antennae are short and of only ten or eleven segments — the normal number in the genus being thirteen. Previous records almost exactly parallel those of *D. gracilipes* in England and Wales. In Scotland I have found it by adopting a technique developed in similar situations further south. This entails turning over stones in oligotrophic streambeds in April. The adult flies are found at rest underneath stones. The behaviour and adaptations of this fly are of some interest and are currently being studied. Records so far are from near Sanquhar in the Spothfore Burn (NS 793141) and by the River Nith (NS 835057) on 25 April 1986. It seems clear from this and similar observations in the North of England, that this species is widely distributed in appropriate habitats in Britain but has escaped observation because of its elusive nature.

**The lucanid beetle *Sinodendron cylindricum* (L.) new to Argyll**

J. T. KNOWLER  
& J. MITCHELL

On 18 June 1986 a single male of this horned beetle (Fig. 1) was observed near the western end of Glasdrum National Nature Reserve (NN 999454) beside Loch Creran, Argyll. Regarded as a reliable indicator of 'primary' (ancient) woodland, there are scattered records from Scottish oakwoods in several southern vice-counties northwards to Perth. From Perth to Inverness *S. cylindricum* appears restricted to the remnants of native pine forest (*Glasg. Nat.* 18: 182).

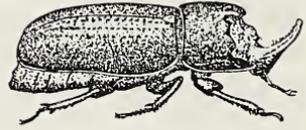


Fig. 1.  
*Sinodendron cylindricum* (L.)

***Strangalia maculata* Poda (Col. Cerambycidae) in Scotland**

J. M. CHRISTIE

Although common in the South of England, this distinctive beetle becomes scarcer northwards, and has always been regarded as a rarity in Scotland. Its known distribution was summarised by Kaufmann, 1948 in *Proc. R. phys. Soc. Edinb.* 23 : 83-94. Three Scottish sites are given : Orchardton, Dalbeattie, and Little Ross, Kirkcudbright, both V.C. 73, and Glen Cloy, Brodick, V.C. 100. It is not known how many specimens were found, but presumably very few, and these in the 19th century.

In more recent years, the late Sir Arthur Duncan collected extensively in South-west Scotland, and his collection, now housed in the Royal Scottish Museum, contains nine *Strangalia maculata* captured between 1954 and 1984. Five are from Caerlaverock, Dumfries, one from Glencaple, Dumfries, one from Sandyhills, Dalbeattie, and two from Cree Wood, Wigtown. Dr R. A. Crowson has recorded the species from Creetown, and also from Southwick, Dalbeattie, and in 1986 several specimens were seen at the Caerlaverock site by Mr Richard Lyszkowski. Thus it can be said that it is established along the northern shore of the Solway Firth from the Nith estuary to Wigtown Bay, in V.C.'s 72, 73 and 74.

On 19 August 1986 I captured one specimen in square NM 51-63-, about a kilometre east of Mingary Castle, Ardnamurchan, V.C.97. It is of the form *mediopunctata* as described by Kaufmann,

1946, *Entomologist's mon. Mag.* 82 : 115-117 (Fig. 2). The site is a steep south-facing bank rising from the sea-shore, and, like the Solway and Brodick, is one of the 'hot-spots' of the west coast. The species requires deciduous wood for its larvae, and flowers, especially umbellifers, for the adults, which fly in sunshine. Most of Scotland may be too cold for it, with suitable conditions only occurring in favoured coastal localities. Other 'hot-spots', such as Ardtornish in Morvern, might yield further specimens. The Distribution pattern looks like a relict one, from some 5000 or so years ago in the "post-glacial climatic optimum", when *S. maculata* probably had a wider and more continuous Scottish distribution.

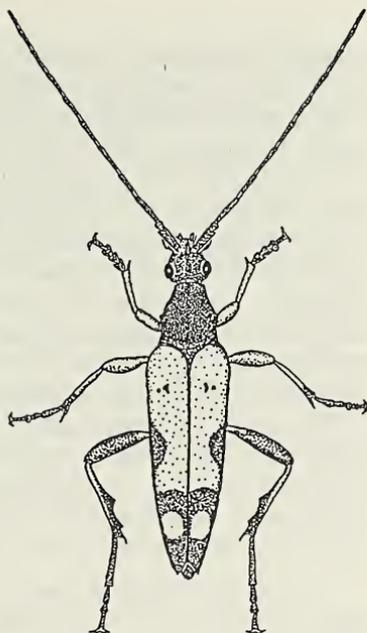


Fig. 2  
*Strangalia maculata* Poda  
*a. mediopunctata* Kaufmann

I am most grateful to Dr R. A. Crowson, Dr R. M. Dobson, Miss Sarah Dobson, Dr G. Rotheray and Mr R. Lyszkowski for their assistance in the preparation of this note.

### Some records of Coleoptera from Dalmeny Park, West Lothian R. A. CROWSON

The Dalmeny estate, for long the seat of the Rosebery family, lies on the southern shores of the Firth of Forth, between Cramond and South Queensferry. It includes substantial areas of mixed woodlands, no doubt of planted origin but long established, pastures, a golf course and a small area of arable land. The soils are mixed, mainly derived from boulder clay, but with sandy areas along the coastal strip, and nowhere markedly base-rich. The relief is low, altitudes ranging to about 80 m above O.D. There is a narrow strip of dune-type habitat along part of the coast, and a few small streams draining into the Firth of Forth, but no substantial wetlands or pond habitats. Public access to the estate is limited to a coastal

footpath between Cramond and South Queensferry. The woodlands are being actively managed, with selective felling and replanting of both conifers and hardwoods, so that habitats offered by dead and dying trees are under-represented at Dalmeny. The estate appears to be fairly rich in Coleoptera, and probably in other insects. The most notable of the coleopterous insects I have found there are the Scarabaeid *Heptaulacus sus* Herbst., the Derodontid *Laricobius erichsoni* Rosenhauer, and the Cryptophagid *Micrambe bimaculatus* (Panzer). The first of these was recorded from Ravelston, Edinburgh in Wilson & Duncan's *Entomologia Edinensis* of 1834 and their record was repeated in Murray's *Coleoptera of Scotland* of 1853, but Fowler, 1890, (*Coleoptera of the British Islands*, Vol. IV) quoted D. Sharp in considering this record erroneous, while Joy, 1932, (*A Practical Handbook of British Beetles*) and Britton, 1956, (*Handbooks for the Identification of British Insects V, part II: Coleoptera Scarabaeoidea*) ignored it. My single specimen was swept from low vegetation in an open sandy glade on 28 August 1985.

The Derodontid has not to my knowledge been previously recorded from Scotland and is a relatively recent addition to the British fauna (P.J. Hammond, 1982, *Ent. Gazette* 33: 35-40). A single specimen was beaten from miscellaneous trees (including some conifers) by my wife E. A. Crowson on 16 July 1985. The species is known as a predator of Chermesidae on spruce, and may well have been introduced to Dalmeny through arboricultural activities. It will be interesting to see whether it spreads further in Scotland.

The *Micrambe* has always been reckoned a very rare species in Britain, and I know of no previous Scottish records of it. Specimens were collected from dead standing trees or logs in a very limited area of the park on 27 September 1972, 14 May 1973 and 16 April 1982. Little seems to be known of the habits of the species.

Other locally uncommon Coleoptera collected by me at Dalmeny include:—

Carabidae	Staphylinidae <i>continued</i>
<i>Amara bifrons</i> (Gyll.)	<i>Lamprinodes saginatus</i> (Grav.)
Micropeplidae	<i>Mycetoporus piceolus</i> Rey
<i>Micropeplus porcatus</i> (Payk.)	<i>Homalota plana</i> (Gyll.)
Leiodidae	<i>Phytosus balticus</i> Kraatz
<i>Nargus anisotomoides</i> (Spence)	Clambidae
Staphylinidae	<i>Calyptomerus dubius</i> (Marsh.)
<i>Anotylus maritimus</i> Thoms.	<i>Clambus nigriclavus</i> Steph.
<i>Quedius semiaeneus</i> (Steph.)	Rhizophagidae
<i>Q. scintillans</i> (Grav.)	<i>Rhizophagus cribratus</i> Gyll.

## Cryptophagidae

*Atomaria pusilla* (Payk.)

## Erotylidae

*Dacne bipustulata* (Thunb.)

## Lathridiidae

*Dienerella elongata* Curtis

## Mycetophagidae

*Pseudotriphyllus suturalis* (F.)

## Cisidae

*Cis bilamellatus* Wood

## Chrysomelidae

*Longitarsus ganglbaueri*

Heikertinger

## Apionidae

*Apion pallipes* Kirkby, W.

It will be noticed that the list does not include any of the species which I regard as reliable markers of old 'primary' woodland sites, such as *Ptinus subpilosus* Sturm, *Acalles ptinoides* (Marsh.), *Tetratoma ancora* F., *Orchesia minor* Walker or *O. micans* (Panz.). There are no sites within 5 km of Dalmeny Park which are likely to preserve remnants of primary woodland.

## Book Review

### **A Field Guide to Caterpillars of Butterflies and Moths in Britain and Europe**

DAVID J. CARTER, illus. by BRIAN HARGREAVES

Collins, London, 1986. 296 pp., 35 + 3 colour plates.

Hardback, ISBN 0 00 219080-X, £9.95.

This welcome "Field Guide" is not comprehensive but includes a wide selection of species of macrolepidoptera that are frequently encountered or of special interest. After an introduction dealing with anatomy, life cycle, enemies, defences, caterpillar finding, rearing, study and conservation, the book gives details of over 500 species under the headings, distribution, description, habitat, foodplants and biology. Species are arranged according to Kloet & Hincks' 1972 *Check List* and additions according to Leraut's *Liste Systématique et Synonymique des Lépidoptères de France, Belgique et Corse*. Butterflies follow the nomenclature of Higgins & Hargreaves' *Butterflies of Britain & Europe*.

The colour plates are superb and illustrate caterpillars, food plants and sometimes adult insects. One deals with some non-lepidopteran larvae and another with caterpillar enemies. The format is usually a double page spread and all plates are concentrated in the middle of the book which facilitates ready reference.

There is a detailed list and index of foodplants, a short bibliography and a general index. End plates have silhouettes of typical caterpillars.

The book is a great advance on the previously available sources for caterpillar identification and authors and publishers are to be congratulated.

RONALD M. DOBSON



**CHARLES ERIC PALMAR**  
1919 - 1986

**Obituary**  
**CHARLES ERIC PALMAR**  
**(1919 – 1986)**

Charles Palmar – or Charlie as he was always affectionately called – was one of the most genial people I have ever had the pleasure of knowing. He was always prepared to take time for anyone – children, members of the public, who wanted information he had probably been asked for hundreds of times, his own staff at work and anyone who needed help. When he died on 14 February 1986 at the age of 66, after such a short retiral period, we all felt we had lost a good friend. He had been Keeper of Natural History at the Art Gallery and Museum, Kelvingrove from 1949 until his retirement in December, 1984.

The son of a horticulturist, Charlie was born at Leamington Spa in Warwickshire but spent most of his childhood in the Sussex countryside with his three sisters and younger brother and it was there he first developed his passion for Natural History, especially birds, taking up photography at the age of twelve when he was given a box Brownie camera. He, from the start, developed his own negatives and made his own prints. Much of his spare time as a teenager was spent cycling round in the South of England photographing birds.

During the war years, he was first stationed with the RAF on the South Coast but was later posted to Oban, to work on flying boats. This proved a turning point in his life due to the opportunities to study and photograph what was to become his favourite subject, the Scottish Golden Eagle.

After the War he settled, supposedly temporarily, in Glasgow in order to explore more fully the hills of Argyll which held for him a tremendous fascination. He joined the staff of Yorkhill Hospital as a medical photographer but most of his spare time was spent photographing birds – especially eagles. For a time however, he became very interested in insectivorous plants, and it was at this time I first heard of him. My botany teacher was called Molly Glen and when she told us – animatedly – about a certain Mr Palmar, who later became Eric and then Charles, then ‘Charlie’, (who was making a film with her on insectivorous plants), we all listened attentively. Later, of course, when we heard that she was going to marry Charlie Palmar, we all decided to go to their wedding in

the summer of 1949. This, I think, says much for the affection we all had for Molly and Charlie whom we had met by this time.

Charlie became Curator of Natural History at Kelvingrove that same year and the next years were busy ones. He pursued an ambition conceived during the war of making a complete photographic life history and colour film of the Golden Eagle. His films were of a very high standard and indeed he was awarded joint first prize in the 1963 BBC Council for Natural History Film Competition for his film 'Highland Heronry'. Other films followed but he never stopped building up his collection of general natural history photographs, many of which are on display at the Museum. One film I particularly recall being made was the one about the natural history of Loch Lomond because I and my family and some of Molly's school pupils were involved. Our involvement was to be photographed as we were guided round Inchcailloch. This was made shortly before Molly's tragically early death in 1970. At that time, Charlie and the boys, David, Colin and Michael could not have coped but for the help of Molly's cousin and great friend Pat and everyone was very happy when, in 1971 Charlie married Pat, who was his companion and strength over the next period of his life when the greater part of their spare time was spent in building up information to be used in the new Natural History Court at the Museum and for Charlie's, unfortunately unfulfilled, ambition to write a book on "50 Years of Natural History Photography". To the latter end they built up and catalogued a cross-referenced index to about 20,000 colour transparencies mainly of Natural History subjects.

He published numerous papers, mainly on birds, either alone or in joint authorship, and many photographs apart from those on display at Kelvingrove. Notable were those of eagles in *The Golden Eagle* (1954) by Seton Gordon, in the *National Geographic Magazine* (1954), in the *Scottish Field* (1955) and in the *Amateur Photographer* (1984). Other fine photographs of various birds, including eagles, appeared in *British Isles, Birds of Britain* and various Forestry Commission leaflets *Forest Record*.

During his long museum career his chief monuments were firstly the development of the Bird Room, with its associated Bird Class which included field excursions, and more recently the modernisation of the Mammal Court with the theme *Natural History in Scotland*. With his great good humour Charlie was a natural communicator, which came over in his films and his many broadcasts and lectures.

His public lectures at Kelvingrove awakened in a wide public a real and lasting interest in Natural History.

Charlie first spoke to the Society in April 1948 on the Golden Eagle and later that year joined the then Andersonian Naturalists. He was soon actively involved, being appointed a Councillor in 1949 and becoming Photography Convener in 1951. He served again on Council from 1959 to 1960 and was Vice-President from 1979-1981. He declined the invitation to become President on several occasions. He contributed numerous short articles to the *Glasgow Naturalist* and gave talks to the Society, his last being *Fifty Years of Natural History* shortly before he retired.

With Charlie Palmar's death, Glasgow has lost one of its best-known and most loved naturalists and we in the Natural History Society have lost an old friend.

*Agnes Walker*

### **The Flora of the Clyde Area**

by JOHN R. LEE

The Society has for sale copies of "The Flora of the Clyde Area" by John R. Lee (1933). This is still the only work of its type on the area and is now in short supply. It contains a list of species found, with descriptions, localities and keys for identification.

Unbound copies price £2; handbound copies price £4 (postage extra 50p per copy) from the Librarian, Mrs R. H. Dobson, 664 Clarkston Road, Glasgow, G44 3YS.



By permission of *Glasgow Herald*

## Obituary

### GERALD RODWAY

(1926 – 1985)

Gerry Rodway died very suddenly on 7 December, 1985. His close association with Glasgow Naturalists started in 1960 and through the years he was on the Council, acting in various capacities; he was convener of the Photographic Section 1972-1982.

Indeed it was as an outstanding photographer, combining his major interests in orchids and butterflies, that many will know him best. He conveyed his enthusiasm to members on his many photographic excursions and talks.

Gerry was for nearly 30 years the orchid specialist at Glasgow Botanic Gardens. The very fine collection of orchids at Glasgow was built up through his enthusiasm and commitment. Although the collection is mainly of species, he raised a number of hybrids, and *Cattleya* 'Gerald Rodway' was named as a tribute to him in recent years. His knowledge and expertise with orchids was widely regarded and his advice was greatly sought after both locally and nationally, and he was much in demand as a lecturer. He was author of the book "Starting with Orchids" and was involved in the founding of the Scottish Orchid Society which had its first meeting in his home.

He was a student at Kew between 1949 and 1951 and he left to join the orchid firm of Sander where he worked at both their St. Albans and Bruges establishments.

His interest in natural history started as a boy in the Gwent and Cotswold countryside. Conservation was a subject which interested him greatly. He was a strong advocate of our Society associating itself with the Glasgow Urban Wildlife Group when that body was formed some years ago and he was a keen member of the Butterfly Conservation Society.

His articles and Short Notes in the *Glasgow Naturalist* included many on Bryophytes, a subject which much interested him in the 1960s. Later his interests turned to Lepidoptera and he published notes on butterflies at Prestwick and in Galloway (1975; 1981).

On more than one occasion he declined nomination as President of the Society, preferring to work for it in other capacities, conveying his enthusiasm for his wide interests to all who came in contact with him. His ready and sometimes irreverent wit enlivened many a gathering. He will be much missed.

He is survived by his wife, Hazel, and daughters Karen and Maxine.

. . . . A more personal tribute by Alison Rutherford appeared in the Society's Newsletter.

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## Proceedings 1985

The chairman, place\* and number present, lecturer's name, title of lecture and note of any exhibits are given for each meeting.

\*UGBD: University of Glasgow, Botany Department  
 GMK: Glasgow Museum and Art Gallery, Kelvingrove  
 US: University of Strathclyde

- 8 JANUARY.** With Scottish Wildlife Trust  
 Dr P. Macpherson, UGBD, 58.  
 Mrs Winifred Brown, Paisley Colour Photographic Club. The 16th Paisley International Colour Slide Exhibition (Nature Section).
- 12 FEBRUARY.** Dr P. Macpherson, UGBD, 50. 55th A.G.M. Reports on activities during 1984 were read, elections were held (see page 233), and appointments made by Council were announced. The Report of Council stated that there were 339 members (270 Ordinary members, 34 Family members, 10 Junior members, 19 School members and 6 Honorary members). There were 29 excursions organised during 1984 (4 general, 16 botanical, 3 geological, 3 ornithological and 3 zoological).  
 The film 'Capital Garden' was shown.
- 26 FEBRUARY.** Mr R. Sutcliffe, UGBD, 34.  
 David Mellor : The Geology of Renfrewshire.  
 Exhibits : Geological specimens from Renfrewshire and fluorescent minerals (Kelvingrove Museum).
- 12 MARCH.** Dr P. Macpherson, UGBD, 42.  
 Fred R. Woodward : John Fleming and his Friends  
 Exhibits : Dead stoat (Mr I. C. McCallum).  
                   : Herbarium specimens from Tenerife  
                   and Las Palmas (Mr J. R. S. Lyth).
- 9 APRIL.** Dr P. Macpherson, UGBD, 42.  
 Mr Ron McBeath : Plant Hunting in Nepal.  
 Exhibit : Collection of named mosses from Milngavie woods (Mr R. Hunter).
- 14 MAY.** Mr I. C. Christie, UGBD, 39.  
 Members' Photographic Night.
- 11 JUNE.** Forth and Clyde Canal. 25.  
 Natural History Social Evening.
- 23 AUGUST.** GMK. 100.  
 Opening of the Andersonian Naturalists' Society.  
 Centenary Exhibition by Professor Blodwyn Lloyd-Binns

- 14 SEPTEMBER.** Stonelaw, Cathkin and Carmunnock. 34.  
Centenary excursion.
- 22 OCTOBER.** Dr P. Macpherson, US, 85.  
Centenary Dinner.  
Tom Weir : Weir's Way Round Scotland.
- 12 NOVEMBER.** Dr P. Macpherson, UGBD, 52.  
Members' Photographic Night.
- 26 NOVEMBER.** Mr B. Zonfrillo. UGBD, 50.  
Bernard Zonfrillo : Bird Life in Southern Africa.  
Exhibit : Weaver Bird's nest (Mr B. Zonfrillo).
- 10 DECEMBER.** Dr P. Macpherson, UGBD, 64.  
Mrs J. Twelves : South Uist and its Otters.  
The death of Mr F. G. Rodway was announced.

# The Glasgow Naturalist

This publication is included in the abstracted and indexing coverage of the Biosciences Information Service of the *Biological Abstracts*.

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\*Part 1 contains (18pp) *The Flora of Easter Dunbartonshire* by J. R. Lee.

†Part 2 contains (18pp) *Additions to the flora of the Clyde Area* by J. R. Lee.

§Part 6 (82pp) is a list of the less common Scottish Basidiomycetes by D. A. Reid and P. K. C. Austwick.

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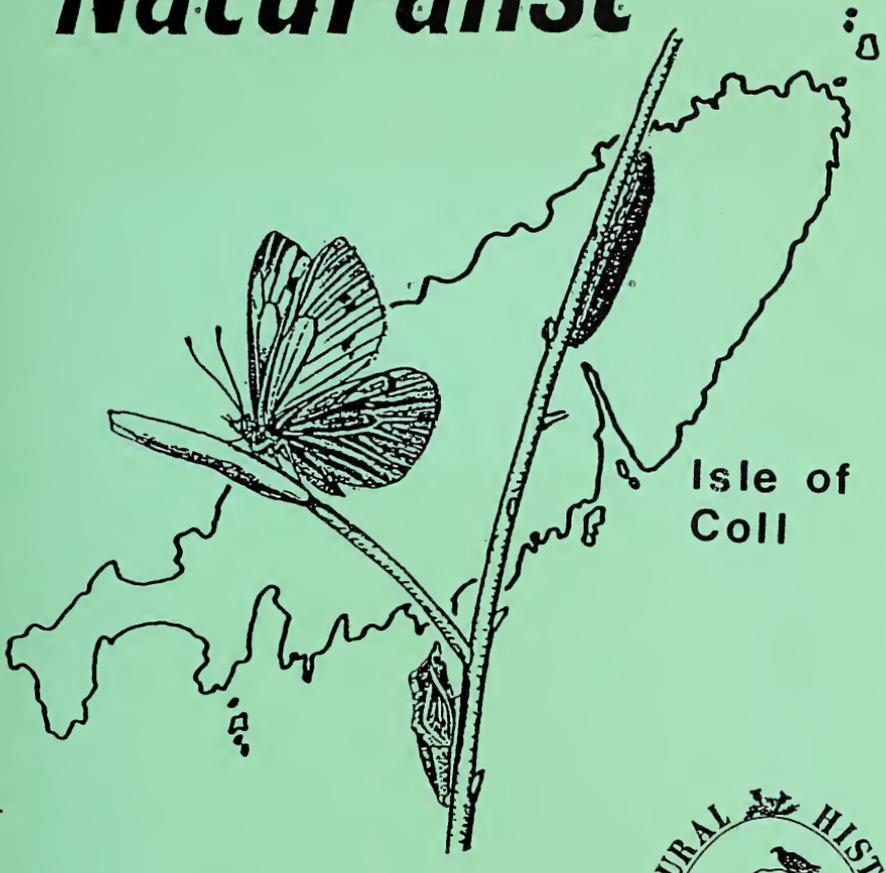
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The drawing of Natterer's Bat on the front cover by Priscilla Barrett is reproduced with permission from Boyle, C.L. 1981, *The RSPCA Book of Mammals*.

# *The Glasgow Naturalist*



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**Volume 21**

Part 3  
1987



## **The Glasgow Natural History Society (formerly The Andersonian Naturalists of Glasgow)**

The object of the Society is the encouragement of the study of natural history in all its branches, by meetings for reading and discussing papers and exhibiting specimens, and by excursions for field work. The Glasgow Natural History Society meet at least once a month except during July and August, in the University of Glasgow, the University of Strathclyde or the Glasgow Art Gallery and Museum.

The present rates of subscription per annum are: for Ordinary Members, £7; for Junior Members, £2.50; for Family Members, £2; and for School Members, £1. Further information regarding the Society's activities and membership application forms are obtainable from the *General Secretary*:

Mr RICHARD SUTCLIFFE,  
NATURAL HISTORY DEPARTMENT,  
MUSEUM & ART GALLERY,  
KELVINGROVE,  
GLASGOW, G3 8AG.

### **The Glasgow Naturalist**

Published by the Glasgow Natural History Society  
ISSN 0373-241X

December 1987  
Price £5.00

Edited by R. M. Dobson

with the assistance of J. H. Dickson, A. McG. Stirling and I. C. Wilkie.

Contributions are invited, especially when they bear on the natural history of Scotland. A note of information for contributors is available from *The Editor*.

Smaller items are also welcome from members and others. These may cover, for example, new stations for a species, rediscoveries of old records, additions to records in the *Atlas of the British Flora*, unusual dates of flowering, unusual colour forms, ringed birds recovered, weather notes, occurrences known to be rare, interesting localities not usually visited by naturalists. (The nomenclature of vascular plants should be as in Clapham, A.R., Tutin, T. G. & Warburg, E. F. 1981. *Excursion Flora of the British Isles*, Ed. 3. Cambridge.)

All communications on editorial matters should be sent to:

Dr R. M. DOBSON,  
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UNIVERSITY OF GLASGOW,  
GLASGOW G12 8QQ.

A limited number of advertisements can be accepted and enquiries should be sent to *The Editor*.

Back numbers available are listed on the inside back cover.

SMITHSONIAN  
APR 29 1988 237

## Records for "The Flora of Glasgow"

### 5. The Quaternary Flora of the Glasgow Area

W. E. BOYD\*

Department of Botany, University of Glasgow,  
Glasgow G12 8QQ

With the beginning of publication of data from the Flora of Glasgow project (e.g. Dickson, 1984; Jarvis *et al.*, 1984), it is appropriate to consider the fossil evidence for plants in the Glasgow area. This paper summarises the known Late Quaternary (i.e. post-glaciation) macroscopic fossil records and comments upon some of the more interesting features of this record.

Since the number of sample sites (i.e. fossil plant localities) is considerably lower than that of present-day plant localities, it is necessary to consider sites which are broadly within the Glasgow area, although not strictly being within the "Glasgow rectangle" as defined for the purposes of the Flora of Glasgow recording project (Dickson, 1984). The fossil sites described below lie within the rectangle or no further than 5 km beyond its perimeter.

#### The sites

There are several types of sites at which fossil plant remains are recovered. These can be broadly grouped under two headings: geological sites, at which the fossils occur within naturally-deposited superficial sediments such as river sand, lake clay and peat; archaeological sites, at which the fossils occur within deposits directly related to past human activity, such as ditch sediments and occupation horizons. There may, of course, be some overlap. The principal consequence of this division is that there is a duality of time scales which can be applied. Geological finds can be dated qualitatively into chronostratigraphical units such as Late Devensian (i.e. late glacial, c. 13,000 – 10,000 years age) and early, middle and late Flandrian (post-glacial, c. 10,000 years ago to the present).

\*Present address: Dept. of Geography, Univ. of Adelaide, G.P.O. Box 498, Adelaide, S. Australia 5001

Likewise, archaeological finds can be dated into broad cultural units, Neolithic, Bronze Age, Iron Age (including the Roman period) and Medieval, with the latter three falling into the late Flandrian geological unit, and the Neolithic approximating to the middle Flandrian.

Data from the following sites have been used to compile the fossil plant list.

- (1) Airdrie, exact location unknown, near NS 785665; Dunlop, 1888, Reid, 1899, p.54-55; peat in glacial till; probably Late Devensian.
- (2) Auld Wives' Lifts, NS 582784; Dickson, 1981; mud and, mostly, peat in a natural hollow on Craigmaddie Moor; mainly early to middle Flandrian.
- (3) Bar Hill, NS 707759; Boyd, 1984a, 1984b, 1985b, in Keppie, forthcoming; fossil soil turves and branch fragments infilling a ditch under the Roman fort; Robertson *et al.*, 1975 pp.48 ff; wooden artifacts; Roman-Iron Age, 1st cent.A.D. to 42/43 A.D.
- (4) Bearsden, NS 545721; Knights *et al.*, 1983; ditch sediments from the Roman fort; Roman, c. 42/43 A.D. Data from a complete species list (Dickson & Dickson, forthcoming) is not included in this survey.
- (5) Cadder, NS 616726; Jessen & Helbaek, 1944, p.20; grain impression on pottery; Middle Bronze Age.
- (6) Camphill, Queens Park; NS 577622; Jessen & Helbaek, 1944, pp14, 25, 26; Fairhurst & Scott, 1950-51; carbonised grain from archaeological excavation; Medieval.
- (7) Castlemilk, exact location unknown, near NS 610595; Wilson, 1851, 1863, p.57; dugout boat in river sediments; possibly Neolithic (Coles *et al.*, 1978, p.36).
- (8) Cowdenglen, exact location unknown, near NS 620600; Mahony, 1869; Bennie, 1891; Reid, 1888, 1899; lake sediments; Flandrian, probably middle and/or late.
- (9) Faskine, near Airdrie, exact location unknown, near NS 760650; Bennie, 1894, Reid, 1899, p.55; peat in glacial till; probably Late Devensian.
- (10) Garscadden Mains, c. NS 535715; Mitchell, 1952; marine sediments; Late Devensian.
- (11) Glasgow City Centre, various sites around NS 590650; Wilson, 1851, 1863, pp.52-57; 26 dugout canoes found in river sediments north and south of the River Clyde; possibly Neolithic (Coles *et al.*, 1978, p.36).
- (12) Glasgow College Goods Yard, NS 598652; Boyd, unpublished; plant fossils from archaeological excavations; Medieval & Post-Medieval.
- (13) Jordanhill Brick Works, exact location unknown, near NS 546685; Robertson & Crosskey, 1874; marine and terrestrial sediments; probably Flandrian.
- (14) Linwood Moss, three localities, around NS 443660; Boyd, 1982, 1986; peat; early and late Flandrian.
- (15) Mollins, NS 714719; Boyd, 1984b, 1985a; soil turf infilling a ditch of a Roman camp; Roman-Iron Age, 1st. cent.A.D.
- (16) Newlands, Langside, exact location unknown, near NS 575610; Jessen & Helbaek, 1944, p.21; grain impression on pottery; Late Bronze Age.
- (17) Old Kilpatrick, NS 459632; Scottish Exhibition, 1911, p.824; Jessen & Helbaek, 1944, pp.14, 25; A. Foxon, pers. comm.; carbonised grain; probably Iron Age.

- (18) Robroyston, NS 633676; Dickson *et al.*, 1976; silt and peat; Late Devensian, radiocarbon dates SRR-697,  $11,265 \pm 125$  years b.p. (silt), SRR-668,  $11,210 \pm 151$  b.p. and SRR-696,  $11,653 \pm 190$  b.p. (peat).
- (19) Saracen Head, Gallowgate, NS 603648; C.A. Dickson unpublished; wood from archaeological excavation; Medieval.
- (20) Sheils, Govan, NS 523667; Robinson, 1983; enclosure ditch infill sediment; Iron Age.
- (21) Springburn, NS 609678; Dickson *et al.*, 1976; peat; Late Devensian; radiocarbon date SRR-761,  $11,140 \pm 110$  years before present.
- (22) St. James Road, Glasgow, NS 600656; Boyd, unpublished; branch fragments from ditch infill, possibly from 17th century defensive hedge.
- (23) Strathblane, exact location unknown, near NS 563795; Jessen & Helbaek, 1944, p.20; grain impressions in pottery; Middle Bronze Age.
- (24) Wilderness West, NS 586723; Newell, 1983; fossil soil turf; Roman-Iron Age; 2nd cent.A.D.
- (25) Windmillcroft, NS 584647; Bennie, 1867, p. 116; Mahony, 1868; river sand and clay deposits; probably Flandrian, possibly middle.
- (26) Yorkhill, exact location unknown, near NS 565660; Jessen & Helbaek, 1944, p. 25; carbonised grain; Roman.

### The fossil plant remains

The following list summarises the macroscopic fossil plant evidence from these sites, providing as accurate an indication of identification as possible (nomenclatures following Clapham *et al.*, 1981), an indication of which period the fossils occurs within, and reference to the site or sites at which each plant has been found.

The majority of fossil remains consist of seeds, fruits, caryopses and nutlets, although several of the woody species are represented by wood, buds and leaf fragments. Occasionally other parts of the plants are represented, such as the flower (*Ericaceae*), the calyx (*Armeria maritima*), rhizomes and stems (*Equisetum* sp.), megaspores (*Isoetes lacustris*) and sclerenchymatous thickenings at the stem base of *Eriophorum vaginatum*. In many cases, identification to species level is not possible, or is unreliable, either because of the similarity of the fossil remains or lack of distinguishing characteristics (eg. *Ranunculus* spp. achenes, *Betula* spp. wood, *Quercus* spp. wood, *Juncus effusus/conglomeratus* seeds) or because in the particular samples examined, preservation was sufficiently poor to hinder full identification (eg. *Cerastium* sp, *Lepidium* sp and *Viola* sp seeds at Shiels).

### Macroscopic v. microscopic fossils

Only those plants for which macroscopic plant fossils are known

are listed. There are, in addition to these records, several sites at which pollen analyses have been undertaken: Garscadden Mains, Linwood Moss, Auld Wives' Lifts, Bearsden, Wilderness West, Bar Hill, Mollins, Shiels and Glasgow College Goods Yard (see details above), in addition to rather inconclusive analyses of ditch sediments at Peel Glen (NS 520725) (Boyd, unpublished). The records from these sites have not been included here for two reasons. First, the source of pollen is often distant from the site of deposition, and consequently the presence of a particular pollen type does not necessarily imply the local presence of the plant from which it comes. There may be exceptions to this, such as where the pollen from very small plants such as *Radiola linoides* Roth is present (Boyd 1985b), and indeed much of the pollen at some of the archaeological sites may be local in source. The second problem is that many pollen types do not correspond to plant species, and generally represent groups of plants. An example of this is *Polygonum persicaria* type (pollen), which includes pollen of four *Polygonum* species (Moore & Webb, 1978, p. 56). Traditionally pollen assemblages are used to elucidate the character of past vegetation rather than of floras.

### Sources of the macroscopic fossils

Much of the fossil remains can be regarded as representing local plants. Seeds, leaves and even wood deposited in peat probably comes from those plants growing on the peat surface itself, and in other deposits they may represent plants growing at or near the site of sedimentation, especially, for example, where seeds and fruits of various herbs are found in ditch sediments and in fossil soils. There are, however, several instances where the immediate source of the fossils may not be taken for granted. The leaf fragments found in the river sands at Windmillcroft by Mahony (1868) may have been washed down the river; the worked wood (oak wheels, pulley blocks, barrels, etc., at Bar Hill, and the oak dugout boats in the River Clyde sediments) need not have been made from local wood. Even the unworked wood found, for example, in the Glasgow College Goods Yard excavation, may have been brought to the site, although in this case probably only from elsewhere within the Glasgow limits. Finally, food plants, or parts of them, may be transported large distances, so the presence of the cereal remains, associated weed seeds and the probable spice plants (see below) need not necessarily imply that these were growing in the area.

## Temporal distribution of the plants

Initial examination of the list indicates a predominance of Late Devensian and late Flandrian fossils. This is an artifact of the analyses, since sites of these ages have been most commonly examined in the Glasgow area. A curious feature of the Glasgow fossils is that, although some species occur during both periods, the majority do not. Many of the species recorded here occur typically during both periods throughout Britain (Godwin, 1975), largely due to a certain similarity in environmental conditions: during both periods, the vegetation tended to be open (in Late Devensian times, forest had not developed, whereas by late Flandrian times the natural forest had been substantially removed by human agricultural and building activities) and the soils tended to be open and disturbed (Late Devensian soils were poorly-developed and often sparsely colonized by plants, whereas late Flandrian soils were disturbed by the activities of pastoral and arable agriculture). This is, of course, a simplification of the situation. The main reason why many of the Late Devensian and late Flandrian plants are not present in the Glasgow records for the other period respectively is that whereas the Late Devensian sediments sampled represent damp localities (with such species as *Myriophyllum* spp. and *Potamogeton* spp.) the late Flandrian sites are frequently drier sites with a dry-ground weedy flora. The corresponding dry, open Late Devensian sites have not been sampled.

There are several, typically arctic or sub-arctic plants which are, as expected, not represented during the Flandrian or at present. Notable amongst these are *Betula nana* and *Salix herbacea*. Their absence is explicable by reference to the change of climate from Late Devensian to Flandrian times.

Many of the late Flandrian plants are plants for which fossils are typically found at archaeological sites throughout Britain, these plants being weeds of broken ground, cultivation or ditches: examples include *Caltha palustris*, *Spergula arvensis*, *Rubus idaeus*, *Polygonum aviculare* agg., *P. persicaria*, *Fallopia convolvulus*, *Rumex acetosella*, *Urtica dioica* and many others recorded here, some of which (eg. *Sonchus asper* and *Plantago major*) are almost exclusively fossils of late Flandrian archaeological sites.

## Food plants

There are several food plants which are almost certainly not

from the Glasgow area. The most interesting are mainly from the Roman fort at Bearsden. Seeds and fruits of *Papaver somniferum* (opium poppy), *Apium graveolens* (wild celery) and *Coriandrum sativum* (coriander) were probably imported as food flavourings (Knights *et. al.*, 1983), and the figs (*Ficus carica*) and walnuts (*Juglans regia*) represented at Bearsden and Bar Hill are also likely to be imports, possibly from the Mediterranean area. These are all known at various Roman and later sites throughout Europe.

The cereals (*Avena*, *Hordeum* and *Triticum*) may have had a more local source. *Hordeum* (barley) is the best represented cereal in Scottish antiquity and was certainly being cultivated and processed at sites in central Scotland during the Iron Age (Boyd 1982/83). Much of the barley present in the Glasgow area was probably cultivated there, although the Bronze Age pottery grain impressions from Cadder, Newlands and Strathblane are derived from the source area of the pottery and need not be derived from this area. *Triticum dicocum* (emmer wheat) is a cultivated wheat which occurs commonly at Roman-Iron Age sites throughout Britain, but with little evidence for the indigenous cultivation of *Triticum* as a major crop in central Scotland at this time, the *Triticum* fossils may attest to the import of wheat to this area during the Roman period. The final cereal represented in Glasgow, *Avena* (oats), was probably cultivated, at least during Medieval times, although *A. fatua*, possibly along with *Agrostemma githago* and *Bromus hordeaceus* at Bearsden, may be cornfield weeds whose seeds and caryopses have contaminated grain samples.

### Fossil rarities

Several species have been only occasionally recorded as fossils elsewhere, although since the study of plant fossils, especially in relation to archaeological excavations, is currently an expanding field of research, the number of records of each species will undoubtedly increase. In the meantime, the scarcity of a fossil is often because it has not been found, rather than necessarily representing a genuine past scarcity of that plant. As far as the author is aware, three species recorded in the Glasgow area have no other British fossil record. These are *Stellaria nemorum* at the Iron Age site of Shiels, *Lathyrus pratensis* at the Roman site of Bearsden and *Crepis paludosa*, from the Late Devensian Garscadden Mains site. There does not appear to be any reason for the rarity of these species in the fossil record, and indeed they are all common, to a varying degree in west Scotland at present (Perring & Walters, 1976, Clapham *et al.*, 1981).

## Modern rarities

Although the Flora of Glasgow project is in its early stage at the time of writing (1986) a considerable species list is already building up. There are several plants recorded as fossils which do not appear to be currently present in Glasgow (marked "A" in the list).

Many of these would not be expected to grow at present in Glasgow, such as the arctic shrubs *Betula nana* and *Salix herbacea*, and the ancient cereal *Triticum dicoccum*. Many of the weeds associated with pre-modern agriculture, which were often very abundant amongst the crops, are becoming increasingly less common in many parts of Britain. The absence of *Agrostemma githago* in Glasgow follows this pattern. Some of the ancient imported plants (*Ficus carica* and *Juglans regia*) also are not native to Glasgow (and never were) although others are now common as weeds and in cultivated areas (*Papaver somniferum*, *Apium graveolens* and *Coriandrum sativum*) (Dickson, 1979). Several of the Glasgow absentees are known to grow in the area around Glasgow; examples of these are *Empetrum nigrum*, which grows on bog surfaces in Milngavie, and *Armeria maritima* and *Juncus maritima* which grow along the Clyde coast to the west of the Flora of Glasgow recording area. The occurrence of such plants in Glasgow may be waiting to be recorded and indeed the absentee list is continuously shrinking. Prior to the summer of 1985, for example, *Linum catharticum* was little known in the Glasgow area, but it is now recorded growing on several pit bings. Even since the writing of this paper was first started, recent occasional discoveries of such plants as *Polygala vulgaris*, *P. serpyllifolia*, *Hypericum humifusum* and *Myriophyllum spicatum* have taken these plants off the absentee list. No doubt other plants recorded as fossils in Glasgow but regarded as present absentees will be recorded during the course of the Flora of Glasgow project.

## List of plants for which there is macroscopic fossil evidence in the Glasgow area

Geological abbreviations: Late Dev. = Late Devonian; Fland.gen. = Flandrian general; Fland.early = early Flandrian; Fland.mid. = middle Flandrian; Fland.late = late Flandrian.

Archaeological abbreviations: Neol. = Neolithic; Br.Age = Bronze Age; Ir.Age/Rom. = Iron Age &/or Roman; Med./p-Med. = Medieval &/or post Medieval. A = plant has not been recorded recently and is probably absent from Glasgow at present; 1,2,3 etc. = reference numbers of sites.

<i>Selaginella selaginoides</i> (L.) Link	Late Dev.; 10
<i>Isoetes lacustris</i> L.	Late Dev., Fland.gen.; 1,8,9
<i>Equisetum</i> sp.	Fland.mid.; 25
<i>Pinus sylvestris</i> L.	Fland.gen.; 8
<i>Caltha palustris</i> L.	Ir.Age/Rom.; 3
<i>Ranunculus</i> spp.	Late Dev., Ir.Age/Rom.; 1,8,10,20
<i>Papaver somniferum</i> L.	Fland.gen., Ir.Age/Rom.; 4,8
Cruciferae	Ir.Age/Rom.; 20
<i>Lepidium</i> sp.	Ir.Age/Rom.; 20
<i>Capsella bursa-pastoris</i> (L.) Medicus	Ir.Age/Rom.; 20
<i>Viola</i> sp.	Fland.gen., Ir.Age/Rom.; 8,20
<i>V. palustris</i> L.	Late Dev., Ir.Age/Rom.; 3,9
<i>Polygala</i> sp.	Ir.Age/Rom.; 3
<i>Hypericum</i> sp.	Ir.Age/Rom.; 20
<i>H. humifusum</i> L.	Ir.Age/Rom.; 3
Caryophyllaceae	Late Dev., Ir.Age/Rom.; 10,20
<i>Agrostemma githago</i> L.	Ir.Age/Rom.; 4, A
<i>Cerastium</i> sp.	Ir.Age/Rom.; 20
<i>Stellaria</i> sp.	Late Dev.; 9
<i>S. nemorum</i> L.	Ir.Age/Rom., Med./p-Med.; 12,20
<i>S. media</i> (L.) Vill.	Med./p-Med.; 12
<i>S. graminea</i> L.	Ir.Age/Rom.; 20
<i>Sagina</i> sp.	Ir.Age/Rom.; 20
<i>Spergula arvensis</i> L.	Ir.Age/Rom., Med./p-Med.; 6,20
<i>Montia fontana</i> L.	Fland.early; 8
<i>Chenopodium album</i> L.	Ir.Age/Rom., Med./p-Med.; 12,20
<i>Linum catharticum</i> L.	Late Dev.; 10
<i>L. usitatissimum</i> L.	Med./p-Med.; 12
<i>Ilex aquifolium</i> L.	Med./p-Med.; 12
<i>Trifolium repens</i> L.	Ir.Age/Rom.; 4
<i>Lathyrus pratensis</i> L.	Ir.Age/Rom.; 4
<i>Filipendula ulmaria</i> (L.) Maxim.	Late Dev.; 10
<i>Rubus idaeus</i> L.	Fland.gen., Ir.Age/Rom.; 4,8
<i>R. fruticosus</i> L.	Ir.Age/Rom., Med./p-Med.; 4,12
<i>Potentilla palustris</i> (L.) Scop.	Late Dev.; 1,10
<i>P. erecta</i> (L.) Rauschel	Late Dev., Ir.Age/Rom.; 3,10,20
<i>P. reptans</i> L.	Med./p-Med.; 12
<i>Fragaria vesca</i> L.	Ir.Age/Rom.; 4
<i>Sanguisorba</i> sp. (prob. <i>S. minor</i> Scop.)	Late Dev.; 8
<i>Prunus avium</i> (L.) L. and/or <i>P. padus</i> L.	Med./p-Med.; 19

<i>P. padus</i> L.	Late Dev., Fland.mid.; 1
<i>Crataegus monogyna</i> Jacq.	Ir.Age/Rom.; 3,22,25
<i>Sorbus aucuparia</i> L.	Ir.Age/Rom.; 3
<i>Myriophyllum spicatum</i> L.	Late Dev., Fland.gen.; 8,10
<i>M. alterniflorum</i> DC	Late Dev.; 10
<i>Hippuris vulgaris</i> L.	Late Dev., Fland.gen.; 8,10
<i>Apium graveolens</i> L.	Ir.Age/Rom.; 4
<i>A. nodiflorum</i> (L.) Lag.	Late Dev.; 1, A
<i>Coriandrum sativum</i> L.	Ir.Age/Rom.; 4
<i>Polygonum aviculare</i> agg.	Ir.Age/Rom., Med./p-Med.; 12,20
<i>P. persicaria</i> L.	Ir.Age/Rom., Med./p-Med.; 12,20
<i>P. lapathifolium</i> L.	Fland.gen., Ir.Age/Rom.; 8,20
<i>Fallopia convolvulus</i> (L.) Á Löve	Ir.Age/Rom.; 20
<i>Rumex acetosella</i> agg.	Ir.Age/Rom., Med./p-Med.; 6,20
<i>R. acetosa</i> L.	Med./p-Med.; 12
<i>R. crispus</i> L.	Fland.gen.; 8
<i>Urtica dioica</i> L.	Med./p-Med.; 3
<i>Ficus carica</i> L.	Ir.Age/Rom.; 4, A
<i>Ulmus glabra</i> Hudson	Fland.mid.; 25
<i>Juglans regia</i> L.	Ir.Age/Rom.; 3, A
<i>Betula pendula</i> Roth and/or	Fland.gen., Fland.early, Fland.mid.,
<i>B. pubescens</i> Ehrh	Fland.late, Med./p-Med.; 2,12,14,25
<i>B.nana</i> L.	Late Dev.; 1,10,A
<i>Alnus glutinosa</i> (L.) Gaertner	Fland.early, Fland.mid., Med./p-Med., 2,12
<i>Corylus avellana</i> L.	Fland.gen., Fland.mid., Fland.late, Ir.Age/Rom., Med./p-Med.;
	3,4,8,12,14,19,25
<i>Quercus robur</i> L. and/or	Fland.gen.; Fland.mid.; Neol.,
<i>Q. petraea</i> (Mattuscka) Liebl.	Ir.Age/Rom., Med./p-Med.;
	3,7,11,12,13,15,19,25
<i>Salix</i> sp.	Late Dev.; Fland.early, Fland.mid.,
	Ir.Age/Rom.; 2,3,4,10,20
<i>S. herbacea</i> L.	Late Dev.; 9, A
Ericaceae	Fland.late, Ir.Age/Rom.; Med./p-Med.;
	3,12,14,20
<i>Calluna vulgaris</i> (L.) Hull	Fland.early, Fland.late, Ir.Age/Rom.,
	Med./p-Med.; 3,12,14,15,20
<i>Erica tetralix</i> L.	Fland.late, 14
<i>Vaccinium myrtillus</i> L.	Ir.Age/Rom.; 4
<i>Empetrum nigrum</i> L.	Late Dev., Fland.early; 1,10,14
<i>Armeria maritima</i> (Miller) Willd.	Late Dev.; 10, A
<i>Fraxinus excelsior</i> L.	Ir.Age/Rom.; 3
<i>Menyanthes trifoliata</i> L.	Late Dev., Fland.gen., Fland.early, Fland.mid.; 1,8,10,14
	Fland.gen.; 8
<i>Pedicularis palustris</i> L.	Ir.Age/Rom.; 20
<i>Mentha</i> sp.	Fland.gen., Ir.Age/Rom.; 8,20
<i>Galeopsis tetrahit</i> L.	Fland.gen.; 8
<i>Scutellaria galericulata</i> L.	Fland.gen.; 8
<i>Ajuga reptans</i> L.	Ir.Age/Rom.; 20
<i>Plantago major</i> L.	Fland.gen.; 8
<i>Galium palustre</i> L.	Med./p-Med.; 12
<i>G. aparine</i> L.	

<i>Bidens cernua</i> L.	Ir.Age/Rom.; 20, A
<i>B. tripartita</i> L.	Ir.Age/Rom.; 20
<i>Senecio</i> sp.	Ir.Age/Rom.; 20
<i>Achillea</i> sp.	Ir.Age/Rom.; 20
<i>Carduus</i> sp.	Late Dev.; 1
<i>Lapsana communis</i> L.	Ir.Age/Rom.; 20
<i>Hypochoeris radicata</i> L.	Ir.Age/Rom.; 3
<i>Sonchus oleraceus</i> L.	Ir.Age/Rom.; 20
<i>S. asper</i> (L.) Hill	Ir.Age/Rom.; 20
<i>Crepis paludosa</i> (L.) Moench	Late Dev.; 10
<i>Alisma plantago-aquatica</i> L.	Fland.gen.; 8
<i>Potamogeton natans</i> L.	Late Dev.; 10
<i>P. lucens</i> L.	Fland.gen.; 8, A
<i>P. alpinus</i> Balbis	Late Dev.; 10
<i>P. perfoliatus</i> L.	Late Dev., Fland.gen.; 8,10
<i>P. pusillus</i> L.	Fland.gen.; 8
<i>P. obtusifolius</i> Mert. & Koch	Late Dev.; 10
<i>P. pectinatus</i> L.	Late Dev., Fland.gen.; 8,10,18
<i>P. filiformis</i> Pers.	Late Dev.; 10, A
<i>Juncus</i> sp.	Fland.early, Fland.mid., Ir.Age/Rom.; 14,20
<i>J. squarrosus</i> L.	Ir.Age/Rom.; 24
<i>J. effusus</i> L. and/or	Fland.mid., Ir.Age/Rom., Med./p-Med.;
<i>J. conglomeratus</i> L.	3,12,14,15,24
<i>J. maritimus</i> Lam.	Fland.mid.; 14, A
<i>Luzula</i> sp.	Ir.Age/Rom.; 3,20
Cyperaceae	Ir.Age/Rom.; 3
<i>Eriophorum vaginatum</i> L.	Fland.early, Fland.mid., Ir.Age/Rom.; 2,14,20
<i>Eleocharis uniglumis</i> (Link)	Late Dev.; 10, A
Schultes	
<i>Schoenoplectus lacustris</i> (L.)	Late Dev., Fland.gen.; 8,10
Palla	
<i>Carex</i> spp.	Late Dev., Fland.early, Fland.mid., Ir.Age/Rom., Med./p-Med.;
	2,3,10,12,15,18,20
<i>C. rostrata</i> Stokes	Late Dev., Fland.gen.; 1,8
<i>C. panicea</i> L.	Late Dev., Ir.Age/Rom.; 1,3
<i>C. pilulifera</i> L.	Ir.Age/Rom.; 3
<i>C. dioica</i> L.	Late Dev.; 1,A
Gramineae	Ir.Age/Rom.; 3,20
<i>Poa</i> sp.	Ir.Age/Rom.; 3
<i>P. pratensis</i> L.	Ir.Age/Rom.; 4
<i>Glyceria fluitans</i> (L.) R.B.r.	Ir.Age/Rom.; 4
<i>Bromus hordeaceus</i> L.	Ir.Age/Rom.; 4
( <i>B. mollis</i> L.)	
<i>Pheum pratense</i> L.	Ir.Age/Rom.; 4
<i>Avena fatua</i> L.	Ir.Age/Rom., Med./p-Med.; 6,12,17
<i>A. strigosa</i> group	Med./p-Med.; 6
<i>A. sativa</i> L.	Med./p-Med.; 6
<i>Avena strigosa</i> and/or	Med./p-Med.; 12
<i>A. sativa</i> L.	
<i>Hordeum</i> sp.	Br.Age, Ir.Age/Rom., Med./p-Med.;
	4,5,6,12,16,17,20,23,26
<i>H. vulgare</i> L.	Ir.Age/Rom., Med./p-Med.; 12,17,26

<i>Triticum</i> spp.	Ir.Age/Rom.; 4,17,26
<i>T. dicoccum</i> (Schrank) Schübel	Ir.Age/Rom.; 17, A
<i>T. aestivum</i> s.l.	Med./p-Med.; 12

## Acknowledgments

This review was undertaken in the Department of Botany, University of Glasgow. The author would like to thank Mrs C. A. Dickson for access to some of her unpublished data. Many thanks are also extended to Dr. J. H. Dickson, who provided comments upon the Flora of Glasgow data and usefully commented on drafts of this paper.

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## Skye Fungi – Additions

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Since the submission of the manuscript on the Fungi of Skye (Watling 1983) Dr R.W.G. Dennis, Kew, has kindly made available to me a list of the fungi he has found on his visits there during September and October 1983, May 1984, May 1985, September-October 1985 and May-June 1986. To these records I have been able to add the records of myxomycetes of Dr B. Ing, my own records and the results of examination of material sent by kind friends. Unfortunately, whatever balance one hopes to achieve when producing lists of fungi, records are usually biased in favour of one group or another. Thus Dr Dennis' information on micro-fungi makes his list a significant contribution and extends his own more extensive study of Hebridean fungi (Dennis 1986). Reader's attention should be also drawn to the records of myxomycetes brought together by Ing (1968) and expanded herein.

The additions to the Flora now make, with the addition of myxomycetes, a total of 1217 for the island (see Table 1); 243 of these additions are not listed for Mull. All species, however, might be expected to occur there. Sixty-six of the additions belong to the mushrooms, toadstools and their allies (= macromycetes); 17 are rusts and smuts and a similar number are myxomycetes; 131 belong to the disc-fungi and their relatives and the remainder to the mildews and moulds.

All the rusts, larger discomycetes and agarics added to the list are fairly widespread in the British Isles but two jelly-fungi, *Helicogloea lagerheimii* (= *Saccoblastia sebacea* Bourd & Galz.) and a *Tremella* on lichens, are particularly worthy of note; the former has also been recently found at the Black Wood of Rannoch and the latter will be the subject of a future communication by Dr. P. Diederich.

The finding of *Uromyces geranii* on *Geranium cinereum*, cv. 'Ballerina', a plant originally purchased from Bloom's of Bressingham, constitutes a new host record; even this cultivated *Geranium* exhibited the tell-tale swollen leaf-petioles which is a

hall-mark of this rust. The under-recorded mildew *Sphaerotheca volkartii*, in addition to two other ascomycetes *Stomiopeltis dryadis* and *Pseudomassaria islandica* should be looked for on *Dryas* elsewhere in Scotland where they very probably occur. The finding of the smut *Entorrhiza digitata* is also noteworthy but its rarity is probably because it grows on the subterranean parts of rushes and is therefore overlooked. Several new genera and species of ascomycetous fungi have been described based on Skye material (Spooners & Dennis, 1986).

According to Ing, (pers. comm.) *Craterium muscorum*, *Diderma lucidum* and *D. ochraceum*, *Fuligo muscorum*, *Lamproderma columbinum* and *Lepidoderma tigrinum* form a group of Atlantic species found on wet, moss-covered rocks in ravines and near water falls, or occasionally as on Skye and in Mull, in humid woodlands (Ing, 1983); the finding of *Lycogala conicum* at Tokavaig reflects the presence of ancient woodland. *Clastoderma pachypus* has an unusual distribution in the British Isles being known from Sussex, west of Scotland and parts of Co. Wicklow, Ireland (McHugh, 1986).

Several resupinates recorded for Skye are of particular interest, *Gloeocystidiellum leucoxanthum*, *Hyphodermella corrugata*, *Sistotrema diademiferum* etc., either only recently being recorded from Scotland and even the British Isles or extending their previously known range; *Russula foetens* and *Lactarius fuliginosus* collected for Raasay are included, the latter being unknown in Skye. At least 34 species of fungi are additions to the Hebridean flora (Dennis, 1986), including *Amylostereum chailletii*, *Ochropsora ariae*, *Taphrina padi*, *Anthostomella limitata*, *Dasyscyphus rehmi*, *Lophiostoma hysteriodes*, *Mirandina arnaudii*, *Oidium laburni*, *Camarosporium macrosporum*, *Cryptocline phacidiellum*, *Diplodia quercus*, *Stagonospora vitensis*, and a whole list of aquatic hyphomycetes and lichen parasymbionts; they show that the flora is not yet exhausted. *Nectriella laminariae*, on dried stems of the brown alga *Laminaria* cast up on the beach, as *Cystopezizella venoeslai* and *Cistella perparvula*, is an addition to the British Ascomycotina (Cannon, Hawksworth & Sherwood-Pike, 1985). Brown algae should be given more attention by collectors in the future; the fungus is very probably widespread and will be found elsewhere if searched for diligently.

The list contains all new records to the island and any records of rare or interesting taxa, or taxa already recorded but for a very

different host; the last are marked with an asterisk. During the survey many species have been recorded in other localities in addition to those published in 1983 but are not included herein. Those wishing further details on the more widespread species should contact the author direct. Species not in the Mull flora or its supplement (Henderson & Watling, 1978; Watling, 1985) are indicated thus §. Nomenclature follows that adopted by Watling (1985), except for the myxomycetes which follows Ing (1980). Collectors are indicated by initials thus: RD = Dr. R.W.G. Dennis; BJC = Dr. B.J. Coppins.

Voucher material is deposited as indicated in the earlier publication.

## List of Fungi Recorded

EUMYCOTA: BASIDIOMYCOTINA  
HYMENOMYCETES  
AGARICALES

### BOLETACEAE

*Suillus bovinus* Kilmarie Wood.

### PLEUROTACEAE

*Pleurotellus & Resupinatus* see below.

### TRICHOLOMATACEAE

- |   |  |
|---|--|
| <i>Clitocybe dealbata</i>                         | Roadside, Kinloch.                                       |
| <i>Collybia carbonaria</i> (= <i>Tephrocybe</i> ) | Shore of cove, S. of Ardvasar: RD.                       |
| <i>Lepista luscina</i>                            | Turf at the lighthouse, Point of Sleat: RD.              |
| * <i>Mycena alcalina</i>                          | On <i>Abies nobilis</i> , Prabost.                       |
| <i>M. crispula</i> (Quél.) Kühner                 | On <i>Rumex</i> , Camus Croise: RD.                      |
| § <i>M. olida</i> Bres.                           | On bark of <i>Ulmus</i> , Armadale.                      |
| <i>Omphalina luteovitellina</i>                   | In damp peaty soil, Stockval, 305m.                      |
| * <i>Oudemansiella mucida</i>                     | On live limb of <i>Acer pseudoplatanus</i> , near Skein. |
| <i>Pleurotellus acerosus</i>                      | On soil, Armadale.                                       |
| <i>Resupinatus applicatus</i>                     | On jetsam on storm beach, Point of Sleat: RD.            |
| § <i>R. trichotis</i> (Pers.) Singer              | On <i>Fagus</i> , Armadale.                              |

### Reduced forms

- |  |  |
|--|--|
| <i>Cyphellopsis anomala</i>                  | On <i>Sorbus aucuparia</i> ; Armadale: RD. |
| <i>C. monacha</i>                            | On <i>Ulex</i> , Armadale: RD.             |
| § <i>Cyphellopsis</i> sp.                    | On <i>Chamaenerion</i> , Port na Long: RD. |
| <i>Lachnella alboviolascens</i>              | On <i>Arctium</i> , Talisker: RD.          |
| § <i>L. cf. eruciformis</i> (Fr.) W.B. Cooke | On <i>Galium aparine</i> , Kilmaluag: RD.  |

### ENTOLOMATACEAE

- Entoloma jubatum* Ben Tote.  
 § *Leptonia aethiops* (Scop.) Gill. Pasture, Aird.

### CORTINARIACEAE

- Cortinarius delibutus* Conardan, near Portree.  
*C. lepidopus* Conardan, near Portree.  
*Crepidotus autochthonus* On *Tilia*, Armadale: RD.  
*Galerina unicolor* Dunvegan Wood.  
*Hebeloma sacchariolens* s. Gröger Conardan, near Portree.  
 & Zsch.  
*Pholiota alnicola* On *Betula*, Ord: RD.

### BOLBITIACEAE

- Agrocybe paludosa* Moors near Loch Eynort.  
 § *Bolbitius (Pluteolus) reticulatus* On *Fraxinus*, Ord.  
 (Pers.: Fr.) Ricken

### STROPHARIACEAE

- Psilocybe merdaria* On cow dung, Sleat, as *Stropharia* in  
 Mull Flora 15.17.

### COPRINACEAE

- § *Coprinus cinereofloccosus* P.D. Orton Storr Lochs Dam.  
*C. lagopus* Roadside grass, Ord glen.  
*Panaeolus ater* In grass, Rubha Hunish.  
*P. olivaceus* Recorded as *P. castaneifolius* Murr.  
 in Watling, 1983.  
 § *Psathyrella noli-tangere* (Fr.) Pearson Roadside grass, Glen Meodal.  
 & Dennis

### AGARICACEAE

- Agaricus arvensis* Rona.  
 § *A. fuscofibrillosus* (F.H. Moeller) Conardan, near Portree.  
 Pilát  
*A. macrosporus* Turf of storm beach, Tokavaig: RD.  
 Conardan, near Portree.

### PLUTEACEAE

- § *Pluteus lutescens* (Fr.) Bres. On *Fraxinus*, Ord.

### RUSSULACEAE

- Lactarius deterrimus* Gröger Conardan, near Portree.  
*L. fuliginosus* Brae Wood, Raasay.  
*L. pubescens* Kinloch Forestry Road.  
*L. serifluus* Under *Quercus* scrub, cliff top S. of  
 Ardvasar.  
 § *L. spinulosus* Quél. Kilmarie Wood.  
*Russula claroflava* Kilmarie Wood.  
 (*R. foetens*) Brae Wood, Raasay).  
 § *R. virescens* (Schaeff.) Fr. Armadale.

## APHYLLOPHORALES

## CLAVARIACEAE

- Clavulinopsis luteoalba* Dunvegan.  
 § *Pistillaria culmigena* Mont. & Fr. On *Arrhenatherum* & *Bromus ramosus*, Kinloch.  
*P. setipes* On *Rubus idaeus*, Kinloch.  
 § *P. todei* (Fr.) Corner On *Dryopteris*, Armadale: RD.

## CORTICIACEAE

- \* *Amylostereum chailletii* (Pers.) Boid. On *Abies*, Armadale: RD.  
 §\* *Botryobasidium ellipsosporum* Hol. On *Sorbus aucuparia*, Coille Dalavil:  
 Jech. see *Oidium* (Watling, 1983).  
 § *Gloeocystidiellum leucoxanthum* (Bres.) Boud. On *Ulex*, Armadale: RD.  
*Hyphoderma praetermissum* On old wood, Armadale: RD.  
*H. sambuci* On floorboards of derelict cottage,  
 Armadale: RD.  
 § *Hyphodermella corrugata* (Fr.) Erikss. On *Sambucus* & *Ulmus*, Kilmore &  
 & Ryv. Armadale: RD.  
 § *Merulius tremellosus* Fr. Kilmorie Wood.  
 § *Mucronella aggregata* Fr. On twig of *Rosa pimpinellifolia*, L.  
 Gauskavaig: RD.  
*Peniophora cinerea* On *Ligustrum* & *Ulmus*, Armadale:  
 RD.  
 § *Sistotrema diademiferum* (Bourd. & Galz.) Donk On *Iris pseudacorus*, Ord: RD.  
 § *Tylospora asterophora* (Bon.) Donk On bare soil, Armadale: RD.

## GANODERMATACEAE

- § *Ganoderma resinaceum* Boud. Armadale (on *Fagus*?).

## HYMENOCHAETACEAE

- § *Hymenochaete cinnamomea* (Pers.) Bres. On *Fagus*, Coille Dalavil: RD.  
 § *Inonotus obliquus* (Fr.) Pilát On *Betula*, Coille Dalavil: RD.

## POLYPORACEAE

- Podoporia confluens* On *Fraxinus*, Ord.  
*Polyporus badius* On *Crataegus*, Armadale: RD.  
 (= *P. picipes*).

## SCHIZOPHYLLACEAE

- Henningsomyces candidus* On *Fagus*, Ardvasar: RD.

‘HYMENOMYCETOUS HETEROBASIDIAE’  
 AURICULARIALES

## AURICULARIACEAE

- § *Helicogloea lagerheimii* Pat. On *Betula*, Ord: RD.

## TREMELLACEAE

*Exidia glandulosa*  
*Tremella* cf. *lichenicola*  
 Diederich

On *Quercus*, Calligarry cliffs: RD.  
 On *lichens*: BJC. (see Coppins &  
 James, 1979).

## SPOROBOLOMYCETALES

## SPOROBOLOMYCETACEAE

§ *Sporobolomyces* sp.

Basidiomycetous yeasts isolated from  
*Corylus* leaves, Ardasar.

GASTEROMYCETES  
LYCOPERDALES

## LYCOPERDACEAE

*Lycoperdon spadiceum*

Glen Brittle shore: RD.

HEMIBASIDIOMYCETES  
UREDINALES

## COLEOSPORIACEAE

§ *Ochropsora ariae* I  
 (Fuckel) Ramsb.

On *Anemone nemorosa*, Calligarry  
 cliffs: RD.

## MELAMPSORACEAE

*Melampsora capraearum* III  
 \* *M. epitea*.

On *Salix caprea*, Armadale: RD..  
 On *Salix viminalis*, Port na Long:  
 RD.

*M. lini* II & III.  
 § *Melampsorella caryophyllacearum*  
 Schroet.

On *Linum catharticum*, Ord.  
 On *Stellaria holostea*, Calligarry  
 cliffs: RD.

§ *Milesina scolopendrii* (Fauil) Hend.

On *Phyllitis scolopendrium*, Camas  
 Malag: RD.

## PUCCINIACEAE

*Cumminsiiella mirabilissima*

On *Mahonia aquifolia*, Armadale:  
 RD.

\* *Puccinia acetosae* II

On *Rumex acetosella*, Loch Eynort:  
 RD.

*P. aegopodii*

Cawdor Garden.

§\* *P. arenariae* (Schum.) Wint.  
*P. cnici-oleracei*

On *Sagina*, Armadale: RD.  
 On *Cirsium heterophyllum*, Kinloch  
 & Loch Eynort.

§ *P. graminis* Pers. II

On *Anthoxanthum odoratum*, Glen  
 Meodal: RD.

*P. heracei* I

On *Heracleum sphondylium*,  
 Fiskavaig: RD.

*P. hieracii* var. *hypochaeridis*

On *Hypochaeris radicata*, Flodigarry:  
 RD.

*P. lapsanae*

On *Lapsana communis*, Armadale.

§ *P. oxyriae* Fuckel

On *Oxyria digyna*, J. Buchanan  
 White in Stevenson, 1893.

- \* *P. sessilis* III  
*Trachyspora intrusa* On *Phalaris*, Armadale.  
On *Alchemilla*, Broadford, Talisker,  
Fiskavaig, Staffin & Dun Beag.
- \* *Uromyces geranii* I  
*U. trifolii* I On *Geranium cinereum*, in garden  
Prabost.  
On *Trifolium repens*, Glen Meodal:  
RD.

## USTILAGINALES

## USTILAGINACEAE

- § *Entorrhiza digitata* Lagerh. On *Juncus* sp., between Tormore &  
Aird: RD.
- § *Entyloma holci* Liro On *Arrhenatherum*, Aird.  
*Urocystis anemones* On *Anemone nemorosa*, Aird of  
Sleat: RD.

EUMYCOTA: ASCOMYCOTINA  
HEMIASCOMYCETES  
TAPHRINALES

## TAPHRINACEAE

- § *Taphridium umbelliferarum* (Rost.) Lag. & Juel. On *Heracleum sphondylium*, Staffin:  
RD.
- § *Taphrina cerasi* (Fuckel) Sadeb. On *Prunus avium* (cult.), Carboist:  
RD.
- § *T. crataegi* Sadeb. On *Crataegus*, between Armadale  
and Kilmore, Sleat: RD.
- § *T. deformans* (Berk.) Tul. On *Prunus amygdalus* (cult.);  
E.. Gray.
- § *T. padi* (Jacx.) Mix On planted *Prunus padus*, Glen  
Meodal, Sleat: RD.

EUASCOMYCETES  
ERYSIPHALES

## ERYSIPHACEAE

- \* *Erysiphe ranunculi* On *Aconitum napellus* (cult.):  
E. Gray.
- Oidium* (see under Hyphomycetes).
- § *Sphaerotheca volkartii* Blumer On *Dryas octopetala*, Camas Malag:  
RD.

## HYPOCREALES

- \* *Nectria cinnabarina*  
 \* *N. galligena* (conidial)  
*N. fuckeliana*  
 § *N. hederæ* C. Booth  
 § *N. lecanodes* Ces.  
 § *N. peziza* (Tode) Fr.  
 § *Nectriella laminariae* O. Erikss.  
 § *Loramycetes juncicola* Weston

## NECTRIACEAE

- On *Araucaria auracana*, Armadale: RD.  
 On *Malus*, Armadale: RD.  
 On *Abies*, Armadale: RD.  
 On *Hedera helix* Aird of Sleat: RD.  
 On *Lobaria virens*, Kilmore: BJC.  
 On decaying *Polyporus squamosus*, Armadale; on *Ulmus*, Armadale: RD.  
 On dried stipes of *Laminaria*, cast up in cove S. of Tormore & Talisker Bay: RD.  
 On dead *Carex* or *Eriophorum*, Lochan E. of L. Ic Iain: RD

## CLAVICIPITALES

- \* *Claviceps purpurea*

## CLAVICIPITACEAE

- Sclerotia widespread on range of grasses; fertile stroma on grass in moss E. of Lealt, Trotternish, and on *Phalaris*, Broadford.

## PROTOMYCETACEAE

- \* *Protomyces macrosporus*

- On *Conopodium majus*, Loch Hope: RD. Rarely recorded on this host.

## DIAPORTHALES

- \* *Diaporthe eres*  
 \* *D. medusaea* Nits.  
*D. pulla*  
 § *Plagiostoma devexum* (Desm.)  
 Fuckel.  
 § *P. tormentillae* (Lind) Bolay

## DIAPORTHACEAE

- On *Rosa*, (= *D. incarcerata* (B. & Br.) Nits.).  
 On *Fagus*, Armadale: RD. (= *D. rudis*(Fr.) Nits.).  
 On *Hedera helix*, Aird: RD.  
 On *Rumex*, Kilmaluag: RD.  
 On *Potentilla erecta*, Quiraing: RD.

## GNOMONIACEAE

- \* *Gnomonia alni-viridis*  
 § *G. comari* P. Karsten  
 § *Ceratospheeria lampadophora*  
 (Berk. & Br.) Niessl.  
*Sillia ferruginea*

- On *Betula*, Ord glen (*G. setacea* auctt.)  
 Leaf-blotch of *Geum rivale*,  
 Kraiknish: RD.  
 On *Ilex*, Allt Coire Ghasgain: RD.  
 On *Corylus*, Calligarry cliffs: RD.

## PSEUDOVALSACEAE

- § *Phragmoportha conformis* On *Alnus*, Talisker: RD.  
(Berk. & Br.) Petrak

## SPHAERIALES

## TRICHOSPHAERIACEAE

- \* *Chaetosphaerella phaeostroma* On *Symphoricarpos*, Armadale: RD.  
§ *Melomastia mastoidea* (Fr.) Schroet. On *Scabiosa succisa*, Aird. On  
*Symphoricarpos*, Armadale: RD.  
§ *Trichosphaeria* cf. *pilosa* (Pers.) On *Corylus*, Tokavaig; differs from  
Fuckel type in longer hairs.

## AMPHISPHAERIACEAE

- § *Pseudomassaria* (*Chaetapiospora*) On *Dryas octopetala*, Camas Malag:  
*islandica* (Johans.) Barr RD.  
§ *Thyridium lividum* (Pers.) Sacc. On *Ilex*, Allt Coire Ghasgain: RD.

## LASIOSPHAERIACEAE

- Lasio-sphaeria hirsuta* On unidentified log, Armadale.  
*L. spermoides* On *Fraxinus*, Armadale.

## POLYSTIGMATACEAE

- Phyllachora graminis* On *Bromus ramosus*, Kinloch.  
*P. junci* On *Juncus*, Kilmaluag: RD.

## SPHAERIACEAE

- § *Zignoella pachyspora* Sacc., Bomm. On *Salix*, Ord glen: RD.  
& Rous.

## XYLARIACEAE

- § *Anthostomella alchemillae* (A.L. On *Alchemilla alpina*, Quiraing: RD.  
Sm. & Ramsb.) Francis  
§ *A. limitata* Sacc. On *Philadelphus coronarius*,  
Armadale: RD.  
§ *A. phaeosticta* (Berk.) Sacc. On *Ammophila*, Glen Brittle: RD.  
*Hypoxylon serpens* On fence post, S. of Tormore; on  
*Corylus*, S. of Tormore.  
§ var. *macrospora* Miller On *Ilex*, Allt Coire Ghasgain: RD.

## ARTHRONIACEAE

- § *Plectocarpon lichenium* (Sommerf.) On *Lobaria pulmonaria* Tokavaig,  
D. Hawks. Kilmore: BJC.

## PHACIDIALES

## PHACIDIACEAE

- § *Propolis phacidiodes* (Fr.) Corda On *Arctostaphylos uva-ursi*, between  
Aird & Point: RD.

## HYPODERMATACEAE

- Hypoderma hederæ* On *Hedera*, Armadale: RD.  
 § *H. scirpinum* DC. On *Scirpus lacustris*, Loch Cill  
 Chriosd, Strath: RD.  
 \* *Lophodermium arundinaceum* On *Ammophila*, Glen Brittle: RD.

## OSTROPALES

## OSTROPACEAE

- § *Skyttea nitschkei* (Koerber) Sherw., On *Thelotrema lepadinum*, Tokavaig:  
 Hauks. & Coppins BJC.  
 § *Skyttea* sp. On *Pyrenula neglecta*, Tokavaig: BJC.  
*Stictis radiata* On *Crataegus* and *Symphoricarpos*,  
 Armadale: RD.  
*Vibrissea truncorum* Talisker glen: RD.

## ODONTOTREMATAACEAE

- § *Xylopezia inclusa* (Pers.) Sherw. On *Ligustrum?*, Prabost.

## LECANORALES

## AGYRIACEAE

- § *Dactylospora lobiarella* (Nyl.) On *Lobaria pulmonaria*, Kilmore: BJC.  
 Hafellner  
 § *Nesolechia oxyspora* (Tul.) Massal. Tokavaig: BJC.  
 § *Sarea resinæ* (Fr.) Kuntze With *Pycnidiella resinæ* (Ehrenb.) v.  
 Hoehn. on *Larix* canker, Armadale.  
 RD.

## HELOTIALES

## ORBILIAEAE

- § *Orbilina cf. acuum* Velen. On *Corylus*, Coille Dalavil: RD.  
 \* *O. epipora* On *Araucaria araucana*, Armadale:  
 RD.  
*O. delicatula* On *Prunus padus*, Ord, Sleat: RD.  
*O. sarraziniana* On *Corylus*, Aird of Sleat: RD.

## DERMATACEAE

- § *Calloria galii* (Fuckel) Sacc. On *Galium aparine*, Kilmore: RD.  
 § *Coleosperma lacustre* Ingold On *Scirpus lacustris*, L. Gillchriosdh:  
 RD.  
 § *Hysteropezizella olivacea* (Mouton) On *Carex*, 76m., unnamed lochan E.  
 Nannf. of L. Ic Iain.  
*Laetinaevia carneoflavida* On *Urtica dioica*, Staffin slip: RD.  
 § *Mollisia macrosperma* (Sacc.) Le On *Ilex*, Allt Coire Ghasgain.  
 Gal. & Mang.  
 § *Mollisia rabenhorstii* (Auersw.) Rehm On *Quercus* leaves, Calligarry Cliffs:  
 RD.  
*Nimbomollisia eriophori* On *Eriophorum*, 425m, Bioda  
 Buidhe: RD.

- § *Niptera lacustris* (Fr.) Fr. On *Scirpus lacustris*, L. Gillchriosdh: RD.
- §\* *Patellariopsis clavispora* (Berk. & Br.) Dennis On *Fraxinus*, Rubha Guall, Kinloch. On *Symphoricarpos*, Armadale. On *Corylus*, Aird. RD.
- Pezicula cinnamomea* On *Fagus*, Armadale: RD.
- Ploettnera exigua* On *Rubus fruticosus*, Staffin slip: RD.
- Pyrenopeziza lychnidis* On *Silene dioica*, Staffin slip: RD.

### HYALOSCYPHACEAE

- § *Cistella perparvula* (Karst.) Nannf. On *Pinus*, Armadale: RD.
- Dasyscyphus clandestinus* On unidentified stem, Staffin slip: RD.
- D. (Clavisdiscum) fugiens* On *Juncus*, Ardvasar & Flodigarry: RD.
- § *D. palarum* (Desm.) Mass. On *Ammophila*, Glen Brittle: RD.
- D. pudibundus* On *Salix*, Tormore, Sleat: RD.
- § *D. rehmii* (Staritz) Sacc. On *Juncus*, Staffin slip: RD.
- § *Hyaloscypha priapi* On unidentified wood-chips, Armadale: RD.
- H. stevensonii* On rotting *Pinus* log, Coille Dalavil, Sleat (Spooner & Dennis, 1986).
- § *Incrupila aspidii* (Lib.) Raitv. On *Polystichum aculeatum*, Camas Malag & on *Athyrium filix-femina* Tokovaig: RD.
- Lachnellula willkommii* Canker on *Larix*, Armadale: RD.
- Phialina ulmariae* On *Filipendula ulmariae*, Ardvasar: RD.
- § *Psilachnum acutum* (Velen.) Svrček On *Bromus ramosus*, Kinloch: RD.

### SCLEROTINIACEAE

- § *Moellerodiscus advenulus* (Phill.) Dumont *Larix* needles, Armadale pier: RD.
- § *Monilinia* (?) Sclerotia on James Grieve apple, Skeabost Bridge.
- § *Poculum myricae* Spooner & Dennis On *Myrica*, Ord Glen, Sleat: RD. – Holotype (Spooner & Dennis, 1986).
- Rutstroemia sydowiana* On *Quercus*, Ord: RD.
- Sclerotinia sclerotiorum* On *Doronicum* & *Primula* in garden, Skeabost Bridge.

### GEOGLOSSACEAE

- Geoglossum glutinosum* Roadside turf, Carbost.

### HELOTIACEAE

- \* *Bisporella sulfurina* On *Cydonia*, Prabost.
- § *Chloroscypha sabiniae* (Fuckel) Dennis On *Juniperus* sp. (cult.), Armadale: RD.
- Cudoniella clavus* var. *grandis* Volovig, Kilmaluag: RD.

- § *Cystopezizella vencoeslai* (Vel.) Svrček On *Pinus*, Armadale: RD (Spooner & Dennis, 1986).  
*Durella connivens* On *Ilex*, Allt Coire Ghasgain: RD.  
*Godronia cassandrae* f. *callunae* On *Calluna*, Kilmaluag: RD.  
*Hymenoscyphus calyculus* Kilmarie Wood.  
§ *H. perplexus* Spooner & Dennis On *Pinus sylvestris*, Sleat, Coille Dalavil: RD. – Holotype (Spooner & Dennis, 1986).  
\* *H. scutula* On *Rumex*, Port na Long: RD.  
§ *Pezizella pulcherrima* Spooner & Dennis On *Ulmus*, Dunvegan: RD. – Holotype (Spooner & Dennis, 1986).  
§ *Rodwayella myricae* Spooner & Dennis On *Myrica*, Ord Glen, Sleat: RD – Holotype (Spooner & Dennis, 1986).  
§ *Skyathea hederæ* Spooner & Dennis On *Hedera*, burn from Loch Fada; RD. – Holotype (Spooner & Dennis, 1986).  
§ *Stamnaria persoonii* (Pers.) Fuckel On *Equisetum*, Heast road end, Broadford: RD.  
*Velutarina rufo-olivacea* On *Rubus*, Ardvasar; on *Ulex*, Armadale: RD.

## PEZIZALES

## ASCOBOLACEAE

*Ascobolus furfuraceus*

On cow dung, Kilbride, Strath: RD.

## HUMARIACEAE

*Coprobria granulata*

On cow dung, Ord glen.

## HELVELLACEAE

*Helvella lacunosa*

Coill a'Ghasgain, Ord glen.

## PEZIZACEAE

- § *Otidea* sp. Kilmarie Wood (ascospores 12–14 x 6–6.5 µm).  
§ *Peziza repanda* Pers. On sawdust, probably *Fagus*, Armadale.

## LOCULOASCOMYCETES

## PLEOSPORALES

## PLEOSPORACEAE

- § *Didymella caricis* Syd. On *Carex*, Sleat, Armadale: RD. (Spooner & Dennis, 1986).  
§ *Homostegia piggottii* (B. & Br.) Karst. On *Parmelia saxatilis*, Tokavaig, Glen Brittle, Glen Eynott: BJC.  
§ *Leptosphaeria baldingeræ* Fautr. & Lamb. On *Phragmites*, Flodigarry: RD.  
§ *L. culmorum* Auersw. ex Rehm On *Juncus*, Kilmaluag: RD. (= *L. derasa* B. & Br. fide Holm).  
*L. derasa* On *Senecio jacobaea*, Kilmaluag: RD.  
\* *L. graminis* On *Phragmites*, Loch Cill, Chriod, Strat. On *Phalaris*, Staffin slip: RD.

- L. silenes-acaulis* On *Silene acualis*, Quiraing: RD.  
 § *Melanomma fuscidulum* (Sacc.) On *Ulmus*, Aird of Sleat: RD.  
 Sacc.  
 § *Monascostroma innumerosa* On *Juncus*, Ardvasar: RD.  
 (Desm.) v. Hoehn.  
*Ophiobolus acuminatus* On *Arctium*, Talisker bay: RD.  
*O. cirsi* On *Cirsium palustre*, Quiraing: RD.  
 § *Pleospora scirpicola* (DC.) On *Scirpus lacustris*, L.  
 P. Karst. Gilchriosdh: RD.

#### LOPHIOSTOMATACEAE

- § *Lophiosphaera ulicis* (Pat.) On *Ulex*, Kilmaluag: RD.  
 E. Müller  
*Lophiostoma angustilabrum* On *Ulex*, Armadale; On *Rubus idaeus*, Aird; On *Chamaenerion*, Port na Long: RD.  
 § *L. hysterioides* (Schw.) Sacc. On *Rubus idaeus*, Flodigarry: RD.  
 \* *Platystomum compressum* var. On *Populus tremula*, Aird: RD.  
*pseudomaerostomum* (Sacc.) Type variety recorded for Skye – on  
 Chesters & Bell *Symphoricarpos*, Armadale: RD.

#### DOTHIDEALES

##### DOTHIDEACEAE

- § *Keissleriella linearis* E. Müller On *Phragmites*, Loch Cill,  
 ex Dennis Chriosd, Strath: RD.

##### DOTHIORACEAE

- Botryosphaeria hyperborea* On *Empetrum*, Rubha na h'Aiseig:  
 RD.  
*Scirrhia aspidiorum* On *Athyrium felix-femina*, Staffin  
 slip: RD.

#### MYCOSPHAERELLACEAE

- § *Mycosphaerella filicum* (Desm.) On *Asplenium trichomanes*, Aird of  
 Starb. Sleat: RD.

#### ARTHROPYRENIACEAE

- § *Mycocomrothelia atlantica* On *Corylus*, Tokavaig: BJC.  
 D. Hawks. & Coppins  
 § *M. confusa* D. Hawks. On *Corylus*, Tokavaig, Glen Brittle:  
 BJC.

#### PYRENIDIACEAE

- § *Pyrenidium actinellum* Nyl. On *Pseudocypbellaria norvegica*,  
 Tokavaig: BJC.

## MYCOPORACEAE

- § *Mycoporium quercus* (Massal) Müll. Arg. On *Quercus* twigs, Rubha Quail: BJC.

## DOTHIDEALES?

- § *Arbrothallus bertianus* de Not. On *Parmelia* spp., Tokavaig, Glen Brittle, Glen Eynott, Coille Gaircallah: BJC.
- A. parmeliarum* (Sommerf.) Arnold On *Parmelia* spp., Quiraing: BJC.
- § *Mycoglaena myricae* (Nyl.) R. C. Harris On *Myrica gale*, Tokavaig, Mudalach, Loch Harport, Coille Gaireallach: BJC.
- § *Stigidium microspilum* (Koerber) D. Hawks. On *Graphis scripta*, Coille Gaireallach: BJC.

## OPEGRAPHALES

## OPEGRAPHACEAE

- § *Leciographa scapanaria* (Carrington) A. L. Sm. On hepatic, Loch Slapin: BJC.
- § *Opegrapha brevis* Coppins On *Thelotrema subtile*, Tokavaig: BJC.
- § *O. parasitica* (Massal) Vezda On crustose lichens, Suardal: BJC.
- § *O. pertusariicola* Coppins On *Pertusaria leioplaca*, Coille Gaircallah: BJC.
- § *O. pulvinata* Rehm On *Dermatocarpon*, Suardal: BJC.
- § *O. thelotrematis* Coppins On *Thelotrema monosporum*, Tokavaig: BJC.

## HEMISPHERIALES

## ASTERINACEAE

- § *Lembosina gontardii* E. Müller On *Arctostaphylos uva-ursi*, between Ard Point & Point of Sleat: RD. (Spooner & Dennis, 1986).

## MICROTHYRIACEAE

- § *Stomiopeltis dryadis* (Rehm) Holm On *Dryas octopetala*, Camas Malag: RD.

DEUTEROMYCOTINA  
'HYPHOMYCETES'

- § *Acrogenospora sphaerocephala* (B. & Br.) Ellis *On Fraxinus* bark, Ord: RD.
- § *Alatospora acuminata* Ingold Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- § *Anguillospora crassa* Ingold Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- § *A.? furtiva* Descals & Webster Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- A.? longissima* (de Willd.) Ingold Foam sample, Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- § *Articulospora angulata* Tubaki Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- A. tetracladia* Ingold Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- Arthrinium arundinis* (Corda) Dyko & Sutton On bamboo cane, Ardvasar: RD.
- § *Aureobasidium bolleyi* (Sprag.) v. Arx On *Poa*, in garden, Prabost.
- § *Bactrodesmium abruptum* (B. & Br.) Mason & Hughes On *Fraxinus* bark, Ord: RD.
- § *B. hebridense* Kirk On *Quercus*, Sleat (Kirk, 1986).
- § *B. obovatum* (Oud.) Ellis On *Hedera*, Aird of Sleat: RD.
- § *Bloxamia truncata* B. & Br. On *Ulmus*, Aird of Sleat: RD.
- § *Camposporium? pellucidum* (Grove), Hughes Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- § *Candelabrum spinulosum* v. Beverwijk Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- § *Cercospora murina* Ellis & Kellerman On *Viola palustris*, Kinloch: RD.
- Cladosporium cladosporoides* (Fres.) de Vries On *Rhododendron* leaves. Portree.
- § *Clavatospora longibractiata* (Ingold) S. Nilsson Foam sample, Armadale: RD.
- § *Conioscypha hoehnelii* Kirk On *Hedera*, Aird of Sleat: RD.
- § *Culicidospora gravida* R. H. Petersen Foam sample, Armadale: RD.
- § *Dendrospora erecta* Ingold Foam sample, Armadale: RD.
- § *Domingoella arctostaphyli* Kirk On dead *Arctostaphylos* leaves, Point of Sleat (Kirk, 1986).
- § *Exosporium tiliae* Link ex Schlecht. On *Tilia*, Armadale: RD.
- § *Flabellospora acuminata* Descals Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- Graphium calicioides* (Fr.) Cke. & Mass. On *Betula*, Coille Dalavil: RD.
- § *Gyoerffyella biappendiculata* (Arnold) Ingold Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.
- § *G. speciosa* (Miura) Ingold Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.

- § *Helicoma muelleri* Corda On wood-chips, Armadale: RD.  
*Heliscus lugdunensis* Sacc. & Therry Allt a' Cham-aird, S. of Ardvassar,  
 Sleat: RD.
- § *Isthrotrichadia britannica* Descals Sleat: RD.
- § *Idriella grisea* (Sutton et al) v. Arx On *Laurus nobilis*, Ord: RD.
- § *Hirsutella eleutheratorum* (Nees: Fr.) Petch On beetle, Armadale: RD.
- § *Lateriramulosa uni-inflata* Mats. Allt a' Cham-aird, S. of Ardvassar,  
 Sleat: RD.
- § *Magdalaenaea monogramma* Arnaud. Allt a' Cham-aird, S. of Ardvassar,  
 Sleat: RD.
- § *Mirandina arnaudii* P. Kirk On rotten *Quercus*, River Ord, Sleat  
 (Kirk, 1986).
- § *Milosporium graphideorum* (Nyl.) On *Lecanactis amylacea*, Tokavaig:  
 Hawks. BJC.
- § '*Oidium*' *laburni* R. Fischer On exposed *Laburnum*, Elgol: E. Gray
- § *Penicillium expansum* Link On James Grieve apple, Prabost.
- § *P. variabile* Sopp On James Grieve apple, Prabost.
- § *Pleuropodium tricladioides* Allt a' Cham-aird, S. of Ardvassar.  
 Matvanova & Iqbal Sleat.
- § *Pseudospiropes nodosus* (Wallr.) On *Symphoricarpos*, Armadale: RD.  
 Ellis
- § *P. simplex* (Kunze) Ellis On *Acer*, Armadale: on driftwood.
- § *Pycnostysanus azaleae* (Peck) On *Rhododendron*, Prabost.  
 Mason
- § *Ramularia calthae* (Erikss.) Lindr. On *Caltha palustris*, Ardvassar: RD.
- § *R. cardamines* Syd. On *Cardamine hirsuta*, Armadale:  
 RD.
- § *R. epilobii-palustris* All. On *Epilobium palustre*, Loch  
 Eynort: RD.
- § *R. plantaginea* Sacc. & Berl. On *Plantago lanceolata*, Loch Eynort:  
 RD.
- § *R. variabilis* Fuckel On *Digitalis purpurea*, Ardvassar: RD.
- § *Sclerococcum sphaerale* (Ach.) Fr. On *Pertusaria corallina*, Glen  
 Brittle, Quiraing, Camas Malag:  
 BJC.
- Spirosphaera floriformis* v. Beverwijk Allt a' Cham-aird, S. of Ardvassar.  
 Sleat: RD.
- § *Sporodesmium altum* (Preuss) Ellis On *Sambucus*, Armadale: RD.
- § *Sympodiocladium frondosum* Descals Allt a' Cham-aird, S. of Ardvassar,  
 Sleat: RD.
- \* *Taeniolina scripta* (Karst.) On *Ilex*, Allt Coire Ghasgain,  
 P. Kirk Kinloch: RD.
- § *Taeniospora gracilis* Marvan. Allt a' Cham-aird, S. of Ardvassar,  
 Sleat: RD.
- § *Tetracladium furcatum* Descals Allt a' Cham-aird, S. of Ardvassar,  
 Sleat: RD.
- § *T. marchalianum* de Wild. Allt a' Cham-aird, S. of Ardvassar,  
 Sleat: RD.
- T. setigerum* (Grove) Ingold Allt a' Cham-aird, S. of Ardvassar,  
 Sleat: RD.

- § *Tricellula aquatica* Webster Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- § *T. botryosa* Descals Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- § *T. graminea* (Ingold, McDougall & Dunn) v. Arx Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- § *Trichocladium* cf. *asperum* Harz. On leaf of *Rhododendron*, Portree in 'Fumago vagans'
- § *Tricladopsis foliosa* Descals Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- § *Tricladium attenuatum* Iqbal Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- T. splendens* Ingold Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- § *Tridentaria* sp. Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- § *Tripospermum camelopardus* Ingold, Dunn & McDougall Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- § *Triscelophorus acuminatus* Nawawi Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- Varicosporium elodeae* Kegel Allt a' Cham-aird, S. of Ardvassar, Sleat: RD.
- § *Verticillium* cf. *lecanii* (Zimm.) Viegas On old agaric, grass slope below Berreraig Waterfall.
- § *Virgaria nigra* (Link) Nees On *Sorbus aucuparia*, Ord: RD.

## 'COELOMYCETES'

### SPHAEROPSIDALES-MELANCONIALES

- § *Ascochyta teretiuscula* On *Luzula sylvatica*, Ardvassar: RD.  
Sacc. & Roum.
- § *Camarosporium kriegeri* Bres. On *Tanacetum*, Talisker bay: RD.
- § *C. macrosporum* (Berk. & Br.) Sacc. On *Philadelphus coronarius* Armadale: RD.
- § *C. metableticum* Grove On *Ammophila*, Glen Brittle: RD.
- § *Chaetospermum chaetosporum* (Pat.) Smith & Ramsb. On *Eupatorium cannabinum*, Kraiknish: RD.
- Coleophoma cylindrospora* (Desm.) v. Hoehn. On *Hedera helix*, Armadale: RD.
- § *Cryptocline phacidiellum* (Grove) v. Arx On *Prunus lusitanica*, Armadale: RD.
- § *Cytospora* cf. *subclypeata* Sacc. On *Rhododendron* (cult.), Portree.
- § *Diplodia quercus* Fuckel On *Quercus*, Calligarry cliffs: RD.
- § *Diplodina eurhododendri* Voss. On *Rhododendron* (cult.), Dunvegan.
- Gloeosporium rhododendri* Briosi & Cav. On *Rhododendron* (cult.), Dunvegan.
- § *Leptothyrium scirpinum* (Fr.) Bub. & Kab. On *Scirpus palustris*, Loch Cill Chriosd: RD.
- § *Phoma* cf. *rhododendri* Cooke On *Rhododendron* (cult.), Dunvegan: 2 distinct taxa involved differing in size of pycnidia and slight differences in conidial shape.

- § *Phomopsis pernicios*a Grove On *Malus* (cult.), Talisker House: RD.  
*Phomopsis* sp. On *Hieracium*, Camas Daraich, Sleat: RD.
- § *Pycnidiella resin*ae (Ehrenb.) v Hoehn On *Larix* canker, Armadale: RD.  
 § *Phyllosticta saccardo*i Thüm. On *Rhododendron* (cult.), Portree.  
 § *Rhabdospora pleurosporoides* Sacc. On *Angelica*, Staffin slip: RD.  
 § *Seimatosporium rosarum* (P. Henn.) Sutton On *Rosa pimpinellifolia*, Gauskavaig: RD.  
 § *Stagonospora aquatica* (Sacc.) Sacc. On *Scirpus palustris*, Loch Cill Chriosd: RD.  
 § *S. paludosa* (Sacc. & Speg.) Sacc. On *Carex distans*, Kraiknish, Loch Eynnort: RD.  
 § *S. vitensis* Unamuno On *Carex flacca*, Kilmaluag: RD.  
*Tiarospora perforans* (Rob.) v. Hoehn On *Ammophila*, Glen Brittle: RD.  
 § *Vouaxiella lichenicola* (Lindsay) Petrak & Syd. On *Lecanora chlorotera*, Glen Eynort: BJC.  
 § *V. uniseptata* D. Hawks. On *Petigera laevigata*, Tokavaig, Rubha Quail: BJC.

## ZYGOMYCOTINA

## ENTOMOPHTHORALES

## ENTOMOPHTHORACEAE

- § *Entomophthora conica* Nowakowski Allt a' Cham-aird, S. of Ardvasar, Sleat: RD.

## MASTIGOMYCOTINA

## PERONOSPORALES

## PERONOSPORACEAE

- § *Peronospora agrestis* Gaum. On *Veronica filiformis*, Broadford pier: RD.  
 § *P. brassicae* Gaum. On *Sinapis arvensis*, Ferindonald: RD.  
 § *P. digitalidis* Gaum. On *Digitalis purpurea*, Ardvasar: RD.  
 § *P. grisea* (Ung.) Ung. On *Veronica serpyllifolia*, Sleat: RD.  
 § *P. trifolii-pratensis* A. Gust. On *Trifolium pratense*, Cille Chroisd, Strath: RD.  
*Plasmopara angelicae* (Casp.) Trott. On *Conopodium denudatum*, Sleat & Staffin: RD.  
 § *P. pygmaea* (Ung.) Schroet. On *Anemone nemorosa*, Aird church: RD.

## CHYTRIDIALES

## SYNCHYTRIAEAE

*Synchytrium aureum*

On *Thymus drucei*, Elishader: RD.

MYXOMYCOTA: MYXOMYCOTINA  
MYXOMYCETES

( ) indicate corticolous species found on the bark of living trees, detected in moist chamber culture. All records except for *Badhamia foliicola* confirmed by B. Ing.

ECHINOSTELIALES

**CLASTODERMATACEAE**

§ (*Clastoderma pachypus* N.-Brem.) Loch na Dal.

LICEALES

**LICEACEAE**

§ (*Licea denudescens* Keller & Brooks) Tokavaig Wood.

§ (*L. scyphoides* Brooks & Keller) Loch na Dal; Tokavaig Wood.

**RETICULARIACEAE**

§ *Enteridium splendens* (Morg.) On *Quercus* sticks, Loch na Dal;  
Macbr. Tokavaig Wood.

§ *Lycogala conicum* Pers. Tokavaig Wood.

TRICHIALES

**TRICHIACEAE**

§ *Arcyria obvelata* (Oeder) Onsberg Loch na Dal; Tokavaig Wood.

§ (*A. pomiformis* (Leers) Rost.) Loch na Dal; Tokavaig Wood.

§ *Trichia scabra* Rost. On old rotting logs,  
Tokavaig Wood.

STEMONITALES

**STEMONITACEAE**

§ *Collaria elegans* (Racib.) On sticks, Tarskavaig.  
Dhillon & N.-Brem.

(*Colloderma oculatum*) Tokavaig Wood.

*Comatricha pulchella* On dead fern fronds, Tokavaig Wood.

(*Paradiacheopsis fimbriata*) Broadford.

§ (*P. solitaria* N.-Brem.) Loch na Dal; Tokavaig Wood.

(*Macbrideola cornea*) Tokavaig Wood.

*Stemonitis axifera* On *Quercus* branches, Loch na Dal;

Lyndale; Tokavaig Wood.

§ *S. lignicola* N.-Brem.

On rotting branches, Tokavaig Wood.

*S. splendens*

On rotten wood, Tokavaig Wood.

## PHYSARALES

	<i>Badhamia foliicola</i>
	<i>B. lilacina</i>
§	<i>B. utricularis</i> (Bull.) Berk.
§	<i>Craterium muscorum</i> B. Ing.
§	( <i>Physarum oblatum</i> Macbr.)
§	<i>P. virescens</i> Ditm.

## PHYSARACEAE

	On <i>Brassica</i> , Armadale: RD.
	<i>Sphagnum</i> bog, Loch na Dal.
	On <i>Stereum</i> , Tokavaig Wood.
	On mossy rocks, Tokavaig Wood.
	Tokavaig Wood.
	Loch na Dal; Tokavaig Wood.

## DIDYMIACEAE

	<i>Diderma lucidum</i>	On mossy rocks, Tokavaig Wood.
	<i>Mucilago crustacea</i>	On grass stems, Tokavaig Wood.

**TABLE 1.** Fungal flora of Skye compared with that of Mull (Varieties are not included in this analysis)

	Skye	Mull
Eumycota		
Basidiomycotina		
Hymenomycetes		
Agaricales	372	721
Aphylophorales	76	192
Jelly fungi (Tremellales etc)	18	23
Gasteromycetes	9	19
Hemibasidiomycetes	84	102
Ascomycotina	377*	811
Deuteromycotina	199	371
Zygomycotina	2	32
Mastigomycotina	15	23
Myxomycota	65	85
<b>Total</b>	<b>1217</b>	<b>2379</b>

\*This figure includes six parasitic members of the Opegraphaceae a family generally considered totally lichenised.

### Acknowledgments

I am deeply indebted to Drs R. W. G. Dennis (RD) and Elizabeth Gray for the full use of their notes, and to Dr B. Ing for all the myxomycete records. I would also like to thank Dr E. Garvie, Mr and Mrs J. de Ruiter, Mr and Mrs C. Murray and Major R. Brown who have corresponded with me and sent material for determination. My thanks also are due to my colleagues, Dr B. J.

Coppins (BJC) for his help with certain determinations and supplying the records of lichen parasymbionts, Dr C. Alexander for the critical examination of the *Geranium cinereum* collection mentioned in the introduction and Dr E. Descals who determined the aquatic fungi in slides prepared from foam supplied by Dr R. W. G. Dennis.

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## Book Reviews

### **Wildfowl in Great Britain**

M. OWEN, G. L. ATKINSON-WILLES &  
D. G. SALMON

Illustrations by SIR PETER SCOTT.

Cambridge University Press. 1986. 613pp., maps,  
drawings. Hardback, ISBN 0521 30986 7, £30

For longer than I care to remember, I have counted each month, the numbers of Geese, Swans and Ducks at my local loch. Counts are then submitted to the Wildfowl Trust and the information analysed and stored. This fine volume puts together my counts along with all others and looks at the status and distribution of wildfowl in Great Britain. The country is divided into areas of wetland and statistics of species or waters are presented for a variable number of years. Maps showing distribution and numerical categories help to sort out what is where. There are other chapters on ringing wildfowl, conservation and population dynamics, all of which help make this the most comprehensive account of waterfowl currently available. Given one or two mistakes, and errors arising from the vast amounts of information handled by the authors these can be dismissed as trivial. Since this is the Second Edition, future editions will show the changes over the years. This is a super book and I thoroughly recommend it to everyone interested in wildfowl.

B. ZONFRILLO

### **Waders. Their Breeding, Haunts and Watchers**

DESMOND and MAIMIE  
NETHERSOLE-THOMPSON

Illustrated by DONALD WATSON

T. & A. D. Poyser, Calton. 1986. 400 pp., black & white  
photographs, drawings. Hardback, ISBN 0 85661 042 9,  
£18

A rather strangely titled book, but none-the-less fascinating account of the encounters and studies of the Thompson family with wading birds and the people who watch them. There are chapters on the early days of wader watching and the historical and modern wader specialists. Species are handled under habitat headings. All species breeding or sometimes breeding in Britain are thoroughly treated. Precise details of courtship and nesting are described and there is much general biological information throughout. Photographs are excellent and Donald Watson's drawings aid the text. I found though, that there seemed to be too much data packed into each chapter and much of it preoccupied with eggs. The sonagrams are sometimes translated phonetically to aid understanding of these "blots", but sometimes not, which is annoying. However, this is a fine book and covers well the biology of waders. It answers many questions and is a book to which one can return time and again. The authors are to be congratulated on producing such a detailed and eloquent account of British waders.

B. ZONFRILLO

## The Vegetation Ecology of Opinan Dunes

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The Opinan dune system lies just south of Gairloch on the N.W. coast of Scotland, V.C.105, West Ross, and immediately adjacent to the road to Red Point (Figs. 1 & 2). It is isolated between two headlands of Torridonian Sandstone and has been built up over fluvio-glacial and raised beach deposits. Comprising some 24.3ha, nearly half of which is 'damaged' land liable to windblow, the

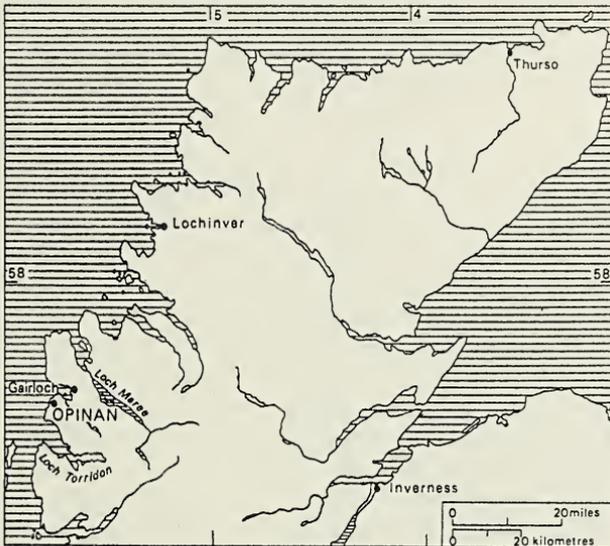


Figure 1 The situation of Opinan

system is extremely dynamic and highly fragile and is unsuitable for the combined grazing and recreational pressures to which it has been increasingly subjected in recent years. In 1978 a fence was erected by the Countryside Commission in conjunction with local crofters to bar vehicular access to the dune system, to limit grazing to the seasons in which vegetation is not growing and to direct personal access via stiles and gates (Fig. 2).

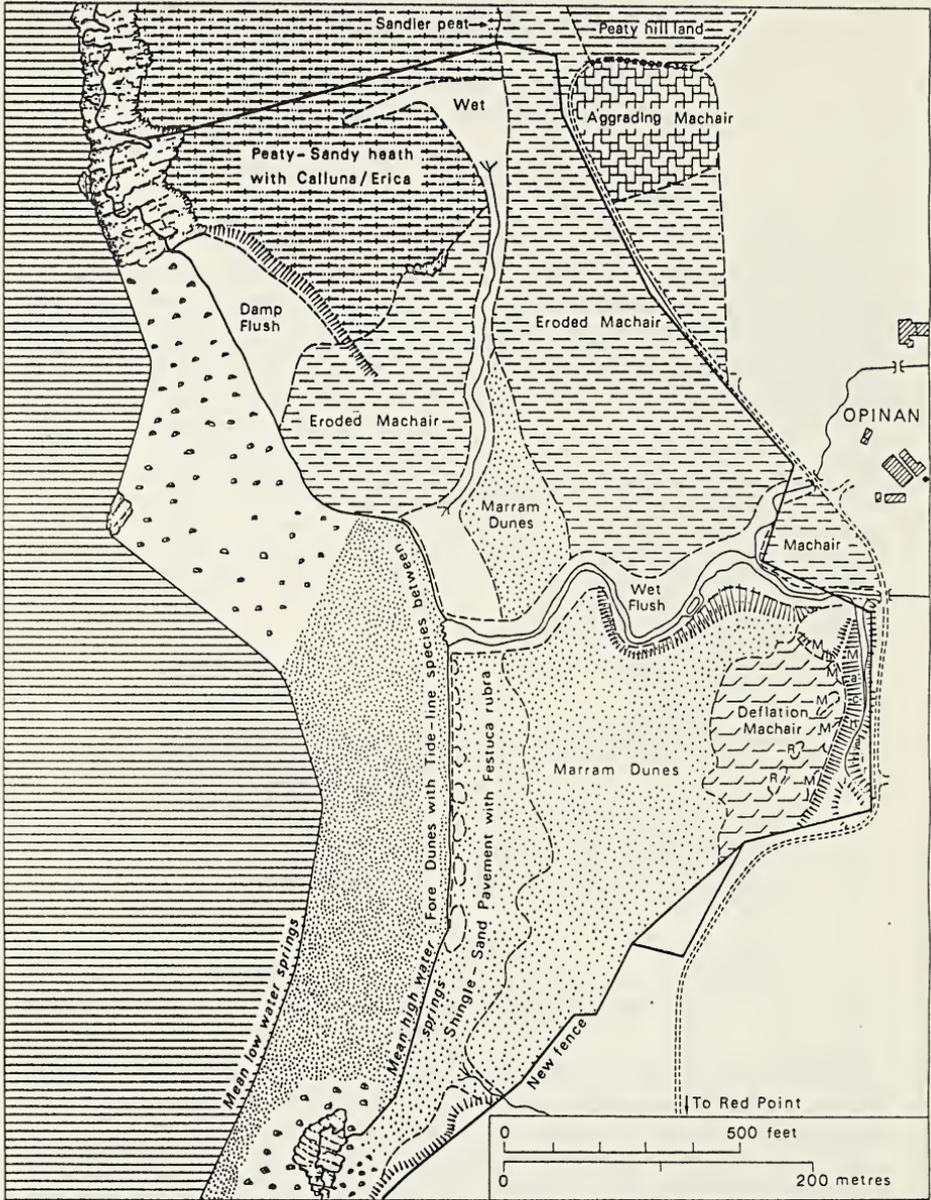


Figure 2 The Opinan area and its vegetation.

This report describes the present relief and vegetation of the system and will act as a basis for reviewing the effects of restricting access over the next few years. Further details concerning the geomorphology and land use of the area can be found in Mather and Crofts (1972), pp. 71-75.

## Soils

The soils of the Opinan Beach Complex are of two main types: incipient soils on the beach and dune system and peats in the wetter areas and moorland around. The sands of Opinan Beach are silicate with markedly less shell fragments than that of the Machair of the Hebrides. These syrosems show little horizon differentiation over much of the area but in places within the dune system to the south of the stream an organic horizon about 5cm thick outcrops on the dune face, indicating stabilization at some time in the past and development of an incipient podsol. The foredunes are highly alkaline with pH 8+. Over much of the dune system readings of pH 8.0 or just below were obtained.

The topogenic peat is dark brown and acid with pH values of about 4.5 (slightly modified by the coastal location). However there are considerable variations in the peaty soils. Where cultivation had once been practised in the north of the area just south of the fence-line, peat and sand were intermixed and pH 5.0 was recorded. Similarly there are a series of mildly acid ranker peats nearer the shore. Thin protorankers of pH 5.0 are found over the Torridonian sandstone of the headlands and on rock outcrops. These are usually only 3-5cm thick. A richly organic gleyed sand is found where the water-table outcrops and small streams begin in the north of the eroded machair system. This soil has a pH of 5.5. Finally a dystrophic ranker with a 15cm A0 horizon has developed in the flushed area at the base of the northern headland cliff-line. This has a pH of 5.75 and is influenced both by seaspray and ingress of some basic salts from inland.

## Vegetation

### The Beach System

The chief characteristics of Opinan beach are the great width of the upper beach (25m) and the backshore (15m). This results in an abundant supply of sand in circulation and consequently a low cover of vegetation. The upper beach has occasional small plants

of *Ammophila arenaria* and rarely *Atriplex prostrata*. Along the winter high-tide line young plants of *Cakile maritima* were seen. However this whole community is unstable and annual in nature since even the perennial *Ammophila* plants are broken remnants rooting only in this location during the quieter summer period. The backshore has more vegetation but still a cover of under 5%. This is almost entirely a glaucous form of *Festuca rubra* with *Elymus farctus* but *Carex arenaria* is commonest in the south of the area where the backshore is composed of a thin covering of sand over a cobble pavement. The major vegetated features of the backshore however are the line of small embryo dunes which have a full cover of *Ammophila arenaria* and occasional plants of *Festuca rubra*.

### The Dune System

A quite extensive dune system has evolved over recent years behind the backshore, developed in part over backshore sand but in part over deflated fragments of the older dune ridges. According to Mather and Ritchie (1972), the area just south of the main stream where most of the present young dunes occur, was intensely deflated in 1964 with remanée dunes upstanding above the surrounding bare sand surface. This situation has obviously been reversed by a large increment of sand into the area. Typical of young, active dunes, this area is dominated by *Ammophila* with scattered *Festuca rubra* and occasional plants of *Carex arenaria*. Sandy hollows between the dunes do not contain *Ammophila*. These are dominated by swards of *Carex arenaria* and the glaucous form of *Festuca rubra* is frequent. Also present in these hollows are occasional plants of *Hypochaeris radicata* and *Potentilla anserina*. Where the organic rich upper soil layer of the old remanée dunes breaks the surface of the present dune system the greater moisture and nutrient availability increase the species present. The dominant species of this peaty sand is *Festuca rubra* but *Carex nigra* and *Potentilla anserina* are also common. Some of these peaty lines create perched water tables or spring lines and possess *Juncus articulatus*, *Sagina procumbens* and *Triglochin palustris*. Others are much drier with *Bellis perennis*, *Carex arenaria*, *Cerastium diffusum* and *Thymus praecox* ssp. *arcticus*. This latter vegetation may well have persisted from the previous dune surface.

### The Machair System

This system has two distinct areas. To the north of the stream the ground rises irregularly at slopes of between 15°–30° over

remanée dunes to a deflation plain at approximately 15m above sea level. This plain is most likely the remnant of a large dune overlying raised beach deposits. It is generally convex in cross-section and is now dissected by small streams and percolines indicating a less permeable lower horizon. This plain must have been stable in the past because there are remnants with the old podsollic soil surface still left as machair 'mesas' some 2m above the deflation floor. The sand deflated from this area has blown north and eastwards beyond the boundary fence up a gully in the moorland and over the road to a new machair surface where *Carex arenaria* and *Festuca rubra* are recolonizing but fresh supplies of sand are coming each winter.

South of the main stream and landward of the major active dunes there is another deflation plain that is still extremely dynamic with over 80% bare ground. Within this are two very distinctive relicts from the previous machair surface. Beyond the beach fence there are further small areas of machair either landwards of the road or where the car park has been created along the stream bottomland opposite the post office. This latter area is presently stable but suffers considerable recreational pressure and vehicular access. The machair areas are much richer in species than the dune systems but because of their marked variation in relief, hydrology and history will have to be described separately.

The deflation plain in the south of the area, seawards of the kirk is presently being revegetated mainly by *Carex arenaria* and *Festuca rubra*. Twenty two species were recorded in this area. They are of two rooting depths, some colonizing the dry sandy surface; others rooting at greater depth in the earlier peaty/organic horizon. Of the latter *Carex nigra* is the commonest. The species concerned are given below:

<i>Festuca rubra</i> : dominant	<i>Taraxacum spectabile</i> : occasional
<i>Carex arenaria</i> : very common	<i>Thymus praecox</i> ssp. <i>articus</i> : occasional
<i>Cerastium diffusum</i> : common	<i>Agrostis stolonifera</i> : rare
<i>Achillea millefolium</i> : frequent	<i>Cirsium arvense</i> : rare
– common	<i>Juncus articulatus</i> : rare
<i>Potentilla anserina</i> : frequent	<i>Ranunculus acris</i> : rare
– common	<i>Rumex acetosella</i> : rare
<i>Cirsium vulgare</i> : frequent	<i>R. crispus</i> : rare
<i>Plantago lanceolata</i> : frequent	<i>Senecio jacobaea</i> : rare
<i>P. maritima</i> : occasional	<i>Succisa pratensis</i> : rare
– frequent	<i>Taraxacum officinale</i> : rare
<i>Elymus farctus</i> : occasional	<i>Trifolium repens</i> : rare
<i>Carex nigra</i> : occasional	
<i>Centaurea nigra</i> : occasional	

The two adjacent remnants of the previous vegetated surface that are present in this area are unique to the whole of Opinan because they are dominated by the low-growing woody shrub, *Salix repens*. This species does not occur elsewhere at Opinan and might suggest the remains of an ancient dune slack. There is a completely closed cover of vegetation with no bare ground. The species list for this small area is:

<i>Salix repens</i> : dominant	<i>Carex arenaria</i> : rare
<i>Thymus praecox</i> ssp. <i>arcticus</i> : common	<i>Festuca rubra</i> : rare
<i>Polygala serpyllifolia</i> : frequent	<i>Lotus corniculatus</i> : rare
<i>Achillea millefolium</i> : occasional	<i>Ranunculus acris</i> : rare
<i>Galium verum</i> : occasional	<i>Trifolium repens</i> : rare

To the north of the stream parts of the deflated machair are becoming increasingly stabilized. In some places low dunes are developing with *Ammophila*. These have migrated upslope from the backshore. Elsewhere the dominant vegetation is *Carex arenaria*, locally with pure patches of *Festuca rubra*. Occasional bushes of *Ulex europaeus* remain, presumably from the previous stable surface. Other species present are *Aira praecox*, *Cerastium diffusum*, *Cirsium arvense*, *Fragaria vesca*, *Leontodon autumnalis*, *Lotus corniculatus*, *Potentilla anserina* and *Senecio jacobaea*. A considerable portion of this deflated area has a very moist sand surface even in summer. The major colonist in these areas is *Agrostis stolonifera*, with *Juncus effusus* in the percolines. Other species present in the damp sands are:

<i>Carex panicea</i>	<i>Plantago maritima</i>
<i>Hydrocotyle vulgaris</i>	<i>Radiola linoides</i>
<i>Juncus ? maritimus</i>	<i>Rumex acetosella</i>
<i>Juncus bufonius</i>	<i>Sagina procumbens</i>
<i>Juncus squarrosus</i>	<i>Sedum anglicum</i>
<i>Plantago coronopus</i>	<i>Viola riviniana</i>

At the northern extremity of the eroded machair quite an extensive stand of *Juncus effusus* marsh is present. This is the region from which the major percolines issue, and in winter the area is covered by standing water. There is slight variation in vegetation over the marsh with *Potamogeton polygonifolius* in the lower patches, *Carex echinata* near the heathland boundary and local clones of *Eriophorum angustifolium*. The other species recorded were:

<i>Agrostis tenuis</i>	<i>Carex panicea</i>
<i>Calluna vulgaris</i>	<i>Carex nigra</i>
<i>Carex demissa</i>	<i>Epilobium</i> sp.

*Festuca rubra*  
*Holcus lanatus*  
*Hydrocotyle vulgaris*  
*Juncus articulatus*  
*Juncus bulbosus*  
*Juncus squarrosus*

*Nardus stricta*  
*Potentilla anserina*  
*Potentilla erecta*  
*Prunella vulgaris*  
*Ranunculus flammula*  
*Sagina procumbens*

The eroded machair remnants are variable, some containing a mixture of mosses, lichens and *Carex arenaria*, others almost entirely dominated by mosses, a third type dominated by herbs, particularly *Achillea millefolium* and *Thymus praecox* ssp. *arcticus* and a fourth type over which *Calluna vulgaris* is dominant. A complete angiosperm species list is as follows:

*Festuca rubra*: dominant  
*Achillea millefolium*: common  
*Carex arenaria*: frequent  
*Lotus corniculatus*: frequent  
*Luzula campestris*: frequent  
*Poa subcaerulea*: frequent  
*Calluna vulgaris*: occasional  
 (locally dominant in patches)  
*Carex panicea*: occasional  
*Galium verum*: occasional  
*Hieracium pilosella*:  
 occasional  
*Plantago maritima*: occasional  
 – frequent (in patches)  
*Agrostis tenuis*: rare

*Antennaria dioica*: rare  
*Carex glauca*: rare  
*Cerastium glomeratum*: rare  
*Leontodon autumnalis*: rare  
*Molinia caerulea*: rare  
*Nardus stricta*: rare  
 (locally creating mini-dunes)  
*Rumex acetosa*: rare  
*Sedum anglicum*: rare  
*Thymus praecox* ssp.  
*arcticus*: rare (locally  
 common in patches)  
*Trifolium repens*: rare  
*Viola riviniana*: rare

## The Stream System

The final vegetation communities present over sandy soils at Opinan are those around and in the main stream area. Effectively this area can be regarded as a freshwater marsh merging into a brackish marsh in the direction of the sea. There is a marked decrease both in species number and in plant biomass seawards. The stream margin particularly is very rich in species and the whole area adds markedly to the diversity of the vegetation at this site. In the water of the stream *Glyceria fluitans* is dominant in the upper reaches but absent elsewhere, *Callitriche stagnalis* is common along most of the stream, *Montia fontana* is frequent and *Alopecurus geniculatus* occasional. Other aquatic species present are *Catabrosa aquatica*, *Eleocharis palustris*, *Equisetum fluviatile*, and *Glyceria declinata*. The stream margin does not have one dominant species though *Eleocharis palustris*, *Festuca rubra* and *Juncus effusus* are locally important. Other species of this habitat are:

*Agrostis stolonifera*  
*Bellis perennis*  
*Cardamine pratensis*  
*Carex echinata*  
*Carex nigra*  
*Carex ovalis*  
*Carex panicea*  
*Catabrosa aquatica*  
*Cynosurus cristatus*  
*Deschampsia flexuosa*  
*Epilobium* sp.  
*Galium palustre*  
*Holcus lanatus*  
*Hydrocotyle vulgaris*  
*Hypochaeris radicata*  
*Juncus articulatus*

*Juncus squarrosus*  
*Lotus corniculatus*  
*Plantago lanceolata*  
*Potentilla anserina*  
*Prunella vulgaris*  
*Ranunculus acris*  
*Ranunculus flammula*  
*Ranunculus repens*  
*Rumex acetosa*  
*Rumex crispus*  
*Rumex obtusifolius*  
*Sagina procumbens*  
*Senecio jacobaea*  
*Stellaria alsine*  
*Taraxacum palustre*  
*Taraxacum spectabile*  
*Trifolium repens*

Either side of the main stream, but particularly to the north, there is a stretch of wet sand which could be best described as a rather open *Eleocharis palustris* marsh. As with the stream, this decreases in species richness seawards, but in the upper part of the beach complex occasional plants of *Carex demissa*, *Juncus bufonius* and *Juncus bulbosus* are present. There are patches of rather dwarfed *Epilobium* sp. and *Equisetum* sp. scattered through the marsh. Other species are represented by only a few individuals. These include:

*Carex flacca*  
*Carex nigra*  
*Carex panicea*  
*Juncus articulatus*

*Myosotis caespitosa*  
*Polygonum hydropiper*  
*Polygonum persicaria*  
*Triglochin palustris*

## The Cliff System

Along the north-western boundary of the fenced area of Opinan Beach complex there is a south facing cliff-face of Torridonian Sandstone. This cliff has small ledges which are rich in tall herb and shrub species since they are inaccessible to sheep and other grazing animals. Oceanic influences are present giving rise to *Asplenium marinum* under some rock overhangs but this is not typical halophytic coastal cliff vegetation. The other species recorded were:

*Dryopteris aemula*  
*Erica cinerea*  
*Galium saxatile*  
*Holcus lanatus*  
*Leontodon autumnalis*  
*Salix lapponum*

*Salix phylicifolia*  
*Sedum anglicum*  
*Solidago virgaurea*  
*Succisa pratensis*  
*Taraxacum officinale*

Below the cliff-face there are fallen rocks with much more typical coastal vegetation of a cliff-top grassland type growing on or between them. However in the lee of some of the larger boulders inland species are also present, resulting in the following rather mixed assemblage of species:

<i>Armeria maritima</i>	<i>Plantago coronopus</i>
<i>Atriplex glabriuscula</i>	<i>Potentilla erecta</i>
<i>Callitriche stagnalis</i>	<i>Ranunculus ficaria</i>
<i>Cochlearia officinalis</i>	<i>Rumex acetosa</i>
<i>Empetrum nigrum</i>	<i>Rumex crispus</i>
<i>Galium palustre</i>	<i>Sagina maritima</i>
<i>Glaux maritima</i>	<i>Stellaria media</i>
<i>Holcus lanatus</i>	<i>Trifolium pratense</i>
<i>Hyacinthoides non-scriptus</i>	<i>Tripleurospermum maritimum</i>
<i>Ligusticum scoticum</i>	<i>Viola riviniana</i>

### The Peatland System

In the north of the fenced area, coastal dune vegetation gives way to heathland. However the vegetation of this area is not typical of the surrounding moorland for two reasons. Firstly considerable parts of the heathland near the dune complex has been affected by blown sand. This is especially true in the north-east where sand has blown right up a gully beyond the fence-line. Secondly there is evidence that parts of the area of heath inside the fence have been cultivated in the past on a run-rig system, resulting at present in lines of wetter and drier soil. Also in a line adjacent to the *Juncus effusus* marsh described earlier there are grassy hillocks that are better drained.

The wetter areas of peat are dominated by *Calluna vulgaris* but *Carex panicea*, *Drosera rotundifolia*, *Erica tetralix*, *Eriophorum angustifolium*, *Nardus stricta*, *Narthecium ossifragum* and *Sphagnum* spp. are also important members of the assemblage. On the grassy hillocks, *Erica* spp die out, *Calluna* is much reduced and the vegetation is mainly composed of *Anthoxanthum odoratum*, *Danthonia decumbens* and *Luzula campestris*. The other species of this heathland are mostly locally distributed dependent upon micro-relief and therefore hydrology. They include:

<i>Achillea millefolium</i>	<i>Hydrocotyle vulgaris</i>
<i>Agrostis stolonifera</i>	<i>Juncus bulbosus</i>
<i>Aira praecox</i>	<i>Juncus squarrosus</i>
<i>Erica cinerea</i>	<i>Molinia caerulea</i>
<i>Euphrasia</i> sp.	<i>Pedicularis sylvatica</i>
<i>Galium saxatile</i>	<i>Pinguicula lusitanica</i>

*Pinguicula vulgaris*  
*Plantago maritima*  
*Polygala serpyllifolia*  
*Potentilla erecta*

*Ranunculus flammula*  
*Succisa pratensis*  
*Trichophorum cespitosum*  
*Trifolium repens*

The final vegetation community to be found within the fenced area of Opinan dune complex is the damp flush that occurs below the run-rig heathland. It is a small basin created by low Torridonian cliffs to the north and west, eroded machair to the east and a beach-back stone and boulder lip to the south. This area is particularly exciting because of the richness of its vegetation within a small area including several species not present elsewhere at Opinan. This site is primarily a grass and sedge flush with *Carex pulicaris*, *Eleocharis quinqueflora* and *Nardus stricta* being the major species but marked variation is caused by minor differences in microtopography and moisture status. The total species list is:

*Anthoxanthum odoratum*  
*Bellis perennis*  
*Calluna vulgaris*  
*Caltha palustris*  
*Carex demissa*  
*Carex flacca*  
*Carex nigra*  
*Carex ovalis*  
*Carex pilulifera*  
*Carex pulicaris*  
*Danthonia decumbens*  
*Drosera rotundifolia*  
*Eleocharis quinqueflora*  
*Erica cinerea*  
*Eriophorum angustifolium*  
*Eriophorum vaginatum*  
*Euphrasia* sp. (2)  
*Festuca ovina*  
*Galium saxatile*  
*Holcus lanatus*  
*Hydrocotyle vulgaris*  
*Juncus bufonius*  
*Juncus bulbosus*  
*Juncus effusus*  
*Juncus maritimus*  
*Juncus squarrosus*

*Koeleria macrantha*  
*Leontodon autumnalis*  
*Luzula campestris*  
*Menyanthes trifoliata*  
*Molinia caerulea*  
*Nardus stricta*  
*Narthecium ossifragum*  
*Pedicularis palustris*  
*Pedicularis sylvatica*  
*Pinguicula lusitanica*  
*Pinguicula vulgaris*  
*Plantago maritima*  
*Poa trivialis*  
*Polygala serpyllifolia*  
*Polygala vulgaris*  
*Potamogeton polygonifolius*  
*Potentilla erecta*  
*Potentilla palustris*  
*Prunella vulgaris*  
*Radiola linoides*  
*Ranunculus flammula*  
*Sellaginella selaginoides*  
*Succisa pratensis*  
*Taraxacum palustris*  
*Trifolium repens*  
*Triglochin maritima*

## Acknowledgments

I wish to thank the Countryside Commission for Scotland for their financial aid and encouragement in carrying out this survey

and Misses H. Gillies, J. Thew, J. Hughes and S. Macfadyen for field assistance.

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## Book Reviews

### **Collins New Generation Guide to the Wild Flowers of Britain and Northern Europe**

ALASTAIR FITTER

Collins, London, 1987. 320 pp., numerous illustrations in colour. Soft-cover ISBN 0 00 219777 4, £6.95

One of a series edited by David Attenborough which introduces a new approach to small format naturalists' guides, this volume aims to be much more than a basic field guide to identification. Approximately half of the book is devoted to brief descriptions of species, each accompanied by a small (about 2cm x 4cm) coloured illustration. The latter inevitably suffer somewhat from this size restriction but capture the essential features of the species surprisingly successfully. An appendix of ten pages contains brief descriptions of 311 scarce species, but these are not illustrated.

The remainder of the book consists of sections dealing with a variety of topics concerning the natural history of plants, including evolution, life cycles, reproduction, anatomy and function. Aspects such as seed dispersal and pollination are dealt with in detail, the text being liberally augmented by coloured illustrations in a most attractive and interesting manner. A typical example is the picture of Toothwort parasitic on hazel, which shows not only the plant above ground but the underground parts and their connection with the roots of the host.

This is probably not a volume the naturalist would necessarily wish to carry as a field guide, but it can be recommended to those who wish to know more about the way plants 'work' and their relationships to their environment. The soft-cover version reviewed is considered to be excellent value for its reasonable price. It should be added that, since the compact format involves extreme abbreviation of the plant descriptions, users are strongly recommended to first study and understand the key to the codes used. This is included just inside the front and back covers.

A. McG. STIRLING

### **Egg, Nature's Miracle of Packaging**

ROBERT BURTON, photographs by JANE BURTON & KIM TAYLOR

Collins, London, 1987. 158 pp., colour photographs, line drawings. Hardback. ISBN 0 00 219437 6, £9.95

This book deals with numerous aspects of the reproduction of animals including mating, nest making, parental care and viviparity as well as the egg *sensu stricto* and in this respect the title is a trifle misleading. The author presents an amazing assemblage of interesting and useful information drawing on most of the animal kingdom from Protozoa to Vertebrata and the text is supported and supplemented by some 250 colour photographs of the highest quality. Although this is essentially a reading book with a non-technical presentation a short glossary would have been of benefit; the lack of adequate references to facilitate extension reading is a serious omission. The standard of presentation is excellent; no typographical errors were noticed and the lack of reference numbers to the plates on pp. 71 and 28 is of little consequence. Good value for £9.95.

RONALD M. DOBSON

# The Freshwater Fauna from the Yellow Mires Marsh, Aberlady Bay, Longniddry, East Lothian.

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Aberlady Bay Local Nature Reserve (East Lothian, V.C.82; Grid Ref. NT 560810) is an area of tidal mud, saltings, sand dune and freshwater marsh, within a wider coastal SSSI. The site is famed for rich and unique ornithological and botanical variety (Usher, 1967; Anon., 1978). Only limited data are available on the freshwater fauna.

Throughout 1985 and 1986 the freshwater animals, especially those found in small pools created by the removal of concrete anti-tank blocks and in the Marl loch (Fig. 1), have been sampled.

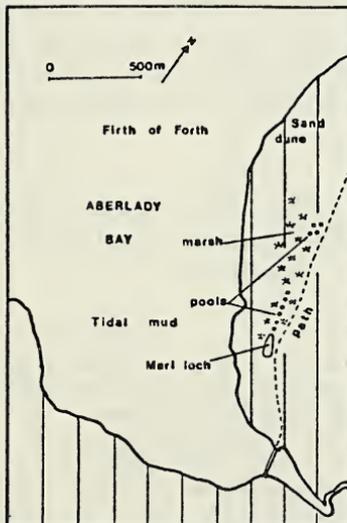


Fig. 1 Position of freshwater marsh, Marl Loch and pools in Aberlady Bay LNR.

Measurements of physical and chemical characteristics of the waters were also made. Table 1 provides a species list for the freshwater animals found during this period. Table 2 summarises physical and chemical data for 1985 for the Yellow Mires pools.

These data suggest that the marsh is a base-rich pH-neutral wetland. This is of importance because many apparently lowland local wetlands, such as Tailend Moss Reserve, W. Lothian (Richardson & Shiells, 1983), are acidic.

Dr. Garth Foster (pers. comm.) has pointed out that two of the freshwater beetles found at Aberlady have a more southerly distribution. The specimens of *Hydroporus memnonius* included a matt female, a form which is regarded as largely English in occurrence (Foster, 1984), and this is probably the most northerly record of this form. The more westerly and northerly distributed shining form of female also occurred. *Enochrus testaceus* has previously only been recorded from Scotland in the Solway Area. Aberlady marsh may thus support a fauna common further south but unusual in Scotland.

The coastal land of East Lothian has been characterised as warm dry lowland (Anon., 1970). The freshwater fauna of Aberlady reflects these conditions, which are uncommon in Scotland, and represents a valuable natural asset in its own right. Future management of the reserve should preserve the variety of freshwater habitats to take account of this diverse and unusual fauna.

### Acknowledgments

I would like to thank Peter Gordon (the Reserve Warden), Dr. Garth Foster and the entomology staff at the Royal Scottish Museum for their help with this work.

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TABLE 1 continued

<i>Agabus bipustulatus</i> (L.)	<i>Dixella autumnalis</i> Mg.
<i>A. labiatus</i> (Brahm)	<i>Chaoborus crystallinus</i> (Deg.)
<i>A. nebulosus</i> (Forst.)	<i>Anopheles claviger</i> (Mg.)
<i>A. unguicularis</i> Thomson	<i>Culiseta annulata</i> (Schrank)
<i>Ilybius ater</i> (Deg.)	<i>Culisella fumipennis</i> (Steph.)
<i>Rhantus exsoletus</i> (Forst.)	Ceratopogonidae indet.
<i>Colymbetes fuscus</i> (L.)	<i>Holotanypus</i> sp.
<i>Dytiscus marginalis</i> L.	<i>Abroblesmia</i> sp.
<i>Helophorus aquaticus</i> (L.)	<i>Meropelopia</i> sp.
<i>H. brevipalpis</i> Bedel	<i>Xenopelopia</i> sp.
<i>Hydrobius fuscipes</i> (L.)	<i>Acricotopus lucens</i> (Zett.)
<i>Anacaena limbata</i> (F.)	<i>Eukiefferiella</i> sp.
<i>Laccobius biguttatus</i> Gerh.	<i>Psectrocladius</i> sp.
<i>Enochrus quadripunctatus</i> Hbst.	<i>Coryoneura scutellata</i> Winn.
<i>E. testaceus</i> (F.)	<i>Chironomus dorsalis</i> Mg.
<i>Ochthebius minimus</i> (F.)	<i>Phaenospectra</i> sp.
<i>Cyphon</i> sp.	<i>Microspectra</i> sp.
Trichoptera	<i>Zavrelia pentatoma</i> (Kieff.)
<i>Holocentropus stagnalis</i> (Albarda)	<i>Odontomyia viridula</i> (F.)
<i>Oxytheria</i> sp. indet.	<i>Stratiomys furcata</i> (F.)
<i>Limnephilus rhombicus</i> (L.)	Empididae indet.
<i>L. binotatus</i> Curt.	Dolichopodidae indet.
<i>L. centralis</i> Curt.	<i>Atherix ibis</i> (F.)
<i>L. vittatus</i> (F.)	
<i>Triaenodes bicolor</i> (Curt.)	
Diptera	CHORDATA
<i>Tipula luna</i> Westh.	Osteichthyes
<i>Dicranomyia ventralis</i> (Schumm.)	<i>Gasterosteus aculeatus</i> (L.)
<i>Phalacrocerca replicata</i> (L.)	Amphibia
Psychodidae indet.	<i>Triturus helveticus</i> Raz.
<i>Ptychoptera scutellaris</i> Mg.	<i>Bufo bufo</i> (L.)
	<i>Rana temporaria</i> L.

TABLE 2. Summary of physical and chemical data for Yellow Mires Marsh pools from 1985. The pools were created in 1963 by removal of anti-tank blocks. Data are means for 11 pools, each sampled on 11 occasions throughout the period 17/3/85 to 20/8/85,  $\pm$  1 standard deviation where appropriate.

pH	7.4 $\pm$ 0.1	Ca <sup>++</sup> mg l <sup>-1</sup>	101.3 $\pm$ 10.5
O <sub>2</sub> mg l <sup>-1</sup>	4.95 $\pm$ 1.75	Na <sup>+</sup> mg l <sup>-1</sup>	26.9 $\pm$ 2.14
T °C. min/max.	2.2/21.2	NO <sub>3</sub> mg l <sup>-1</sup>	0.10 $\pm$ 0.26

## Annual Migration and Diet of Perch *Perca fluviatilis* L. in Loch Lomond, Scotland

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The diet and population biology of the Eurasian Perch, *Perca fluviatilis* L. have been widely studied throughout its distribution and Thorpe (1977a, b) has summarised the extensive literature. Growth of Perch in Loch Lomond was briefly studied by Hartley (1947) and diet, population age structure and growth by Shafi and Maitland (1971). This paper describes an analysis of stomach content samples taken from 590 adult Perch caught during the periods January to December 1977 and September to December 1978, and presents a different picture of diet from that obtained by Shafi and Maitland (1971) who sampled 10 years earlier. The fish were released after stomach sampling and in some instances were recaptured in the programme (Giles, 1980).

Annual migratory movements of Perch shoals in Lake Windermere were described by Allen (1935); in summer the littoral and sub-littoral zones to a depth of 10m are occupied by large numbers of Perch and these migrate during October to overwintering depths of between 18m and 27m. Craig (1977) studied daily activity in adult Windermere Perch throughout the year and confirmed Allen's findings of a late autumnal migration into deeper water. However Craig found that the mass movement is incomplete, with low numbers of Perch remaining in the littoral zone during winter at depths as shallow as 1m. In Slapton Ley, a shallow eutrophic lake in Devon, no annual migratory behaviour is shown (Craig, 1974), but the Perch do shoal in large numbers in the deeper water areas during winter and over the spawning period. The present paper discusses mass movements of perch shoals and of tagged individuals within a single bay in the mid-basin of Loch Lomond.

### Materials and Methods

Perch and other fish were sampled in Camas an Losgainn (NN

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373 986), a small bay of Loch Lomond. The bay is approximately 200m long and has a shallow littoral flora composed of a sparse cover of *Littorella uniflora* (L.) Aschers over a sand/silt bottom to a depth of 3m. At depths of 3 to 5m over sand areas dense beds of *Myriophyllum* sp. are interspersed with *Elodea canadensis* Michx. over silt substrates. The lake bed shelves gently from a stony shore line to an average depth of 5m with a maximum of 12m at the mouth. 30m long benthic gill nets of bar length 19, 20, 31 and 39mm (Norsenet, Sweden) were set throughout the year at depths of between 2 and 5m with occasional nets being set outside the bay at 20m depth. Standard Perch traps (Worthington, 1950) with doors which could be opened for set periods were also set during the spawning period. This combination of techniques was used in order to minimise sampling bias, because both methods have some disadvantages (eg. Stott, 1970; Bagenal, 1972; Kipling, 1963). Sampling was conducted weekly, both nets and traps being fished from dusk to dawn when Perch activity is on average greatest through the year (Craig, 1977; Alabaster and Stott, 1978). A random sub-sample of 292 Perch was marked using individually recognisable dorsal fin tags, and released after stomach sampling, all subsequent recaptures being recorded. The stomach sampling device (Giles, 1980) is 100% efficient at removing small planktonic food items and 98.6% for larger prey species. Food items were identified and counted. Results are presented in terms of numbers of prey organisms, with no attempt to compensate for the differing bulk of the respective species.

## Results

### *Annual Movements*

Perch movements were assessed in two ways during the study: 1) by analysis of net and trap returns, and 2) by the occurrence of recaptured tagged fish both in nets and traps. Table 1 and Fig. 1, summarise the total net and trap catches of Perch from January

Table 1. Perch catches from Camas an Losgainn during the sampling period January-December 1977, and day-lengths in hours (sunrise-sunset G.M.T.) in Glasgow on the 15th day of each month.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Number netted	5	0	2	15	130	20	82	56	4	9	27	8
Number trapped	0	0	0	0	147	85	0	0	0	0	0	0
Total number	5	0	2	15	277	105	82	56	4	9	27	8
Daylength (hours)	7.5	9.5	11.45	14	16.20	17.30	17	15	12.45	10	8.20	7

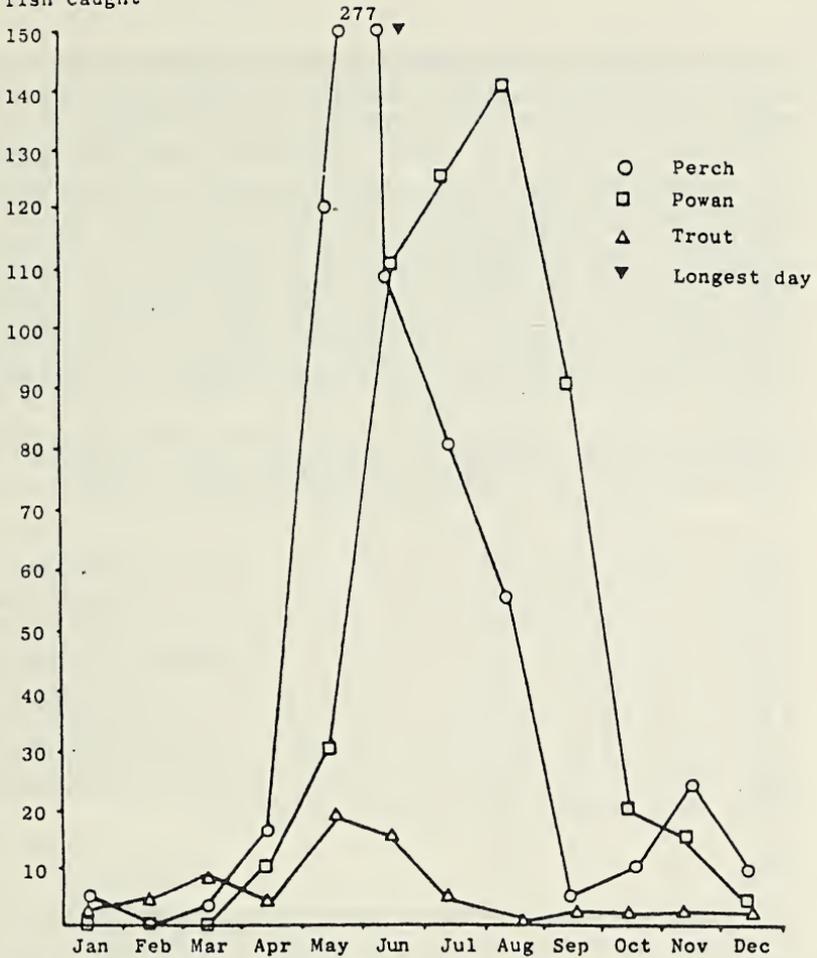
Total number of  
fish caught

Fig. 1. Loch Lomond combined netting and trapping catch data 1977

to December 1977. Additional data from a small number of fish caught in the period from September to November 1978 are also included, to increase the sample size for diet analysis at a time of year when most of the Perch had departed the littoral zone. Netting was continued fortnightly throughout 1978 and yielded a similar catch pattern to that obtained in 1977 (unpresented data). Catches from gill nets set at depths of 3m and 5m indicate that from September to April small numbers of adult perch are present in the littoral zone as described by Craig (1977) for Windermere. A large influx of mature fish occurs in May, and in 1977 spawning started in the middle of this month and continued into July and August.

The peak in Perch density (Fig. 1) coincided closely with the longest day (June 15th, 17 hrs 30min. daylight, Table 1) suggesting a possible photoperiodic timing of the spawning migration. Powan (*Coregonus lavaretus* (L.) and Trout (*Salmo trutta* L.) are the other main fish species using the littoral zone, and information on their population size is also presented in Fig. 1 for comparison. Most fish had left the littoral zone by September. All 28 of the spawn masses observed during the early breeding season were shed among *Myriophyllum* beds. Later in the season three separate spawnings were recorded at depths of 2m or less in stony littoral areas, or occasionally upon the wire mesh of the traps. None was recorded in silty areas or on *Elodea*. Benthic nets set at depths ranging from 5m to 20m in winter caught only the occasional Perch, and the position of the bulk of the overwintering population is unknown. Large numbers of Perch were caught in traps in May and June, but at no other time of year.

A total of 60 tagged individuals was captured, representing 20.5% of the 292 marked and released. The high recapture rate and incidence of multiple recaptures indicate that the Perch present in the bay over the spawning period remain within a small area for periods of up to 54 days. A trend for members of a shoal of fish tagged on a single sampling occasion to be recaptured together at a later date was also noted. For instance, 6 Perch tagged on May 19th from a gill net were recaptured together on May 22nd in a single trap. Three of these were subsequently caught by anglers fishing 400m from Camas an Losgairn in mid-June.

### Diet

Table 2 presents the percentage summer monthly composition of dietary items. At the onset of breeding in May the water flea *Daphnia hyalina* (Leydig) and chironomid pupae occur most commonly in stomach samples with mayfly and stonefly nymphs and caddis larvae in smaller numbers. The slater *Asellus aquaticus* (L.) is also taken in large numbers at this time and throughout the summer. In June *D. hyalina* is still important, with *Diaptomus gracilis* (Sars) and *Bosmina coregoni* (Baird), both from plankton, often the only species present within the stomach. Adult male *Pungitius pungitius* (L.) (10-spined Stickleback) in breeding coloration are also taken together with young *Gasterosteus aculeatus* (L.) (3-spined Stickleback) fry. In July predatory cladocerans from the plankton become prevalent in the diet. *Bythotrephes longimanus* (Leydig) formed most of the prey with smaller numbers of *Polyphemus pediculus* (L.) and *Leptodora kindtii* (Focke).

*D. hyalina*, *D. gracilis* and *Bosmina longirostris* (Muller) occur in smaller numbers together with some mixed benthic invertebrate species. In August a peak of *B. longimanus* occurs with *D. hyalina* re-appearing in large numbers.

In September most of the Perch migrate from the littoral zone of the lake. Nymphs of Mayflies (*Leptophlebia* spp.), Corixidae and the fry of *G. aculeatus* occur in September samples. In October nymphs of the mayfly *Ephemera danica* (Muller), chironomid larvae and Stickleback fry are taken. The fish component of the diet, including small numbers of Perch fry and Minnows (*Phoxinus phoxinus* (L.)), increased in importance through the winter months.

Table 2. Percentage composition of monthly dietary items by number. Tables 2 and 3 include only species that form at least 1% of the monthly diet. (+ = <1%)

	May	June	July	August
Total organisms	1717	973	1814	2193
<i>Diaptomus gracilis</i>	4.9	7.9	7.4	+
<i>Daphnia hyalina</i>	40.9	41.4	10.5	21.0
<i>Bythotrephes longimanus</i>	0	1.2	38.6	67.4
Other Cladocera	3.1	15.7	35.2	3.1
<i>Asellus aquaticus</i>	12.3	8.4	0	+
<i>Gammarus pulex</i>	1.0	1.9	0	0
Ephemeropteran nymphs	7.2	5.7	1.3	+
Chironomid pupae	25.8	6.1	4.6	4.6
Others	3.3	9.6	0.8	2.2
Empty stomachs	65	10	17	13
Total Perch sampled	277	105	82	56

Table 3. Percentage by number of dietary items eaten by size category of Perch

	Size category		
	130-180mm	181-230mm	231-360mm
<i>Diaptomus gracilis</i>	6.6	2.3	10.5
<i>Daphnia hyalina</i>	19.8	35.9	3.7
<i>Bythotrephes longimanus</i>	41.0	20.5	0
Other Cladocera	19.1	10.6	+
<i>Asellus aquaticus</i>	1.4	7.5	5.3
<i>Gammarus pulex</i>	+	1.15	0.
Ephemeropteran nymphs	+	4.2	25.3
Chironomid larvae and pupae	8.6	12.0	21.3
Fish species	+	+	14.4
Others	+	3.7	17.5
Empty stomachs	42	70	12
Total Perch sampled	159	371	60

Table 3 presents the percentage of each prey species taken by a given size group of Perch. Perch of 130mm to 180mm are of 3+ years of age (opercular bone readings from net casualties), 180mm to 230mm predominantly 6+ years of age, and 230mm and larger 8+ years of age (Shafi, 1969). 3+ fish included all the zooplanktonic species and most of the obligate benthic dwelling organisms in their diet with *Bythotrephes longimanus* being the most important zooplanktonic prey species. Chironomid pupae were also widely represented often occurring in small numbers together with other prey in a single stomach. Of the benthic species *Asellus aquaticus*, *Ephemera danica* and chironomid larvae occurred in most stomachs with fewer larvae of the Alderfly *Sialis lutaria* (L.), the mayflies *Leptophlebia* sp., *Paraleptophlebia* sp. and *Ephemerella ignita* (Poda) nymphs. Fish prey were regularly recorded including adult male *Pungitius*, the fry of *Gasterosteus* and Perch together with other unidentified species. 6+ fish ate the widest variety of prey species with *Asellus* and chironomid pupae occurring in most stomachs but with fewer of all of the planktonic crustacea. *Gasterosteus* and *Pungitius* were important food items as were *Ephemera danica* nymphs. The reduced importance of animals from the plankton in the diet is offset by the inclusion of small numbers of a wide variety of benthic species including mayfly, stonefly and dragonfly nymphs, caddis larvae, the fresh water shrimp *Gammarus pulex* (L.) and the leech *Erpobdella octoculata* (L.). 8+ and older fish can be seen to have a similar diet to the 6+ fish, with *Asellus* and chironomid pupae continuing to occur in large numbers and with *Gasterosteus* fry forming the bulk of the winter food. Planktonic crustacea are represented by *Daphnia hyalina*, *Diaptomus gracilis*, *Bosmina coregoni* and *Leptodora kindti* but *Bythotrephes* is absent.

Perch which had been stomach-sampled, marked, released and then recaptured at a later date were again stomach-sampled, and the dietary items stored for later analysis. Such recaptured fish had seldom eaten prey species similar to those sampled from the stomach at the time of initial capture. Several individuals initially found to contain large numbers of *D. hyalina* and *Bythotrephes* were later recaptured and found to have been eating chironomid pupae or mixed benthic invertebrates, and in two cases *Gasterosteus* fry. The technique of stomach sampling with the subsequent release of the live fish allows feeding selection by (marked) individual fish to be studied in the field but large scale mark and release experiments are needed in order to obtain adequate numbers of recaptured fish.

## Discussion

From all available information (Shafi, 1969) and the present study, it appears that adult perch in the mid-basin of Loch Lomond undergo an annual migration similar to that shown by Windermere fish (Allen, 1935). The exogenous factor controlling the timing of the migration may principally be photoperiod length (Fig. 1) since the littoral Perch population on Loch Lomond reaches maximum density just before the longest day. Bye (1984) noted that the predominant environmental cue timing salmonid reproduction is photoperiod, whilst cyprinids are primarily temperature dependent. The temperature in the mid-basin of Loch Lomond is highest in late August or September (Chapman, 1972) by which time the Perch have left the littoral zone, however temperature is still likely to be an important influence upon gonadal maturation in Perch. The findings of Craig (1977) of an incomplete autumnal movement from the littoral zone are also paralleled in Loch Lomond where the remaining littoral Perch eat a markedly different diet from that of the summer fish. Tagged individuals remained within a small area for a period of several weeks over the spawning period. Shafi (1969, 1974) sampling at the same site ten years before recorded that *Cyclops* sp., *Gammarus pulex*, Chironomidae and *Gasterosteus aculeatus* are the main food of adult Perch in Loch Lomond with a wider variety of other invertebrates being eaten in smaller numbers. This situation now appears to be much changed with *Bythotrephes longimanus*, *Asellus aquaticus* and *Sialis lutaria* being of great importance in both 1977 (Table 2) and 1978 (unpresented data). Year to year variations in diet are known to occur in adult Perch, however, and Craig (1978) has shown that the abundance of young of the year Perch fry determines the degree of cannibalistic behaviour shown by adult Perch. In years of low fry abundance Perch eat a wider variety of invertebrate prey (data from McCormack, 1970). Allen's hypothesis (1935) that growing Perch switch from a diet of plankton to benthos to fish with increasing size has been shown to be an over-simplified view of Windermere Perch diet (McCormack, 1970).

In Loch Lomond different age classes of Perch feed upon a wide variety of food species, the proportions of which vary between size groups of Perch and with the annual cycle of abundance of each prey organism. The zooplankton is dominated numerically by the copepod *Diaptomus gracilis* and the cladocerans *Daphnia hyalina* and *Bosmina coregoni* (Chapman, 1969). The Perch appear to take the commonest zooplankters through the summer except in the case

of the predatory cladocerans *Bythotrephes*, *Polyphemus* and *Leptodora*. These are rare in the zooplankton (Chapman, 1969) but are taken in large numbers by the Perch (Table 2), probably because of their large body size compared with the copepods and other cladocerans.

Slack *et al.* (1957) found that in Loch Lomond the Powan shows a very similar monthly distribution of zooplanktonic prey to the Perch in the present study, with *Daphnia* and *Bosmina* dominating numerically and *Bythotrephes* and *Leptodora* occurring in the autumn. The importance of chironomid pupae in the diet of Perch reflects the dominance of this dipteran family in the benthos communities of the loch. (Slack, 1965).

### Acknowledgments

We thank Dr F. A. Huntingford for advice in this work. This research was funded by a S.R.C. research studentship and carried out at The University Field Station, Rowardennan, Loch Lomond. The Loch Lomond Angling Improvement Association kindly gave permission to set nets during the study period.

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## Book Reviews

### Collins British Birds

JOHN GOODERS, paintings by TERENCE LAMBERT  
Collins, 1987. 384 pp. Revised, softback.  
ISBN 0 00 219831 2, £8.95

In 1983 I reviewed the hardback copy of the above for *Glasg. Nat.* and stated that it was an excellent buy at £12.95. This softback, with many minor revisions, is essentially the same book. As an A4 sized publication it is not a book to be taken into the field but is an excellent companion to a field guide. The text, which is most comprehensive, includes distribution maps and general information including populations of nearly 250 breeding birds. For those visiting unfamiliar areas there are details of R.S.P.B. reserves, bird observatories and major haunts of rarities. Unfortunately, and especially for visitors coming north of the Border, there is still no mention of the Scottish Wildlife Trust reserves. As before, I thoroughly recommend this attractively priced book.

I. C. McCALLUM

### Collins New Generation Guide to the Birds of Britain and Europe

CHRISTOPHER PERRINS

Collins, Lond., 1987. 320pp., keys to directory codes,  
colour illustr. Softback ISBN 0 00 219769 3, £6.95

Two books in one for the new generation of naturalists. They provide something quite new claims Dr Perrins. This guide is divided into four parts; the evolution of birds, the directory of species, the life of a bird and the ecology of birds. Each section is fully cross-referenced. The book remains pocket-size. In order to compete with the many guides available, the 142 pages of the directory must provide bird watchers with all the information they expect from their field guide. The directory includes all species which breed in Europe plus those that visit in reasonable numbers, a total of 429 species. After studying the key to the codes a vast amount of information, a small map, illustrations of plumage variations and the bird in flight, is given for each species. Although the small size of the illustrations and the number of birds on each page appear daunting at first, the presence of similar species on the one page proves a bonus to identification in the field. The narrative sections are easy to read and well illustrated. While the subjects are of interest to every naturalist, actually using the cross-references to these sections when in the field seems unlikely. The validity of the dual purpose of these books is left to the reader to decide but much valuable information is condensed into this new guide.

MARION E. OSLER

## Notes on a Risso's Dolphin from Argyll, with Analyses of its Stomach Contents and Mercury Levels.

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On 15 March, 1986, after a night of violent storm, a dead female Risso's Dolphin, *Grampus griseus* (Cuvier) was found on the beach at Loch na Cille, Kilmelford, Argyll (NM 840126), by Mr Ian McTavish.

This species, which is distributed throughout the seas of the world and usually occurs singly or in small schools of up to about a dozen individuals, can be distinguished from other dolphins by its bulbous, beakless head, its recurved, posteriorly concave dorsal fin and its medially notched tail fluke.

The present specimen (Fig. 1), a juvenile, weighed 77.1 kg and was measured as follows: tip of snout to tail notch – 205 cm; tip of snout to blow hole – 27 cm; tip of snout to front of dorsal fin – 83 cm; genital opening to vent – 14 cm. There were no teeth visible in either jaw. Its general colour was dark grey, darkening to black on the head, fin, tail and flippers and becoming lighter grey towards the ventral surface which was white from throat to vent. A well-defined white patch extending upwards from between the flippers to just behind the eye had its front margin interrupted by lateral and mid-ventral dark V-shaped marks (Figs. 1 & 2).

Short white parallel scars on its sides may have been relics of fights with other individuals, as this species is known to be aggressive, but the vertical light banding seen in Fig. 1 was possibly an artefact caused by bending during transportation.

The specimen was deposited in the Art Gallery and Museum, Kelvingrove, Glasgow, where, after making a plaster cast of the entire body and removal of stomach, liver and kidneys, it was placed in a deep freeze pending further study.

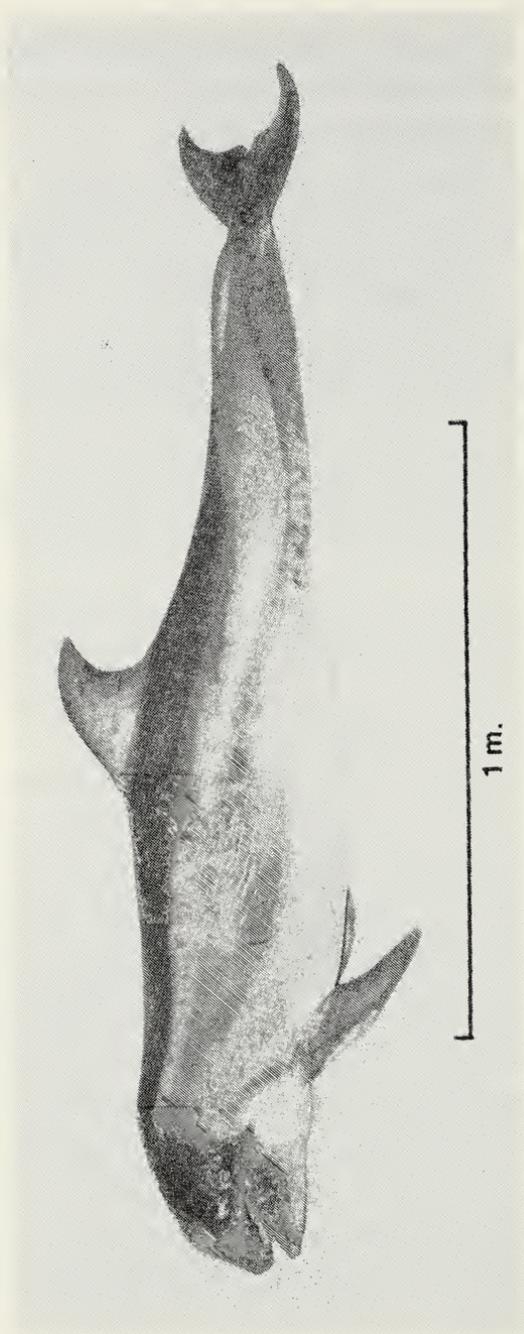


Figure 1. The Risso's Dolphin from Kilmelford, Argyll

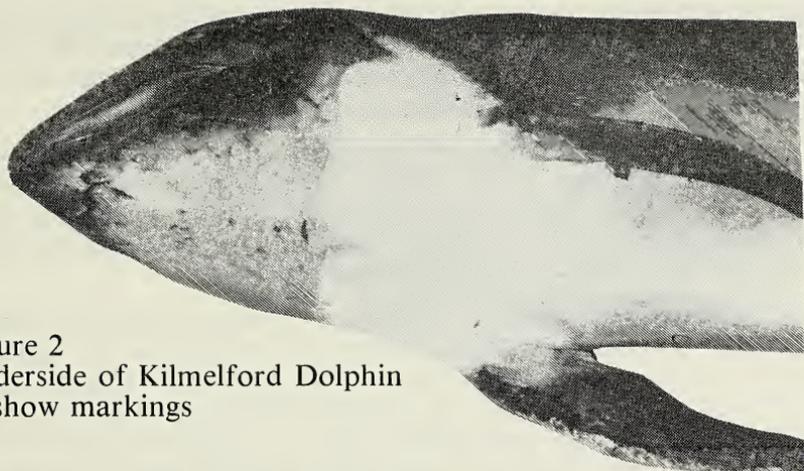


Figure 2  
Underside of Kilmelford Dolphin  
to show markings

Examination of the stomach contents showed that the dolphin had fed on cephalopods, the various species of which could be identified by the remains of their beaks which resist digestion. Most toothed cetaceans feed on fish or cephalopods and an accurate picture of their foods can be deduced from undigested remains. Such residues do not, however, necessarily reflect the local abundance of prey since they may remain in the stomach for long periods. The cephalopod remains found are detailed in Table 1: all are from species found in waters off the west coast of Scotland.

Table 1. Cephalopod beaks from the stomach of the Risso's Dolphin from Kilmelford.

Order	Family	Species	Beaks		Total
			Upper	Lower	
Octopoda	Octopodidae	<i>E. cirrhosa</i>	3	2	3
Teuthoidea	Ommastrephidae	<i>T. sagittatus</i>	1	3	4
	Gonatidae	<i>G. ?steenstrupi</i>	2	3	3
Sepioidea	Sepiolidae	<i>R. macrosoma</i>	0	1	1
		<i>S. oweniana</i>	2	4	4
		Total			15

*Eledone cirrhosa* (Lamarck) (Lesser Octopus) is common and widely distributed inshore below low water mark and is probably the only octopus found regularly in Scottish seas. The squid *Todarodes sagittatus* (Lamarck) is occasionally abundant inshore (Allen, 1962) and *Gonatus steenstrupi* Kristensen, a pelagic species found in the deeper waters of the Atlantic, is the squid most commonly taken by Fulmars, *Fulmarus glacialis* (L.), at colonies

in the Clyde Sea Area (pers. obs.). It has, however, not yet been recorded there alive. The sepiolids *Rossia macrosoma* (delle Chiaje) and *Sepietta oweniana* (Orbigny) are common inshore and feed near the sea bed, mainly on crustaceans.

The only other item found in the stomach was a badly worn, unidentifiable fish otolith. Although it is impossible to deduce from a single specimen how important cephalopods or fish are to Risso's Dolphin, this individual appears to have fed mainly on cephalopods found in inshore waters.

Other workers have also examined stomach contents of Risso's Dolphin. Eggleton (1905) found bones of cod and part of a cuttlefish beak, whilst Taylor (1913) found only fish bones and fragments of shells of crabs, urchins, etc. Clarke and Pascoe (1985) obtained six species of cephalopods from a specimen stranded on the Devon coast and these included *E. cirrhosa* (in numbers) and *T. sagittatus*. They suggested that since both these species are much more common on the Continental Shelf of Scotland than in the English Channel their dolphin had possibly come from Scottish latitudes before being stranded. The other species they found were *Sepia officinalis* L. (Cuttlefish), *Loligo ?forbesi* Steenstrup, *Todaropsis eblanae* (Ball) and a large oceanic squid.

### Mercury Levels in Risso's Dolpin

Measurement of mercury levels is of interest because mercury is thought to be the heavy metal most likely to cause pollution in marine environments (Bryan, 1984). Contaminated fish have caused death of both cats and humans in Japan and, in Scandinavia, mercurial seed dressings have caused death and reproductive failure of birds of prey at the top of the aquatic food chain. It has also been suggested that pollution by mercury, and other heavy metals, may cause strandings of cetaceans due to effects on their nervous systems and behaviour (Stoneburner, 1978; Bryan, 1984). High levels of mercury may thus be expected in some, or most, stranded animals.

Estimates of both total and organic (i.e. methyl) mercury were made on samples of liver and kidney tissues from the dolphin (using the methods described in Furness *et al.*, 1986), 4 samples being used for each estimate. The results, together with comparative data from other species of dolphins (Wagemann & Muir, 1984) are shown in Table 2.

Table 2. Mercury levels in liver and kidney tissues of Risso's Dolphin from Kilmelford compared with levels in livers of other dolphins reported by Wagemann & Muir (1984). Values are wet weight with four replicates for each Risso's tissue.

Species	Tissue	Water content	Total mercury level (mg/kg wet weight)		Methyl-mercury as % of total mercury
			Mean	Stand.dev.	
Risso's Dolphin	Kidney	79%	0.55	0.045	25
Risso's Dolphin	Liver	70%	1.16	0.015	44
Striped Dolphin	Liver	—	2.05 (45 animals, range 1.70–4.85)		
Long-snouted Dolphin	Liver	—	9.5 (2 animals, values 6.0, 13.0)		

The concentration in the liver was about twice as high as that in the kidney, as is normal in marine mammals. Mercury occurs in foods such as fish and cephalopods mainly in the form of methyl mercury (Bryan, 1984). In contrast, more than half of the mercury in the liver and kidney was inorganic.

The presence of much inorganic mercury in the liver and kidney implies that Risso's Dolphin, like some other sea mammals, can demethylate organic mercury into inorganic mercury. Buhler *et al.* (1975) found that almost all the mercury in the muscle of the sea lion *Zalophus californianus* (Lesson) was in the methyl form whereas 98% of that in the liver was inorganic and Martoja & Viale (1977) found storage granules of mercuric selenide in the liver of Cuvier's whale *Ziphius cavirostris* Cuvier.

Methyl mercury is lipid-soluble: hence it is highly mobile within the body, being transported in blood and deposited in many tissues, and is extremely toxic. By contrast, inorganic mercury is only soluble in aqueous media and tends to bind firmly to membranes; as mercuric selenide granules it is effectively non-toxic. An ability amongst marine mammals to convert methyl into inorganic mercury implies that these animals have evolved this detoxification mechanism as the result of long natural exposure, on an evolutionary timescale, to methyl mercury from marine foods.

The comparatively low levels found in this specimen (Table 2), suggest that the stranding is unlikely to have been due to an abnormally high intake of mercury.

Among seabirds, pelagic species feeding on large prey have the highest levels of mercury. The stomach contents of this specimen suggest that Risso's Dolphin feeds on small, bottom-living inshore cephalopods, so it was not unexpected to find that it showed lower

mercury levels than some other dolphin species. However, in cetaceans, mercury levels tend to increase with age (Gaskin *et al.*, 1979; Sergeant, 1980) so the youth of this specimen would also lead to an expectation of a low mercury level.

On 1 June 1986, Mr Ian McTavish, who found the Kilmelford specimen, saw another juvenile Risso's Dolphin, about 140cm long, west of Lunga in the sound of Jura which had been trapped by a net and had to be freed by a fisherman. It appeared to be calmed when stroked and spoken to, before being released. There were signs of earlier injuries on its underside.

### Acknowledgments

The authors are grateful to Mr R. Hendry and the Taxidermy Department at the Art Gallery and Museum, Kelvingrove, Glasgow for recovering the specimen, taking measurements and providing tissue samples, and to Dr M. J. Imber for providing data for Table 1. The photographs were taken by the Photographic Department, Glasgow Museums and Art Galleries.

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## Book Review

### **A Field Guide to Photographing Birds in Britain and Western Europe**

Dr MIKE HILL and GORDON LANGSBURY

Collins, London, 1987. 252 pp., colour plates and line drawings. Hardback ISBN 0 00 219821 5, £12.95

Although this Field Guide uses the familiar format of presenting the authors' own pictures, it is very unusual in that it not only tells you how to take good bird pictures, but also tells you where to go in Europe to find specific subjects.

The first part of the book is a survey of equipment and techniques used for bird photography and covers cameras, lenses and hides for working at or away from the nest. How to work in adverse weather or habitat conditions is discussed and advice is given on how to sell your pictures. The many superb colour pictures taken by the authors are a constant reminder of what can be achieved. Bird photography and the law is discussed in detail.

The second part of the book is divided into sections on different habitats and comments on the particular demands of each habitat. Suggestions are made on suitable approaches for obtaining the best pictures of species likely to be found. Top birdwatching spots for each country are listed, with information on reserves, access, contacts and useful addresses.

The abundance of hints and information packed into this Field Guide make it a "must" for the travelling camera enthusiast.

T. NORMAN TAIT

## Book Review

### The Skuas

ROBERT FURNESS

T. & A. D. Poyser, Waterhouses, Staffordshire, 1987, 363pp., photographs, maps, line drawings. Hardback, ISBN 0 85661 0461, £18.00.

T. & A. D. Poyser have established an excellent reputation for the publication of monographs on single bird species and families and "The Skuas" admirably continues the tradition. It is well written and thoroughly researched. The sixteen chapters range over classification, population dynamics, plumage polymorphism, various aspects of behaviour and breeding and the interaction of skuas with man. The chapters on kleptoparasitism (food robbing), sexual size dimorphism and the consideration of the evolutionary relationships among skuas are particularly masterly and the three chapters relating to the interaction of skuas with man are thought-provoking and well balanced. In all chapters, contentious and ill-understood aspects of skua biology are very carefully argued although occasionally the arguments become rather laboured and repetitive. My only other small criticism is that, in view of Dr Furness' considerable knowledge of the genus *Stercorarius*, I would have liked to have seen a contribution to the recent lively discussion on the field identification of juvenile Pomarine, Arctic and Long-tailed Skuas; perhaps in the form of an appendix.

The 30 photographs are not always of the highest quality but are well chosen as illustrations of points made in the text. Figures and tables are clear and concise and the illustrations by John Busby are delightful.

This book will not be a high priority for the occasional bird watcher but for those devoted to sea birds and sea bird watching, it will be an essential purchase and a source book for many years to come.

JOHN KNOWLER

### An Acknowledgment

The Council and Publishing Committee of The Glasgow Natural History Society wish to express their gratitude to those members of the Society whose anonymous donations have contributed much to the costs of production of this enlarged issue of the *Glasgow Naturalist*.

## **Lepidoptera in the West of Scotland 1986**

**Compiled by I. C. CHRISTIE**

Gartlea, Caldarvan by Alexandria

The depressing effect of the poor summer of 1985 was compounded by the cold wet month of May 1986, and resulted in reduced populations of most, though not all species. Geometrids appeared less affected than Noctuids. In general, resident butterflies were scarce. The Ringlet, though of very local occurrence in Strathclyde, withstood the adverse conditions better than most, and the numbers of Scotch Argus and Small Mountain Ringlets actually increased. It has been suggested that these two species can spend more than one winter as larvae, in which case adults in 1986 may have been derived from eggs laid in the fine summer of 1984. Small Tortoiseshells were reduced to odd specimens at warm sites, and Peacocks, formerly plentiful in coastal Ayrshire and Argyll, were all but eliminated. Weather from mid-June to mid-October was generally favourable, and observations in 1987 indicated that populations of many species were able to partially recover during this period. Conditions for light-trapping were seldom good during the summer, sunny days usually resulting in cool nights. The evening of 28th June was outstandingly hot and calm, and can seldom have been equalled for 'dusking'.

There was a major immigration at midsummer involving Red Admirals, Painted Ladies, Hummingbird Hawks and Silver Ys. The Red Admirals oviposited throughout the West of Scotland, and unprecedented numbers of larvae resulted: in the nettle beds near Mingary Castle, Ardnamurchan, literally thousands of larvae could be seen during August. Their development was uneven, the most advanced producing adults during the second week of September, and others failing to reach the pupal stage. The Painted Ladies did not breed successfully.

From the following list of noteworthy records, those obtained on the Isle of Coll have been omitted, since they appear elsewhere in this number of the Glasgow Naturalist. Some earlier records are included where appropriate, also a few obtained in 1987, to avoid future repetition. Specific names and reference numbers are as in

*Glasg. Nat.* 21 part 3 (1987)

Bradley, J. D. and Fletcher, D. S. 1979. *A Recorder's Log Book or Label List of British Butterflies and Moths*. Curwen Books, London.

In previous lists the vice-county number of the Allt Coire Dubhchraig near Cononish, Tyndrum, was erroneously given as V.C.87. It is properly V.C.88, the dividing line between these being the watershed between the Falloch and Dochart river systems. This applies to 794 *Lita virgella* (1985 List), and 1337 *Eudonia alpina* (1984 List).

- 149 *Adela cuprella* (D. & S.), Glen Nant, Taynult, V.C.98, 16/5/86, many, ICC.  
 180 *Diplodoma herminata* (Geoff.), Milton Wood, Dumbarton, V.C.99, 11/5/86, RKJ.  
 186 *Psyche casta* (Pallas), Gartlea, Loch Lomond, V.C.99, 28/6/86, two males flying at dusk, ICC.  
 292 *Caloptilia leucapennella* (Steph.) form *aurantiella*, Torrinch, Loch Lomond, V.C.99, 25/9/86, ICC.  
 300 *Parornix loganella* (Stt.), Lambhill Cemetery, Glasgow, V.C.77, 25/5/86, RKJ; Flanders Moss, Thornhill, V.C.87, 1/6/87, ICC.  
 388 *Choreutis myllerana* (Fab.), Mingary, Ardnamurchan, V.C. 97, 19/8/86, ICC; Arnisdale, Loch Hourn, V.C.97, 11/8/87, ICC.  
 413 *Argyresthia sorbiella* (Treit.), Ardtornish, Morvern, V.C.97, 12/7/86, ICC.  
 416 *Argyresthia glaucinella* Zell., oak trunks containing larvae were found at the following sites in V.C.77 in spring 1986: Falls of Clyde, Lanark; Bishop Loch, Glasgow; Kenmuir Bank, Glasgow; all RKJ.  
 444 *Ocnerosoma piniariella* Zell., Flanders Moss, Thornhill, V.C.87, 4/7/86, ICC; Gartlea, Loch Lomond, V.C.99, 9/7/86, ICC.  
 452 *Ypsolopha nemorella* (L.), Black Lochs, Oban, V.C.98, 26/7/86, PW.  
 463 *Ypsolopha vittella* (L.), Ardtornish, Morvern, V.C.97, 5/8/86, ICC.  
 553 *Coleophora striatipennella* Nyl., Gartlea, Loch Lomond, V.C.86 and V.C.99, 20/9/86, larvae on *Stellaria graminea* and *Cerastium fontanum*, emerged 10/7/86, ICC.  
 604 *Elachista orstadii* Palm., Bennane Head, Ballantrae, V.C.75, 6/6/86, ICC.  
 611 *Elachista triatomea* (Haw.), Ardtornish, Morvern, V.C.97, 12/7/86, ICC.  
 747 *Chrysoesthia sexguttella* (Thunb.), Old Kilpatrick, V.C.99, larva 30/9/85, emerged 4/6/86, RKJ.  
 784 *Bryotropha galbanella* (Zell.), Gartlea, Loch Lomond, V.C.99, 16/7/86, ICC; Flanders Moss, Thornhill, V.C.87, 28/7/86, ICC.  
 855 *Acompsia cinerella* (Cl.), Flanders Moss, Port of Menteith, V.C.87, 15/7/86, RKJ; Ardtornish, Morvern, V.C.97, 5/8/86, ICC.  
 882 *Mompha locupletella* (D. & S.), Possil, Glasgow, V.C.77, 20/6/86, RKJ; Taynish, Knapdale, V.C.101, 11/7/84, ICC.  
 992 *Clepsis rurinana* (L.), Ardtornish, Morvern, V.C.97, 8 adults on 12/7/86 and 3 on 5/8/86, foodplant probably hazel, ICC.  
 1008 *Philedone geringana* (D. & S.), Paisley Moss, V.C.76, 22/7/86, JM; Gartlea, Loch Lomond, V.C.99, 3/8/86, ICC.  
 1031 *Eana penziana* (Thun.), Edramucky, Killin, V.C.88, 22/7/86, ICC.  
 1095 *Apotomis sororculana* (Zett.), Flanders Moss, Thornhill, V.C.87, 24/6/86; ICC; Gartlea, Loch Lomond, V.C.99, 3/6/79, ICC.  
 1146 *Epinotia rubiginosana* (H.-S.), Gartlea, Loch Lomond, V.C.99, 28/6/86, ICC.  
 1168 *Gypsonoma sociana* (Haw.), Paisley Moss, V.C.76, 22/7/86, JM.  
 1182 *Epiblema turbidana* (Treit.), Carmyle, Glasgow, V.C.77, 15/7/86, RKJ.

- 1205 *Spilonota ocellana* (D. & S.), Gartloch Moss, Glasgow, V.C.77, 26/6/86, RKJ.
- 1212 *Rhyacionia pinivorana* (L. & Z.), Gartlea, Loch Lomond, V.C.99, 28/6/86, many, ICC.
- 1276 *Dichrorampha plumbagana* (Treit.), Bennane Head, Ballantrae, V.C.75, 6/6/86, several, ICC.
- 1288 *Alucita hexadactyla* (L.), Barcaldine, Oban, V.C.98, 1/6/86, JCAC.
- 1315 *Catoptria furcatellus* (Zett.), Meall nan Gabhar, Succoth, Dalmally, V.C.98, 10/7/86, three, GMAG; Ben Cruachan, Loch Awe, V.C.98, 22/7/87, several, KPB.
- 1393 *Udea uliginosalis* (Steph.), Ben Lomond, V.C.86, 29/7/86, several, ICC; Meall nan Gabhar, Succoth, Dalmally, V.C.98, 29/7/86, many, GMAG.
- 1553 *Anthocaris cardamines* (L.), Orange Tip, Ardmore Point, Cardross, V.C.99, 21/6/86, one male, Peter Whyatt per ICC.
- 1715 *Idaea straminata* (Borkh.), Plain Wave, Flanders Moss, Thornhill, V.C.87, 14 and 31/7/86, two, ICC.
- 1806 *Perizoma blandiata* (D. & S.), Pretty Pinion, Garscadden, Glasgow, V.C.99, 3/8/86, RKJ.
- 1840 *Eupithecia subumbrata* (D. & S.), Shaded Pug, Gartlea, Loch Lomond, V.C.99, 30/6/86, three, ICC; Balmaha, Loch Lomond, V.C.86, 14/6/81, ICC.
- 1884 *Abraxas grossulariata* (L.), Magpie, Paisley, V.C.76, 13/7/86 to 17/8/86, four, JM. This species is scarce and transitory in the Glasgow area, inhabiting gardens. It is locally common on the Argyll coasts among long heather.
- 1885 *Abraxas sylvata* (Scop.), Clouded Magpie, Barcaldine, Oban, V.C.98, 30/6/86 to 15/7/86, four, JCAC.
- 1907 *Epione repandaria* (Huf.), Bordered Beauty, Barcaldine, Oban, V.C.98, 26/8/86 and 8/10/86, JCAC; Taynish, Knapdale, V.C.101, 23/8/83, ICC; Balmaha, Loch Lomond, V.C.86, 26/8/81, ICC.
- 1929 *Lycia lapponaria* (Boisd.), Rannoch Brindled Beauty, colony on Flanders Moss, Thornhill, V.C.87, 1986. Larvae eating bog myrtle, pupated last week of July, ICC. An adult female was taken at the same site on 17 May 1924 by Mr Alan Maclaurin.
- 1940 *Deileptenia ribeata* (Cl.), Satin Beauty, Taynish, Knapdale, V.C.101, 21/7/86, RKJ; colony at Rowardennan, Loch Lomond, V.C.86, ICC.
- 1945 *Cleorodes lichenaria* (Huf.), Brussels Lace, Barcaldine, Oban, V.C.98, 13/7/86, JCAC.
- 1972 *Agrius convolvuli* (L.), Convolvulus Hawk, Barcaldine, Oban, V.C.98, 8/10/86, JCAC.
- 1984 *Macroglossum stellatarum* (L.), Hummingbird Hawk, Portencross, Ayrshire, V.C.75, 1/7/86, B.Z.; Kennedy's Pass, Girvan, V.C.75, 4/7/86, three, and 7/7/86, one, Mark Hope per ICC; Barcaldine, Oban, V.C.98, 10/8/87, one, JCAC.
- 1992 *Deilephila porcellus* (L.), Small Elephant Hawk, Flanders Moss, Port of Menteith, V.C.87, 15/7/86, RKJ.
- 2136 *Naenia typica* (L.), Gothic, Barcaldine, Oban, V.C.98, 8 and 18/8/86, two, JCAC.
- 2177 *Tholera cespitis* (D. & S.), Hedge Rustic, Barcaldine, Oban, V.C.98, 5/9/86, JCAC.
- 2229 *Dasyptolia templi* (Thun.), Brindled Ochre, Barcaldine, Oban, V.C.98, 7 and 15/10/86, JCAC.
- 2233 *Lithomoia solidaginis* (Hub.), Golden-rod Brindle, Barcaldine, Oban, V.C.98, 5/9/86, JCAC.

- 2255 *Eumichtis lichenea* (Hub.), Feathered Ranunculus, Bennane Head, Ballantrae, V.C.75, larva found on garlic 19/5/86 and reared exclusively on this, pupated 31/5/86, emerged 7/9/86, ICC.
- 2375 *Rhizedra lutosa* (Hub.), Large Wainscot, Barcaldine, Oban, V.C.98, 6/10/86, two, JCAC.
- 2403 *Heliothis peltigera* (D. & S.), Bordered Straw, Newmilns, Ayrshire, V.C.75, 14/7/86, GMAG.
- 2423 *Nycteola revayana* (Scop.), Oak Nycteoline, west side of Cart and Kittoch S.S.S.I., Glasgow, V.C.76, 15/3/86, RKJ; Black Lochs, Oban, V.C.98, 24/9/82, several, RKJ; Tainish, Knapdale, V.C.101, 22/5/84, ICC; Rowardennan, Loch Lomond, V.C.86, 29/2/80, ICC.

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## The Lepidoptera of The Isle of Coll, Inner Hebrides

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This article summarizes our knowledge of the Lepidoptera of the Isle of Coll (Mid Ebudes, V.C. 103), a sparsely populated island some 16 miles long by 3 miles wide.

Coll is virtually treeless, with no natural woodland, although there are now three small areas of recent afforestation. This treeless condition appears to date from between 1700 and 1764 and certainly prevailed when Walker visited the island in 1764 (61). However, water-logged deposits found during excavations of Breachacha Castle in the south (60), and accurately dated to c. 1700, contained small branches of a number of species of tree suggesting that if clearance had occurred by this date it could not have occurred much earlier. Present trees, unassociated with recent habitation, are eared-willow, rowan, aspen, birch, oak, hazel, alder and larch. Other trees which occurred in c. 1700, such as Scots pine, ash and bird cherry, are now found only in situations indicative of deliberate planting. Most of the island is covered with various forms of acid heath while the rest, other than that given over to agriculture, is active sand-dune systems with associated machair. No part has escaped the influence of Man and his animals – an influence that appears to have started about 2000 B.C. (57).

Previous lists of Lepidoptera were compiled by Harrison (22,45) and Wormell (63). Recently, however, much data have accumulated due to visits by the present authors as follows: P.W. (1976-'86), I.C.C. (1978-'85) and K.P.B. (1981-'86). As their collecting was not carried out systematically over the whole island comments on the abundance of species, which would be arbitrary and possibly misleading, have been avoided as far as possible.

Coll is located in four 10km O.S. grid squares, NM 15, 16, 25 & 26. However, only three of these have been included here for distribution purposes as the fourth, NM 16, is represented by less than 1km of coastline and records from it are included in NM 15.

From the capture of a lepidopteran imago it is usually not possible to determine whether a species is a resident or an immigrant. For those species known to breed on Coll the food-plant on which the larvae have been found is given.

In the following list scientific names follow the checklist of Kloet & Hincks, 1972 (55), except where they have been changed recently (Emmet, 1987; 18a). Such changed names are accompanied by the former ones given in parenthesis. The order of entry, the reference numbers and the common names are as in the indexed list of Bradley and Fletcher, 1986 (11a).

The Isles of Coll, Tiree and Mull constitute V.C. 103, the Mid Ebudes. However, as early as 1938, Harrison (52) proposed that Coll and Tiree should be separated from Mull and become V.C. 110B thus linking them with the Outer Hebrides whose flora shows many similarities. This proposal has not gained much support so we have maintained the comparison with the Inner Hebrides (see 63).

### List of Species

\* denotes first published record from Coll; + indicates species not recorded elsewhere from Inner Hebrides; NM 15,25,26 = 0.S. 10km grid squares; figures in brackets relate to references listed at end of paper.

#### MICROPTERIGIDAE

4. *Micropterix aruncella* (Scop.); NM15,25,26; widespread, imagines found of feeding at the flowers of *Potentilla erecta*; (63).

#### HEPIALIDAE

\* 14. *Hepialus humuli* (Linn.), Ghost Moth; NM26; very local, Torastan area only.

18. *H. fusconebulosa* (DeG.), Map-winged Swift; NM15,25,26; widespread but in low numbers; (51, 63).

#### NEPTICULIDAE

45. *Trifurcula griseella* Wolff; NM15; one only near Hogh Bay on 2.vii.1983; foodplant unknown; previously known in Scotland only from Fife; (2,7,8,13).

+ \* 61. *Stigmella serella* (Stt.); NM25; a few empty leaf-mines in *Potentilla erecta* in July and September 1986.

\* 66. *S. sorbi* (Stt.); NM25,26; a few empty leaf-mines in *Sorbus aucuparia*.

+ 69. *S. auritella* Skåla; NM15,25,26; leaf-mines widespread on *Salix aurita* and occasionally *S. repens*; reared and male genitalia checked; (63).

\* 92. *S. anomalella* (Goeze); NM15; reared from leaf-mines on *Rosa pimpinellifolia* on Ben Feall.

103. *S. nylandiella* (Teng.) (= *aucupariae* auct.); NM26; larvae widespread in leaf-mines on *Sorbus aucuparia* in the north of the island; (63).

#### OPOSTEGIDAE

+ 121. *Opostega crepusculella* Zell.; NM15,26; at Cornaigbeg several imagines were seen flying round a clump of *Mentha* sp., otherwise singletons only; (63).

#### INCURVARIIDAE

+ 142. *Nematopogon pilella* (D. & S.); NM26; one only on 27.vi.1983 near Loch na Cloiche; a moorland species which is only recorded in Britain from a few widely separated localities, namely Aviemore, Rannoch, Glen Tilt, Stoneyhurst (Lancs.) and Olchon (Herefords.); (2,6,8,13).

#### HELIOZELIDAE

\* 157. *Heliozela hammoniella* Sorh. (= *betulae* (Stt.)); NM25; single vacated leaf-mine in *Betula pubescens* seen near The Lodge, Arinagour, 24.ix.1986.

#### ZYGAENIDAE

169. *Zygaena filipendulae* (Linn.), Six-spot Burnet; NM15,25,26; resident but in low density; (33, 38, 45, 63).

172. *Z. purpuralis* (Brünn.), Transparent Burnet; NM15; recorded by Harrison from the Isle of Gunna off the south-western tip of Coll; (33, 38, 45, 56).

#### TINEIDAE

\* 227. *Monopis laevigella* (D. & S.) (= *rusticella* (Hübner)), Skin Moth; NM15,26; larvae widespread in bird's nests (reared from nests of buzzard, crow and pipit).

\* 245. *Tinea pallescentella* Stt., Large Pale Clothes Moth; NM26; reared in large numbers from the debris and pellets in a buzzard's nest near Cornaigbeg.

#### OCHSENHEIMERIIDAE

\* 252. *Ochsenheimeria urella* F.v R. (= *bisontella* (L. & Z.)); NM15; two imagines near McLean's Tomb on 7.viii.1983; presumed resident.

#### LYONETIIDAE

263. *Lyonetia clerkella* (Linn.), Apple Leaf Miner; NM25; a single specimen was reared from a cocoon found, on 13.vii.1982 near Eilean Ornsay, fixed to the upper surface of an Aspen leaf. No associated mine could be found. There were Rowan trees some 10 yards away but no signs of *L. clerkella* mines could be found on them nor have been seen on them since; (63).

#### GRACILLARIIDAE

282. *Caloptilia elongella* (Linn.); NM25, 26; larvae in leaf-rolls on most of the Alder trees; (63).

\* 286. *C. alchimiella* (Scop.); NM25; the conical leaf-rolls of the larvae occurred in numbers on the isolated Oaks at Arinagour and Arinthluic, ix. 1986.

288. *C. stigmatella* (Fabr.); NM15,25,26; the conical leaf-rolls of the larvae widespread on *Populus tremula*, *Salix aurita*, *S. repens* & *S. viminalis*; (63).

\* 293. *C. syringella* (Fabr.); NM25; the untidy larval leaf-rolls on Ash and Privet occur sparingly around The Lodge, Arinagour.

294. *Aspilapteryx tringipennella* (Zell.); NM15,25,26; the blister-like leafmines on *Plantago lanceolata* widespread; (63).

305. *Parornix scoticella* (Stt.); NM25,26; reared from mines and folded leaves of Rowan; widespread in northern half of island; (63).

\* 337. *Phyllonorycter hilarella* (Zett.) (= *spinoella* (Dup.)); NM15,25,26; widespread, reared from blister-like leafmines on *Salix aurita*, and also on *S. atrocinerea*.

+ 348. *Phyllonorycter quinqueguttella* (Stt.); NM15,25,26; widespread, reared from blister-like leafmines on *Salix repens*; (2,7,8,13).

+ \* 354. *Phyllonorycter emberizaepenella* (Bouché); NM25,26; blister-like leafmines on *Lonicera periclymenum* widespread in northern half of the island, erroneously published as belonging to *P. trifasciella*; (2,7).

#### CHOREUTIDAE

385. *Anthophila fabriciana* (Linn.); NM15,25,26; widespread on *Urtica dioica*; (22,63).

387. *Choreutis sehestediana* (Fabr.) (= *punctosa* (Haw.)); NM15,25,26; the Small Skullcap, *Scutellaria minor*, is not usually given as a larval foodplant for this species, but *P. sehestediana* is widespread on it on Coll; (1,4,5,63).

#### GLYPHIPTERIGIDAE

+ \* 391. *Glyphipteryx simplicella* (Steph.), Cocksfoot Moth; NM25; only around Arinagour; larvae in seedheads and then stems of *Dactylis glomerata*.

392. *G. schoenicolella* Boyd; NM26; very local; larvae in seedheads of *Schoenus nigricans*; (2,7,13,63).

+ 395. *G. haworthana* (Steph.); NM25,26; very local; larvae in seedheads of *Eriophorum augustifolium*; (15).

397. *G. thrasonella* (Scop.); NM15,25,26; widespread; (63).

#### YPONOMEUTIDAE

\* 411. *Argyresthia goedartella* (Linn.); NM25; very local about alder.

412. *A. pygmaeella* (D. & S.); NM15,25,26; apparently rather local about *Salix aurita*; (63).

418. *A. conjugella* Zell., Apple Fruit Moth; NM25,26; widespread, larvae in fruits of Rowan; (63).

464. *Plutella xylostella* (Linn.), Diamond-back Moth; NM15,25,26; widespread, imagines often around clumps of *Cakile maritima*, larvae on agricultural brassicas; (63).

467. *Rhigognostis annulatella* (Curt.); NM15,25,26; larvae on *Cochlearia officinalis*; (63).

#### EPERMENIIDAE

\* 478. *Phaulernis fulviguttella* (Zell.); NM15,25,26; on *Angelica sylvestris*.

#### COLEOPHORIDAE

504. *Coleophora viminetella* Zell.; NM25,26; cases widespread on *Myrica gale* on heathland, also once found on *Salix aurita*; (22,63).

+ 510. *C. juncicolella* Stt.; NM25; several imagines swept from or taken in flight over *Calluna vulgaris* in Eilean Ornsay area; (63).

\* 513. *C. potentillae* Elisha; NM25; single fully-fed case on *Potentilla reptans* near Arinthaluic, 25.ix.1986.

+ \* 541. *C. pyrrolipennella* Zell.; NM25; 2 males to light at Arinagour 19.vii.1986.

\* 544. *C. albicosta* (Haw.); NM25; many cases on *Ulex europaeus* near The Lodge, Arinagour, 29.ix.1986.

\* 547. *C. discordella* Zell.; NM15,25,26; cases widespread on *Lotus corniculatus*; (63).

583. *C. tamesis* Waters; NM15,25,26; widespread and presumed resident; taken by day and at light. (63).

584. *C. alticolella* Zell.; NM15,25,26; cases widespread on *Juncus squarrosus* but only confirmed by imagines from Eileraig, 13.vii.1985; (22).

#### ELACHISTIDAE

+ 599. *Elachista alpinella* Stt.; NM26; widespread in northern part of island; one reared from a pupa found in the Meall nan Uan area in 1982; (63).

\* 601. *E. albifrontella* (Hübner.); NM25; one to light in Arinagour, 13.vii.1986.

603. *E. subnigrella* Dougl.; NM15,26; three imagines taken in three different years; (14).

607. *E. canapennella* (Hübner.) (= *pulchella* (Haw.)); NM15,25,26; widespread, comes to light readily; (63).

610. *E. argentella* (Clerck); NM15; appears to be confined to the Ben Feall area; (63).

630. *Biselachista albidella* Teng.; NM25,26; widespread, imagines sometimes flying in large numbers; (63).

#### OECOPHORIDAE

647. *Hofmannophila pseudospretella* (Stt.), Brown House-moth; NM15,25,26; usually associated with human habitation; (63).

648. *Endrosia sarcitrella* (Linn.), White-shouldered House-moth; NM15,25,26; often associated with human habitation but also reared from buzzard's nest; (63).

654. *Pleurota bicostella* (Clerck); NM25,26; widespread on heathland; (63).

670. *Depressaria daucella* (D. & S.); NM15,25,26; larvae widespread on *Oenanthe crocata*; (26,41,45,63).

\* 672. *D. pastinacella* (Dup.), Parsnip Moth; NM15; larvae on *Heracleum sphondylium*; (22).

674. *D. badiella* (Hübner.); NM15,25,26; regular visitor to light, presumed resident; (63).

+ \* 678. *D. weirella* Stt.; NM26; one to light at Torastan, 11.viii. 1982 and one to light near Cornaigbeg, 16.viii.1982.

\* 685. *Levipalpus hepatariella* (L. & Z.); NM26; several to light in Cornaigbeg/Torastan area, viii.1981, 1982 & 1984; foodplant unknown; (63).

#### PROPOSED RED DATA BOOK SPECIES.

688. *Agonopterix heracliana* (Linn.); NM25; larvae on *Heracleum sphondylium*; (22,63).

689. *A. ciliella* (Stt.); NM15,25,26; widespread, larvae on *Angelica sylvestris*; (63).

698. *A. kaekeritziana* (Linn.) (= *liturella* (D. & S.)); NM26; larvae on *Centaurea nigra*; (63).

#### GELECHIIDAE

+ \* 768. *Teleiodes notatella* (Hübner.); NM25,26; reared from larvae on *Salix aurita*.

+ \* 773. *T. paripunctella* (Thunb.); NM25,26; reared from larvae on *Myrica gale*.

+ 782. *Bryotropha senectella* Zell.; NM15,26; less frequent than the following species; (63).

787. *B. terrella* (D. & S.); NM15,25,26; widespread; (63).

797. *Neofaculta ericetella* (Hübner.); NM25,26; widespread on heathland areas; (22,63).

811. *Scrobipalpa samadensis plantaginella* (Stt.); NM15,25,26; widespread, comes to light; (63).

820. *S. artemisiella* (Treits.), Thyme Moth; NM15,26; a species characteristic of the machair; (63).

821. *S. murinella* (H.-S.); NM26; reared from mines in the leaves of *Antennaria dioica*: although the foodplant is common in all the rocky areas of the island, *S. murinella* has so far only been found in a small area in the northern part of the island; (2,7,13). PROPOSED RED DATA BOOK SPECIES.

829. *Caryocolum marmoreum* (Haw.); NM15,25,26; a widespread species characteristic of the machair; (63).

+ 843. *Aproaerema anthyllidella* (Hübner.); NM15,26; larvae in 'podded' leaves of *Anthyllis vulneraria*; (15).

+ 845. *Syncopacma sangiella* (Stt.); NM26; one only near Cornaigbeg, 4.vii.1983; (2,13).

+ 852. *Anacamptis temerella* (L. & Z.); NM26; the larva spins together the leaves of the terminal shoots of *Salix repens* which is widespread on the island, but *A. temerella* seems to be confined to the rocky knolls along the coast at Cornaigbeg. This is the most northerly outpost of this species in Britain; (9,10,14).

#### MOMPHIDAE

+ 882. *Mompha locupletella* (D. & S.); NM26; reared from larvae on the leaves of *Epilobium palustre*, as well as being swept as an imago; (13).

#### COCHYLIDAE

\* 935. *Cochylimorpha straminea* (Haw.); NM15,25,26; widespread.

937. *Agapeta hamana* (Linn.); NM15,26; presumed resident; (63).

942. *Aethes piercei* O'bratz.; NM26; presumed resident; (63).

954. *Eupoecilia angustana* (Hübner.); NM15,25,26; widespread on heathland; (63).

960. *Falseuncaria ruficiliana* (Haw.); NM15,25,26; widespread; (63).

#### TORTRICIDAE

(977. *Archips podana* (Scop.), Large Fruit-tree Tortrix; record in Wormell (63) based on a mis-identification by KPB).

981. *A. rosana* (Linn.), Rose Tortrix; NM25,26; reared from larvae on *Populus tremula*, *Salix aurita*, *Myrica gale*, *Filipendula ulmaria* & *Rosa canina*; (63).

988. *Aphelia viburnana* (D. & S.), Bilberry Tortrix; NM15,25,26; widespread, reared from larvae on *Empetrum nigrum*, *Populus tremula*, *Myrica gale*, *Succisa pratensis*, *Hypericum elodes* & *Lotus corniculatus*; (63).

989. *A. paleana* (Hübner.), Timothy Tortrix; NM15; reared from larvae found on *Iris pseudacorus* at Caolas, vi.1980; (63).

\*1009. *Philedonides lunana* (Thunb.); NM26; reared from larvae on *Arctostaphylos uva-ursi* from Loch Fada.

1019. *Cnephasia conspersana* Dougl.; NM26; this littoral species is univoltine throughout most of Britain but appears to be bivoltine in the Burren, Ireland. Two flight periods also seem to occur on Coll as imagines are on the wing in the second half of July and the latter half of August. However this appears to be due

to a univoltine species adopting two different emergence strategies. Reared from larvae on *Trifolium pratense*, *Cerastium fontanum*, *Hypochoeris* sp. & *Rhinanthus minor*; (11,14,63).

1029. *Eana osseana* (Scop.); NM15,25,26; widespread; (63).

1031. *Eana penziana colquhounana* (Barr.); NM15,25,26; widespread, reared from larvae in silk tubes amongst roots of *Armeria maritima* & *Sedum anglicum*; (63).

+ 1039. *Acleris comariana* (L. & Z.), Strawberry Tortrix; NM26; several to light at Torastan, viii.1981 & 1982; (63).

1040. *A. caledoniana* (Steph.) NM15,25,26; widespread, reared from larvae on *Myrica gale*; (63).

1043. *A. aspersana* (Hübner.); NM15,25,26; widespread, reared from larvae on *Potentilla anserina*, *P. erecta*, *Filipendula ulmaria* & *Plantago lanceolata*; (63).

1048. *A. variegana* (D. & S.), Garden Rose Tortrix; NM15,25,26; widespread, reared from larvae on *Crataegus monogyna*, *Rosa canina*, *R. pimpinellifolia*, *Rubus fruticosus* & *Sorbus aucuparia*; (45, 52, 63).

1053. *A. hastiana* (Linn.); NM25,26; widespread, reared from larvae on *Salix aurita* & *S. repens*; (22, 63).

\*1055. *A. hyemana* (Haw.); NM15; single imago reared from larva on *Erica cinerea* at Gorton Bay, 1985.

1062. *A. emargana* (Fabr.); NM25,26; a few only about *Salix aurita*; (63).

1067. *Celypha cespitana* (Hübner.); NM15,25,26; widespread on machair; ; (63).

1076. *Olethreutes lacunana* (D. & S.); NM15,25; occasional specimens; (63).

\*1085. *Hedya atropunctana* (Zett.); NM26; reared from *Myrica gale* and also taken on the wing; Torastan area only; (22, 63).

+ \*1095. *Apotomis sororculana* (Zett.); NM25; one reared from larva on *Betula* sp. collected ix. 1985 near The Lodge, Arinagour.

1109. *Lobesia littoralis* (H. & W.); NM15,25,26; widespread along coast; (63).

1110. *Bactra furfurana* (Haw.); NM15,26; occasional adults only; (63).

1111. *B. lancealana* (Hübner.); NM15,25,26; widespread; (63).

1117. *Ancylis unguicella* (Linn.); NM15; several seen by day in Crossapol/Caolas area, vi. 1980; (63).

+ \*1118. *A. uncella* (D. & S.); NM25; one at dusk near Arinagour, 12.vii.1986.

1132. *Epinotia subocellana* (Don.); NM25,26; reared from larvae on *Salix aurita*; (63).

1139. *E.tenerana* (D. & S.), Nut Bud Moth; NM25,26; about *Alnus glutinosa*; (22).

+ 1141. *E. nemorivaga* (Tengst.); NM25,26; this montane species was reared from larvae on *Arctostaphylos uva-ursi*; on Coll bearberry occurs on the tops of many of the rocky knolls at only 40m above the sea; (63).

1147. *E. cruciana* (Linn.), Willow Tortrix; NM15,25,26; widespread, reared from *Salix aurita* & *S. repens*; (63).

\*1151. *E. trigonella* (Linn.) (= *stroemiana* (Fabr.)); NM25; several beaten from *Betula* sp., 10.ix.1985 at The Lodge, Arinagour.

\*1154. *E. caprana* (Fabr.); NM25,26; widespread on heathland.

\*1159. *Rhopobota naevana* (Hübner.) (= *unipunctana* (Haw.)), Holly Tortrix; NM26; one to light at Torastan, 19.viii.1984.

\*1166. *Zeiraphera diniana* (Guen.), Larch Tortrix; NM26; occasionally taken at Gallanach Plantation.

\*1174. *Epiblema cynosbatella* (Linn.); NM25; one to light at Arinagour, 15.vii.1986.

\*1175. *E. uddmanniana* (Linn.), Bramble Shoot Moth; NM26; one to light at Gallanach Plantation, 4.viii.1983.

- \*1184. *E. cirsiiana/scutulana*; NM15,25; reared from stems of *Cirsium palustre*.  
 \*1187. *E. costipunctana* (Haw.); NM15; several at Caolas, 30.vi.1983.  
 1197. *Eucosma campoliliana* (D. & S.); NM26; one to light at A'Chròic, 19.vii.1982; (63).  
 + \*1200. *E. hohenwartiana* (D. & S.); NM25,26; mostly to light.  
 1201. *E. cana* (Haw.); NM15,25,26; widespread, flies at dusk and comes to light; (63).  
 1232. *Pammene populana* (Fabr.); NM26; several flying over *Salix aurita* near Loch na Cloiche, viii.1982; (63).  
 1273. *Dichrorampha petiverella* (Linn.); NM15,26; larvae on *Achillea millefolium*; (63).  
 1283. *D. montanana* (Dup.); NM26; occasional; (63).

## PYRALIDAE

1293. *Chrysoteuchia culmella* (Linn.); NM15,26; occasional, presumed resident; (63).  
 1294. *Crambus pascuella* (Linn.); NM15,25,26; widespread; (63).  
 1301. *C. lathoniellus* (Zinck.) (= *nemorella* (Hübner.)); NM15,26; very local; (63).  
 1302. *C. perlella* (Scop.); NM15,25,26; widespread on machair; (63).  
 1304. *Agriphila straminella* (D. & S.); NM15,25,26; widespread; (63).  
 1305. *A. tristella* (D. & S.); NM15,25,26; widespread; (63).  
 1309. *A. geniculea* (Haw.); NM15,25,26; widespread; (63).  
 1314. *Catoptria margaritella* (D. & S.); NM15,25,26; widespread on heathland; (63).  
 + 1330. *Donacaula mucronellus* (D. & S.); NM15,26; presumed resident; (13, 63).  
 1333. *Scoparia pyralella* (D. & S.) (= *arundinata* Thunb.); NM15,26; presumed resident; (63).  
 1334. *S. ambigualis* (Treits.); NM15,25,26; widespread; (22,63).  
 + \*1339. *Eudonia murana* (Curt.); NM26; three specimens Meall nan Uan, 21.viii.1984.  
 1340. *E. truncicolella* Stt.; NM26; one only Meall na h-Iolair, 9.viii.1982; (63).  
 + \*1341. *E. lineola* (Curt.); NM25; one to light at Arinagour, 19.vii.1986.  
 + 1342. *E. angustea* (Curt.); NM15,25,26; widespread; (63).  
 \*1344. *E. mercurella* (Linn.); NM15,25,26; widespread.  
 1345. *Elophila nymphaeata* (Linn.), Brown China-Mark; NM15,25,26; widespread by lochans; (63).  
 1356. *Evergestis forficalis* (Linn.), Garden Pebble; NM25; recorded by Harrison, also one to light at Arinagour, 15.vii.1986; (22).  
 1362. *Pyrausta purpuralis* (Linn.); NM15,26; recorded on Gunna by Harrison and one to light in dunes near Cornaigbeg, 14.viii.1977; (38,45,63).  
 + 1363. *P. ostrinalis* (Hübner.); NM15,26; presumed resident; (63).  
 1365. *P. cespitalis* (D. & S.); NM15,26; presumed resident; (63).  
 1379. *Mutuuraia terrealis* (Treits.); NM26; reared from larvae on *Solidago virgaurea*; appears to be confined to the coastal cliffs in the Meall nan Uan area; (63). PROPOSED RED DATA BOOK SPECIES.  
 1386. *Opsibotys fuscalis* (D. & S.); NM15,25,26; on Coll this species has been reared from the seed capsules of both *Rhinanthus minor* (Yellow-rattle) and *Pedicularis sylvatica* (Lousewort), however its distribution on the island suggests that the latter pabulum may be the most common one on Coll. Lousewort does not appear to have been recorded previously as a substrate for *O. fuscalis*!; (38, 45, 63).

1388. *Udea lutealis* (Hübner.) (= *elutalis* (D. & S.) auctt.); NM25,26; reared from larva in spun leaves of *Centaurea nigra*; (63).

+ \*1390. *Udea prunalis* (D. & S.); NM26; one to light at Torastan, 20.viii.1984.

1395. *U. ferrugalis* (Hübner.); NM15,25; probably an immigrant; (63).

1398. *Nomophila noctuella* (D. & S.), Rush Veneer; NM25,26; usually taken at light, probably an immigrant; (63).

\*1428. *Aphomia sociella* (Linn.), Bee Moth; NM25,26; comes to light, probably resident.

1451. *Pyla fusca* (Haw.); NM26; one only at Meall nah-Iolaire, 29.vi.78; (63).

1462. *Pempeliella diluta* (Haw.) (= *dilutella* (Hübner.) auctt.); NM15,26; reared from larvae in silk tubes under *Thymus drucei* – no ants were associated with the plants; imago comes to light; (63).

#### PTEROPHORIDAE

\*1502. *Platyptilia isodactylus* (Zell.); NM26; taken twice in the Torastan area.

1510. *Pterophorus tridactyla* (Linn.); NM25,26; first recorded by Harrison from Loch Cliad in July 1947; always associated with *Thymus drucei*; (7, 47, 63).

#### PIERIDAE

+ 1543. *Colias hyale* (Linn.), Pale Clouded Yellow; NM25,26; casual immigrant in June 1947, not resident; (18,49,51,53,59).

1545. *C. croceus* (Geoff.), Clouded Yellow; NM15,25; casual immigrant in August 1947, not resident; (18,49,51,59,63).

1549. *Pieris brassicae* (Linn.), Large White; NM15,26; scarce, probably not a permanent resident; (25,53,59,63).

1550. *P. rapae* (Linn.), Small White; recorded by Harrison in 1947 who presumed it to be an immigrant; no other records; (51).

1551. *P. napi* (Linn.), Green-veined White; NM15,25,26; a widespread resident, attached to *Cardamine pratensis* according to Harrison; (16,22,23,27,38,45,50,59,63).

#### LYCAENIDAE

1555. *Callophrys rubi* (Linn.), Green Hairstreak; NM25,26; widespread on heathland, larvae on *Vaccinium myrtillus*, *Erica tetralix* & *Calluna vulgaris*; (16,22,23,34,45,51,63).

1574. *Polyommatus icarus* (Rott.), Common Blue; NM15,25,26; widespread, larvae on *Lotus corniculatus*; (16,22,23,38,45,59,63).

#### NYMPHALIDAE

1590. *Vanessa atalanta* (Linn.), Red Admiral; NM15,25; immigrant, but larvae often to be found on *Urtica dioica*; (16,22,23,49,63).

1591. *Cynthia cardui* (Linn.), Painted Lady; NM15,26; immigrant, but larvae often to be found on *Cirsium arvense* & *C. vulgare*; (12,16,22,23,25,38,63).

1593. *Aglais urticae* (Linn.), Small Tortoiseshell; NM15,25,26; widespread; larvae on *Urtica dioica*; (16,22,23,45,53,59,63).

1597. *Inachis io* (Linn.), Peacock; NM26; occasional immigrant; (22,23,45,63).

1600. *Boloria selene* (D. & S.), Small Pearl-bordered Fritillary; NM25; a single specimen was recorded by Cowan in 1919 and f. *insularum* Harrison was recorded as 'widespread' in 1946, but no recent records are known; (16,45,53,59).

1607. *Argynnis aglaja* (Linn.), Dark Green Fritillary; NM25; recorded as 'very

common' by Cowan in 1919, and 'fairly common' by Harrison in 1946, but no recent records are known; (16,21,45,53,59).

1610. *Euphydryas aurinia* (Roth.), Marsh Fritillary; NM15; 'absolutely swarming' on Gunna on 6.vi.1940 but no recent records: (3,36,38,45,53,56,59).

#### SATYRIDAE

1621. *Hipparchia semele* (Linn.), The Grayling; NM15,25,26; frequents the coastal dunes and rocky knolls; (16,23,30,45,51,59,63).

1626. *Maniola jurtina* (Linn.), Meadow Brown; NM15,25,26; widespread; (16,19,20,22,23,30,45,63).

1627. *Coenonympha pamphilus* (Linn.), Small Heath; NM15,25,26; widespread; (16,22,23,45,51,63).

1628. *C. tullia* (Müll.), Large Heath; NM15,25,26; widespread; (16,22,23,45,51,59,63).

#### LASIOCAMPIDAE

1637. *Lasiocampa quercus callunae* Pal., Northern Eggar; NM15,25,26; widespread, larvae on *Calluna vulgaris* & *Salix aurita*; (22,45,63).

1638. *Macrothylacia rubi* (Linn.), Fox Moth; NM15,25,26; widespread, larvae on *Calluna vulgaris*, *Salix aurita* & *Lotus corniculatus*; (38,45,63).

\*1640. *Philudoria potatoria* (Linn.), The Drinker; NM26; appears to be confined to the north-east end of the island.

#### SATURNIDAE

1643. *Saturnia pavonia* (Linn.), Emperor Moth; NM15,25,26; widespread on heathland, larvae on *Calluna vulgaris* & *Salix aurita*; (22,45,63).

#### THYATIRIDAE

1655. *Tethea or* (D. & S.), Poplar Lutestring; NM25; very local, larvae on *Populus tremula*; (13,22,45,51).

#### GEOMETRIDAE

1694. *Scopula ternata* (Schrank), Smoky Wave; NM15,25,26; Harrison records it as 'scattered on the Coll heaths from Bousd to Arileod'; no recent records; (45).

\*1719. *Orthonama vittata* (Borkh.), Oblique Striped; NM26; one to light near Cornaigbeg, 25.vii.1984.

1722. *Xanthorhoe designata* (Hufn.), Flame Carpet; NM26; recorded by Harrison occasionally but recently recorded once only in Torastan area, 8.vi.1980; (45,63).

\*1723. *X. munitata* (Hübner), Red Carpet; NM15,25,26; widespread, comes to light.

\*1725. *X. ferrugata* (Clerck), Dark-barred Twin-spot Carpet; NM26; appears to be restricted to the northeast third of the island, occasionally comes to light.

1727. *X. montanata* (D. & S.), Silver-ground Carpet; NM25,26; easily disturbed, occasionally comes to light; (45,63).

1728. *X. fluctuata* (Linn.), Garden Carpet; NM15,25,26; widespread, occasionally comes to light; (63).

1732. *Scotopteryx chenopodiata* (Linn.), Shaded Broad-bar; NM15; recorded by Harrison from 'the Breacacha district' but not subsequently recorded; (43,45).

1738. *Epirrhoe alternata* (Müll.), Common Carpet; NM15,25,26; widespread; flies by day, but occasionally comes to light; (38,45,63).

1742. *Camptogramma bilineata* (Linn.), Yellow Shell; NM15,25,26; widespread, easily disturbed by day; larvae found on primrose by Harrison; (22,38,45,63).

1743. *Entephria flavicinctata* (Hübner), Yellow-ringed Carpet; NM26; represented by the bivoltine subspecies *flavicinctata*; recorded only from Meall nan Uan area where the larvae feed on *Sedum anglicum*; (58,63).

1744. *E. caesiata* (D. & S.), Grey Mountain Carpet; NM26; appears to be restricted to the north-east end of the island and to be very local even there; (63).

1746. *Anticlea badiata* (D. & S.), Shoulder Stripe; NM26; single larva on Rose in Torastan area, vi.1980; (63).

1752. *Cosmorhoe ocellata* (Linn.), Purple Bar; NM15,25,26; widespread, easily disturbed by day and occasionally comes to light; (45,63).

1753. *Coenotephria salicata* (Hübner), Striped Twin-spot Carpet; NM25,26; widespread in the northern half of the island but only an occasional visitor to light; (63).

1755. *Eulithis testata* (Linn.), The Chevron; NM15,25,26; widespread, occasionally at light; reared from larvae on *Corylus avellana* in 1947 by Harrison, but this is obviously not its only foodplant; there are now only 6 hazel bushes on the island; (45,51,63).

\*1756. *E. populata* (Linn.), Northern Spinach; NM26; one to light at Meall nan Uan, 16.vii.1982.

+ 1758. *E. pyraliata* (D. & S.), Barred Straw; NM15,26; most frequent at the southwest end of the island, occasionally comes to light; (63).

1761. *Chloroclysta miata* (Linn.), Autumn Green Carpet; NM15,25; recorded by Harrison as 'beaten from rose, birch, etc.' and as 'larvae on Salices and birch', but no recent records; (22,45,51).

1762. *C. citrata* (Linn.), Dark Marbled Carpet; NM15,26; only occasionally met with, easily disturbed; larvae found by Harrison on primrose; (38,45,63).

1764. *C. truncata* Hufn., Common Marbled Carpet; NM15,25,26; widespread and often abundant, easily disturbed; univoltine, flying July/August as ssp. *concinata* (Steph.) (Arran Carpet); recent evidence suggests that *C. concinnata* is a subspecies of *C. truncata*; (22,38,45,63).

1765. *Cidaria fulvata* (Forst.), Barred Yellow; NM26; Harrison recorded 'larvae in abundance on the Burnet Rose'; one to light at Torastan, early viii. 1981; (45,63).

\*1768. *Thera obeliscata* (Hübner), Grey Pine Carpet; NM26; one to light at Gallanach Plantation; 4.viii.1983.

1770. *T. cognata* (Thunb.), Chestnut-coloured Carpet; NM15,25,26; widespread, comes to light; larvae on *Juniperus communis*; (17,45,51,63).

1771. *T. juniperata* (Linn.), Juniper Carpet; NM15,25,26; widespread, larvae on *Juniperus communis*; (45,63).

1775. *Colostygia multistrigaria* (Haw.), Mottled Grey; recorded by Harrison in April; (22,45).

1777. *Hydriomena furcata* (Thunb.), July Highflyer; NM15,25,26; widespread but only as solitary individuals; larvae on *Salix aurita* & *Corylus avellana*; (45,63).

1787. *Rheumaptera hastata* (Linn.), Argent & Sable; NM15,25; Harrison found the 'larvae not rare on *Myrica*'; no recent records known; (45).

1799. *Operophtera brumata* (Linn.), Winter Moth; NM25; recorded by Harrison, vi.1939 from larvae on *Prunus spinosa* behind Coll Church; this plant does not appear to occur on the island any longer; (28,45).

1803. *Perizoma alchemillata* (Linn.), Small Rivulet; Harrison recorded the

larvae to be 'exceptionally common on Hempenettle' in 1947, but there are no subsequent records; (51).

1805. *P. minorata* (Treits.), Heath Rivulet; NM26; two flying in sunshine at Bousd, 1 & 7.viii.1981; (63).

1806 *P. blandiata* (D. & S.), Pretty Pinion; recorded from Coll in vi.1947 by Harrison but no subsequent records are known; (51).

1807. *P. albulata* (D. & S.), Grass Rivulet; NM15,26; flies freely at dusk; reared from larvae in the seed-capsules of *Rhinanthus minor*; (45, 51).

1809. *P. didymata* (Linn.), Twin-spot Carpet; NM15,26; very local, occurring at Gunna, Calgary Point, Meall nan Uan & Cornaigbeg; larvae found on Primrose by Harrison; (22,38,45,63).

\*1823. *Eupithecia venosata* (Fabr.), Netted Pug; NM15; reared from larvae on *Silene maritima* on Ben Feall, 1983.

\*1827. *E. intricata hibernica* Mere, Mere's Pug; NM25; one to light at Arinagour, 18.vii.1986.

1828. *E. satyrata* (Hüb.), Satyr Pug; NM25,26; reared from larvae on *Erica tetralix*; (22, 63).

1830/1831 *E. absinthiata* (Clerck)/*goossensiata* Mab., Ling Pug; NM25; first recorded by Harrison in 1938 from larvae but the only recent record is one to light at Arinagour, 28.vii.1986; (22,45).

\*1834. *E. vulgata* (Haw.), Common Pug; NM25; one to light at Arinagour, 18.vii.1986.

1837. *E. subfuscata* (Haw.), Grey Pug; NM25,26; presumed resident, occasional specimens to light; (22,45).

\*1843. *E. distinctaria* (H-S.), Thyme Pug; NM26; apparently restricted to the machair in the northeast part of the island.

1846. *E. nanata* (Hüb.), Narrow-winged Pug; NM25,26; not yet met with in the southwest part of the island; reared from larvae on *Erica tetralix* and *Salix aurita*; comes to light; (22,45,63).

\*1851. *E. virgaureata* Doubl., Golden-rod Pug; NM25; one male to light at Arinagour, 5.viii.1983.

\*1854. *E. pusillata* (D. & S.), Juniper Pug; NM26; two taken in flight at Meall nan Uan, 21.viii.1984.

1862. *Gymnoscelis rufifasciata* (Haw.), Double-striped Pug; NM26; two taken in flight at Loch Fada, 29.vi.1978; (63).

1867. *Aplocera plagiata* (Linn.), Treble-bar; NM15,26; occasionally taken at light; (45,63).

1884. *Abraxas grossulariata* (Linn.), The Magpie; NM15,25,26; larvae on *Calluna vulgaris* preferring areas of old deep heather; occurs in compact colonies that are in different places each year; Harrison also records the larvae on *Erica*, *Corylus* & *Salix*; comes readily to light, sometimes in large numbers of up to 94/night; (45,63).

\*1887. *Lomaspilis marginata* (Linn.), Clouded Border; NM15; reared from larvae on *Salix aurita* at Arinagour, ix.1985.

1889. *Semiothisa notata* (Linn.), Peacock Moth; NM26; one only netted on *Salix aurita* at Meall nan Uan, 11.vi.1980; (63).

1906. *Opisthograptis luteolata* (Linn.), Brimstone Moth; NM15,25; occasional specimens disturbed; reared from larvae on *Malus domestica*; (63).

1921. *Crocallis elinguaris* (Linn.), Scalloped Oak; NM25,26; occasionally comes to light; the larvae probably feed on *Calluna vulgaris* since on 21.vii.1982 several freshly emerged females were found drying their wings on a large clump

of heather on open moorland. Bilberry was not present in the area and is, in fact, rather uncommon on the island; Harrison recorded larvae on birch but this is now very rare on the island; (45,63).

1928. *Lycia zonaria* (D. & S.), Belted Beauty; NM15,26; restricted on the machair and dunes where the larvae feed on a wide variety of grasses and herbs, including *Lotus corniculatus*, *Iris pseudacorus* & *Plantago lanceolata*; (22,24,32,38,45,51,62,63). RED DATA BOOK SPECIES.

1938. *Selidosema brunnearia* (Vill.), Bordered Grey; NM26; occasional specimens active by day seen in the northern part of the island; (63).

1941. *Alcis repandata* (Linn.), Mottled Beauty; NM15; Harrison recorded a few near Friesland; (45).

1952. *Ematurga atomaria* (Linn.), Common Heath; NM25; recorded by Harrison as everywhere and from larvae, but recent records confined to a single specimen reared from a larva feeding on *Succisa pratensis* at Loch Ronard, 18.vii.1982; (22,45).

1955. *Cabera pusaria* (Linn.), Common White Wave; recorded by Harrison amongst birch; (22,45).

1956. *C. exanthemata* (Scop.), Common Wave; NM25,26; very local, easily disturbed and occasionally comes to light; (22,45,63).

1963. *Gnophos obfuscatus* (D. & S.), Scotch Annulet; NM15,25,26; widespread, comes to light (up to 44/night); reared from larvae on *Erica cinerea*; (63).

1964. *G. obscuratus* (D. & S.), The Annulet; NM25,26; occasionally comes to light, much less frequent than *G. obfuscatus*; (45,63).

1969. *Dyscia fagaria* (Thunb.), Grey Scalloped Bar; NM26; recorded by Harrison 'on heather, Loch a'Mhill Aird district' in 1947; no subsequent records known; (51).

#### SPHINGIDAE

1981. *Laothoe populi* (Linn.), Poplar Hawk-moth; NM15,25,26; widespread, larvae on *Populus tremula* & *Salix aurita*; (42,45,51,63).

1984. *Macroglossum stellatarum* (Linn.), Humming-bird Hawk-moth; recorded by Harrison as plentiful as an immigrant in 1947; (51).

#### NOTODONTIDAE

1994. *Phalera bucephala* (Linn.), Buff-tip; NM15,25,26; widespread, clutches of larvae on *Salix aurita*, *S. atrocinerea*, *Populus tremula* & *Alnus glutinosa*; (63).

1995. *Cerura vinula* (Linn.), Puss Moth; NM15,25,26; widespread, larvae on *Populus tremula*, *P. nigra*, *Salix aurita* & *S. repens*; (29,45,63).

1997. *Harpya furcula* (Clerck), Sallow Kitten; NM25,26; appears to be very local even though the larvae are on *Salix aurita*; (39,45,63).

2003. *Eligmodonta ziczac* (Linn.), Pebble Prominent; NM25,26; larvae on *Populus tremula*; (63).

2007. *Pheosia tremula* (Clerck), Swallow Prominent; NM15,25,26; widespread, both colour forms of the larva occur on *Populus tremula* on the island; (63).

2008. *Ptilodon capucina* (Linn.), Coxcomb Prominent; NM26; first recorded by Harrison in vi.1947 from Loch Cliad but no recent records; (48,51,54,63).

+ 2017. *Clostera pigra* (Hufn.), Small Chocolate-tip; NM25,26; reared from larvae on *Salix aurita*; not confined to Eilean Ornsay as suggested by Harrison; (40,45,63).

## ARCTIIDAE

2050. *Eilema lurideola* (Zinck.), Common Footman; a single larva found by Harrison 'amongst rocks along Loch Cliad . . . probably belonged to the present species'. Unfortunately he failed to rear it; (51).

2056. *Parasemia plantaginis* (Linn.), Wood Tiger; NM15,26; presumed resident; (45,63).

2057. *Arctia caja* (Linn.), Garden Tiger; NM15,25,26; widespread, regular visitor to light; (38,45,63).

2060. *Spilosoma lubricipeda* (Linn.), White Ermine; NM25,26; comes to light, presumed resident; (45).

2061. *S. luteum* (Hufn.), Buff Ermine; NM25,26; reared from clutches of larvae on *Sorbus aucuparia*; larvae are unusually pale and have also been found on Oak; (63).

2064. *Phragmatobia fuliginosa* (Linn.), Ruby Tiger; NM15,25,26; larvae found feeding on *Salix aurita* and *Molinia caerulea*; (38,45,63).

## NOCTUIDAE

2081. *Euxoa tritici* (Linn.), White-line Dart; NM15,25,26; widespread, a regular visitor to light (up to 100/night); (45,63).

2083. *E. cursoria* (Hufn.), Coast Dart; NM15,26; occasional specimens to light in the machair; (14,63).

2085. *Agrotis vestigialis* (Hufn.), Archer's Dart; NM15,26; comes to light in the machair (up to 40/night); (63).

\*2087. *A. segetum* (D. & S.), Turnip Moth; NM25; occasional specimens to light in Arinagour, vii.1986.

2089. *A. exclamationis* (Linn.), Heart & Dart; NM25,26; comes to light in the north of the island (up to 100/night); (63).

\*2091. *A. ipsilon* (Hufn.), Dark Sword Grass; NM25,26; occasional individuals at light.

2099. *Ochropleura praecox* (Linn.), Portland Moth; NM26; a few taken at light in the northern machair; (63).

\*2102. *O. plecta* (Linn.), Flame Shoulder; NM25,26; occasional specimens to light.

2104. *Standfussiana lucerneae* (Linn.), Northern Rustic; NM15,25,26; widespread as single specimens to light; (63).

2107. *Noctua pronuba* (Linn.), Large Yellow Underwing; NM15,25,26; widespread, comes to light (up to 10/night); Harrison reared it from larvae; (22,45,54,63).

2109. *N. comes* Hübn., Lesser Yellow Underwing; NM25,26; occasional specimens to light; Harrison reared it from larvae; (22,45,63).

2111. *N. janthina* (D. & S.), Lesser Broad-bordered Yellow Underwing; NM26; taken less often at light than *N. comes*; (22).

2117. *Paradiarsia glareosa* (Esp.), Autumnal Rustic; NM25,26; comes to light; Harrison recorded larvae; (22,45,63).

2118. *Lycophotia porphyrea* (D. & S.), True Lover's Knot; NM15,25,26; widespread; comes to light (up to 46/night) and is also active by day; (45,54,63).

2120. *Diarsia mendica* (Fab.), Ingrailed Clay; NM15,25,26; widespread, comes to light in small numbers; (63).

2122. *D. brunnea* (D. & S.), Purple Clay; NM25,26; larvae recorded on various low plants from Coll by Harrison but not seen recently; (22,45).

2124. *D. florida* (Schm.), Fen Square-spot; NM15,25,26; widespread but always in small numbers; (63).

\*2126. *Xestia c-nigrum* (Linn.), Setaceous Hebrew Character; NM26; one to light at Cornaigbeg, 25.vii.1984.

\*2127. *X. ditrapezium* (D. & S.), Triple-spotted Clay; NM26; one to light at Torastan, 21.viii.1984.

2128. *X. triangulum* (Hufn.), Double Square-spot; NM26; one to light at Meall nan Uan, 16.vii.1982; (63).

2130. *X. baja* (D. & S.), Dotted Clay; NM25,26; occasional specimens to light; (45,63).

\*2132. *X. castanea* (Esp.), Neglected Rustic; NM26; occasionally at light.

\*2133. *X. sexstrigata* (Haw.), Six-striped Rustic; NM15,25; widespread but only as occasional specimens to light.

2134. *X. xanthographa* (D. & S.), Square-spot Rustic; NM25,26; comes to light (up to 10/night); (22,45,63).

2135. *X. agathina* (Dup.), Heath Rustic; NM25,26; occasional specimens to light; larvae recorded on heather by Harrison; (45).

2137. *Eurois occulta* (Linn.), Great Brocade; NM26; once only to light; possible immigrant; (63).

2139. *Cerastis rubricosa* (D. & S.), Red Chestnut; recorded by Harrison at sallow catkins in the spring; (22,45).

2142. *Anarta myrtilli* (Linn.), Beautiful Yellow Underwing; NM25,26; reared from larvae on grass, *Erica cinerea* & *Calluna vulgaris*; (45,63).

2147. *Hada nana* (Hufn.), The Shears; NM26; several to light at Torastan, 28.vi.1983; (63).

2160. *Lacanobia oleracea* (Linn.), Bright-line Brown-eye; NM25,26; widespread on heathland, comes to light (up to 10/night); (63).

2163. *Ceramica pisi* (Linn.), Broom Moth; NM15,25,26; occasional imagines to light; larvae widespread on heathland; (22,45,63).

\*2166. *Hadena rivularis* (Fab.), The Campion; NM26; one taken at rest at Bousd, 22.vii.1985.

2171. *H. confusa* (Hufn.), Marbled Coronet; NM15; larvae in seed-capsules of *Silene maritima* in Ben Feall and Hogh Bay area; (63).

2176. *Cerapteryx graminis* (Linn.), Antler Moth; NM15,25,26; widespread, occasionally extremely abundant – on 23.vii.1982, during a mass emergence near Calgary Point, some 20 specimens of *C. graminis* were simultaneously in flight over an area 5 yards square! The whole immediate vicinity was similarly afflicted; (22,45,63).

2177. *Tholera cespitis* (D. & S.), Hedge Rustic; NM25,26; occasional specimens to light; (63).

2186. *Orthosia gracilis* (D. & S.), Powdered Quaker; NM15; imagines at sallow and larvae in spun Meadow Sweet heads recorded by Harrison; (22,38,45).

2187. *O. cerasi* (Fabr.) (= *stabilis* (D. & S.)) Common Quaker; recorded by Harrison at sallow; (22,45).

2188. *O. incerta* (Hufn.), Clouded Drab; recorded by Harrison; (22,45).

2190. *O. gothica* (Linn.), Hebrew Character; recorded by Harrison at sallow; (22,45).

2198. *Mythimna impura* (Hübner), Smoky Wainscot; NM15,25,26; widespread, comes to light; (63).

2216. *Cucullia umbratica* (Linn.), The Shark; NM26; apparently confined to the north end of the island; reared from a larva in the machair; (63).

2225. *Brachylochia viminalis* (Fabr.), Minor Shoulder-knot; NM25,26; occasional specimens to light; larvae beaten from sallow by Harrison; (45,63).

2231. *Aporophyla lutulenta* (D. & S.), Deep-brown Dart; NM26; comes to light (up to 30/night); (63).

\*2232. *A. nigra* (Haw.), Black Rustic; NM25,26; single specimens to light.

\*2241. *Xylena vetusta* (Hübner), Red Sword-grass; NM26; reared from a larva on *Molinia caerulea* near Loch an t-Sagairt, 31.vii.1984.

2243. *Xylocampa areola* (Esp.), Early Grey; NM26; comes to light; larvae 'very abundant on Honeysuckle' in 1947 according to Harrison; (51,63).

\*2250. *Blepharita adusta* (Esp.), Dark Brocade; NM26; several to light at Torastan, vi. 1983.

2254. *Antitype chi* (Linn.), Grey Chi; NM26; comes to light; first recorded by Harrison from larvae on 'mixed herbage' in 1947, also reared from larva on *Iris pseudacorus*; (51).

2263. *Agrochola lota* (Clerck), Red-line Quaker; NM26; once to light; larvae on *Salix aurita* according to Harrison; (45,51).

2270. *Omphaloscelis lunosa* (Haw.), Lunar Underwing; NM26; one to light at Torastan, 8.ix.1985; (15).

\*2273. *Xanthia togata* (Esp.), Pink-barred Sallow; NM25,26; occasional specimens to light.

\*2274. *X. icteritia* (Hufn.), The Sallow; NM26; one to light at Torastan, 20.viii.1984.

2284. *Acronicta psi* (Linn.), Grey Dagger; NM25; larvae on *Sorbus aucuparia*; (63).

2286. *A. menyanthidis* (Esp.), Light Knot Grass; NM25,26; larvae feed on *Arctostaphylos uva-ursi*, *Myrica gale*, *Salix aurita*, *Iris pseudacorus*, *Erica tetralix* & *Calluna vulgaris*; (45,63).

2288. *A. euphorbiae* (D. & S.), Sweet-gale Moth; NM15,25,26; widespread, larvae feed on *Myrica gale*, *Calluna vulgaris*, *Iris pseudacorus*, *Lonicera periclymenum* & *Salix aurita*; (14,15,17,31,37,45).

2289. *A. rumicis* (Linn.), Knot Grass; NM15,25,26; widespread, occasionally comes to light; larvae feed on *Lotus corniculatus*, *Myrica gale*, *Filipendula ulmaria*, *Iris pseudacorus*, *Potentilla anserina*, *Rubus fruticosus*, *Salix repens* & *Populus tremula* suckers; (45,63).

2299. *Amphipyra tragopogonis* (Clerck), Mouse Moth; NM15,25,26; widespread, occasional specimens to light; (45,63).

2303. *Thalophila matura* (Hufn.), Straw Underwing; NM26; occasional specimens to light in the northern part of the island; (63).

\*2305. *Euplexia lucipara* (Linn.), Small Angle Shades; NM25; occasional single specimens to light at Arinagour.

2306. *Phlogophora meticulosa* (Linn.), Angle Shades; NM25,26; larvae on 'various plants, *Salix aurita* etc.' according to Harrison; (51).

\*2318. *Cosmia trapezina* (Linn.), The Dun-bar; NM26; several to light at Torastan, 20.viii.1984.

2321. *Apamea monoglypha* (Hufn.), Dark Arches; NM15,25,26; widespread, comes to light (up to 22/night); (45,63).

\*2322. *A. lithoxyloa* (D. & S.), Light Arches; NM26; single specimens to light at Cornaigbeg on 25 & 29.vii.1984.

2326. *A. crenata* (Hufn.), Clouded-bordered Brindle; NM25,26; occasional specimens at light; (63).

\*2329. *A. furva* (D. & S.), The Confused; NM25; one found dead in a house in Arinagour, 23.vii.1985.

2330. *A. remissa* (Hübner), Dusky Brocade; NM15,25,26; comes to light (up to 11/night); (63).

2337. *Oligia strigilis* (Linn.), Marbled Minor; several recorded by Harrison, but no recent records; (45).

2338. *O. versicolor* (Borkh.), Rufous Minor; NM25; recorded 'at Ragwort, Arinagour' by Harrison, but no recent records; Heslop Harrison's identification of this species is certainly correct bearing in mind that he was the first person to record this species from the British Isles; (45,46).

2340. *O. fasciuncula* (Haw.), Middle-barred Minor; NM15,25; comes to light; also active by day; (63).

+ 2341. *Mesoligia furuncula* (D. & S.), Cloaked Minor; NM25; a single specimen of *f. rufuncula* Haw. recorded by Harrison in 1947, no subsequent records; (51).

2343. *Mesapamea secalis* (Linn.), Common Rustic; NM15,25,26; widespread, comes to light (up to 21/night); male genitalia of some specimens from NM15 & 25 only checked; (22,45,63).

+ \*2343a. *M. secalella* Remm.; NM25; several to light in Arinagour, vii.1986; male genitalia checked.

\*2345. *Photodes minima* (Haw.), Small Dotted Buff; NM25,26; single specimens at light on two occasions.

2350. *P. pygmina* (Haw.), Small Wainscot; NM15,25,26; widespread, comes to light (up to 15/night); (45,63).

2353. *Luperina testacea* (D. & S.), Flounced Rustic; NM15,26; comes to light sometimes in large numbers (up to 118/night); an inhabitant of the machair; (63).

2357. *Amphipoea lucens* (Frey.), Large Ear; NM15,25,26; widespread, regular visitor to light (up to 50/night); (45,63).

2358. *A. fucosa* (Frey), Saltern Ear; NM26; several to light at Torastan 6.viii.1981; (63).

2359. *A. crinanensis* (Burr.) Crinan Ear; NM26; several to light at Torastan, 13.viii.1982; (45,63).

2361. *Hydraecia micacea* (Esp.), Rosy Rustic; NM25,26; comes to light; (45,63).

+ \*2364. *Gortyna flavago* (D. & S.), Frosted Orange; NM25; one to light at Arinagour, 30.ix.1986.

2367. *Celaena haworthii* (Curt.), Haworth's Rustic; NM26; taken near Loch a'Mhill Aird by Harrison; one to light at Torastan 19.viii.1984; (45).

2368. *C. leucostigma* (Hübner.), The Crescent; NM25,26; occasional specimens to light on heathland; (63).

+ 2379. *Coenobia rufa* (Haw.), Small Rufous; NM25; Harrison recorded it as 'taken once, flying in the setting sun, Loch Cliad'; (45).

(2381. *Hoplodrina octogenaria* (Goeze) (= *alsines* Brahm), The Uncertain; recorded by error in Wormell (1983); male genitalia examination of the reputed specimen showed it to be an unusual form of *H. blanda*.)

2382. *H. blanda* (D. & S.), The Rustic; NM15,25,26; widespread, to light; (63).

2389. *Caradrina clavipalpis* (Scop.), Pale Mottled Willow; recorded by Harrison as 'common on flowers' but no recent records; (45).

2394. *Stilbia anomala* (Haw.), The Anomalous; NM15,25,26; widespread, occasional specimens to light; (44,45,63).

2434. *Diachrysa chrysitis* (Linn.), Burnished Brass; NM15,25,26; widespread, to light; (63).

2437. *Polychrysia moneta* (Fab.), Golden Plusia; NM25; Harrison recorded several larvae on Monkshood at Arinagour in 1939; (35,45).

2439. *Plusia festucae* (Linn.), Gold Spot; NM15,25,26; widespread, comes to light; reared from larva on *Iris pseudacorus*; (63).

2441. *Autographa gamma* (Linn.), Silver Y; NM15,25,26; active by day and also comes to light, probably mostly immigrants; (25,45,56,63).

2442. *A. pulchrina* (Haw.), Beautiful Golden Y; NM15,25,26; widespread, comes to light; (63).

+ 2443. *A. jota* (Linn.), Plain Golden Y; NM26; one to light at Torastan, early viii.1981; (63).

2444. *A. bractea* (D. & S.), Gold Spangle; NM26; one to light at A'Chròic, 25.vii.1981; (63).

2450. *Abrostola triplasia* (Linn.), The Spectacle; NM25,26; occasional specimens to light; reared from larvae on *Urtica dioica* (both colour forms of the larva occur on the island); (22,45,63).

2470. *Phytometra viridaria* (Clerck), Small Purple-barred; recorded 'in some numbers in several stations on Coll' by Harrison; no recent records; (45).

\*2474. *Rivula sericealis* (Scop.), Straw Dot; NM25,26; occasional specimens to light.

2477. *Hypena proboscidalis* (Linn), The Snout; NM25; occasional single specimens to light in Arinagour; (22,45,63).

## Conclusions

Some 350 species of Lepidoptera have been recorded from the Isle of Coll, Inner Hebrides. Of these, 77 species are here recorded from Coll for the first time and 40 have not been reported from elsewhere in the Inner Hebrides. The island has a rich lepidopterous fauna and the list includes 4 current or proposed RED DATA BOOK SPECIES and 34 species given the status of 'Notable' in the Nature Conservancy Council's Invertebrate Site Register. Three of the four current or proposed Red Data Book Species, namely *Scrobipalpa murinella*, *Mutuuraia terrealis* and *Lycia zonaria*, are known to be resident on the island. The status of the remaining proposed Red Data Book Species, *Levipalpus hepatariella*, is unknown as also is its life history. This species was however taken on the island on several occasions and in 3 different years, in numbers such as would indicate that it can only be resident.

## Acknowledgments

We are most grateful to Mr E. C. Pelham-Clinton for identifying many of the specimens included in this list.

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2. Covered reprints from recent issues of *Glasg. Nat.*:
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## The Spiders of Fair Isle

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Fair Isle, V.C. 112, Shetland, is a 3km<sup>2</sup> rocky island lying midway between Orkney and Shetland. It is owned by the National Trust for Scotland and is a resting place for a great diversity of migratory birds. The island is surrounded on nearly all sides by sea-cliffs and its central part is mainly heather moorland. In the southern half an extensive area is cultivated by 35 crofting families. Rabbits are common and in several places there are swards of closely cropped turf and Thrift (*Armeria maritima*) on the cliff tops. In damper places there are areas of *Sphagnum* bog and in some places Least Willow (*Salix herbacea*) and a local subspecies of Juniper occur. The highest part, Ward Hill, rises to over 200m and is mainly covered with *Festuca* grassland and heather. In several areas, particularly on Ward Hill, the vegetation does not form a complete ground cover, due in part to erosion.

Few observations on the invertebrate fauna have been published and spider records are sparse, there being only those of Lindroth (1955), Cloudsley-Thompson (1956) and Carpenter (1962) which, taken together, produce a list of 23 species.

The writer visited Fair Isle briefly twice, in early September 1984 and in late July 1985, and collected spiders from various habitats including shingle beaches in the north, cultivated land including pastures and hay meadows, *Sphagnum* bog areas and adjacent heather, sea-cliffs especially where dominated by *Armeria maritima*, Ward Hill and the airfield. A further 23 species were found and these are listed below with all previous records.

The total number of species (46) is low compared with the numbers from Orkney and Shetland and, while further collecting will no doubt increase this total, it is likely that the fauna is limited by isolation and the restricted range of habitats available. The majority of spiders now known from Fair Isle also occur on both Orkney and Shetland and only 4 species have not already been recorded from both island groups. Furthermore, most of the recorded species of Linyphiidae are common on the upper slopes of various high peaks on the Scottish mainland, which seem to

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offer similar habitats. For example 13 of the 28 species recorded from Fair Isle have been found at altitudes of over 500m on Ben Hope (on the N. coast of the mainland) by Merrett (1971).

Two species, *Porrhomma montanum* Jackson and *Entelecara errata* O.P.-Cambridge, occur infrequently in Britain although both are known from other places in N. Europe.

Ashmole (1979), with later records by Hillyard (1977), lists 19 species of Linyphiidae as sub-arctic forms which all occur in Orkney, Shetland, Faeroes and Iceland and twelve of them, marked "A" in the list are now known to occur on Fair Isle. Two of these, *Hilaira frigida* (Thorell) and *Scotinotylus evansi* O.P.-Cambridge, occur on Ward Hill, which at 200m, is one of the lowest recorded localities for them. Whether or not any of the remaining 7 species, or others classed as montane on the mainland, occur on Fair Isle can only be determined by more extensive collecting.

### List of Species

Nomenclature used is that given by Merrett *et al.* (1985). Abbreviations used: A = sub-arctic species (Ashmole, 1979); Carp. = recorded by Carpenter, 1962; Cl-Th. = recorded by Cloudsley-Thompson, 1956; Lind. = recorded by Lindroth, 1955; Miln.'84,'85 = recorded by present author in September 1984 and/or July 1985; NS, NO = not recorded from Shetland and/or Orkney.

#### AMAUROBIIDAE

*Amaurobius fenestralis* (Stroem): Lind., Cl-Th., Miln. '84; at Busta.

#### CLUBIONIDAE

*Clubiona phragmitis* C. L. Koch: Miln. '85; on shingle beach.

*Clubiona trivialis* C. L. Koch: Carp., Cl-Th.

#### THOMISIDAE

*Xysticus cristatus* (Clerck): Carp., Cl-Th.

*Oxyptila trux* (Blackwall): Carp.

#### LYCOSIDAE

*Pardosa palustris* (Linnaeus): Carp., Cl-Th., Miln. '85.

*Pardosa pullata* (Clerck): Cl-Th., Miln. '85.

*Trochosa terricola* Thorell: Cl-Th.

*Pirata piraticus* (Clerck): Cl-Th., Miln. '85.

#### AGELENIDAE

*Textrix denticulata* (Olivier): Carp., Cl-Th., Miln. '85.

*Tegenaria domestica* (Clerck): Cl-Th., Miln. '84.

*Cryphoeca silvicola* (C. L. Koch): Carp., Miln. '84; at Busta.

## THERIDIIDAE

- Robertus lividus* (Blackwall): Miln. '84, '85; at War Hill.  
*Robertus arundineti* (O.P.-Cambridge): Miln. '85; at Airfield.

## TETRAGNATHIDAE

- Tetragnatha extensa* (Linnaeus): Cl-Th.  
*Pachygnatha degeeri* Sundevall: Carp., Cl-Th.  
*Meta segmentata* (Clerck): Carp., Cl-Th.  
*Meta merianae* (Scopoli): Carp., Cl-Th., Miln. '85; at several localities.

## LINYPHIIDAE

- Ceratinella brevipes* (Westring): A; Miln. '84; at Ward Hill.  
*Walckenaeria acuminata* Blackwall: Miln. '84; at Ward Hill.  
*Walckenaeria nudipalpis* (Westring): A; Miln. '85; at Ward Hill.  
*Dicymbium brevisetosum* Locket: NS; Miln., '85; on cultivated land.  
*Entelecara errata* O.P.-Cambridge: NO; Miln. '85; at airfield  
*Hypomma bituberculatum* (Wider): Miln. '85; at N. end of island.  
*Goniatum rubens* (Blackwall): A; Cl-Th.  
*Oedothorax fuscus* (Blackwall): Cl-Th., Miln. '84; at Busta.  
*Savignya frontata* (Blackwall): A; Miln. '84; at Ward Hill.  
*Diplocephalus cristatus* (Blackwall): A; Miln. '85; on cultivated land.  
*Diplocephalus permixtus* (O.P.-Cambridge): A; Miln. '84, '85; on cultivated land.  
*Scotinotylus evansi* (O.P.-Cambridge): A; Miln. '85; at Ward Hill.  
*Erigone dentipalpis* (Wider): Cl-Th., Miln. '84.  
*Erigone atra* (Blackwall): A; Cl-Th., Miln. '84, '85; on cultivated land.  
*Erigone promiscua* (O.P.-Cambridge): Miln. '85; on sea cliffs.  
*Rhaebothorax morulus* (O.P.-Cambridge): A; Miln. '85; on sea cliffs.  
*Leptorhoptrum robustum* (Westring): A; Miln. '85; on sea cliffs.  
*Hilaira frigida* (Thorell): A; Miln. '85; at Ward Hill.  
*Porrhomma montanum* (Jackson): NO; Miln. '85; at Ward Hill.  
*Agyreta subtilis* (O.P.-Cambridge): NS, NO; Carp.  
*Centromerita concinna* (Thorell): Miln. '84; at Ward Hill.  
*Bathyphantes gracilis* (Blackwall): Cl-Th., Miln. '85; at Busta.  
*Poecilonea globosa* (Wider): Miln. '84, '85; at Ward Hill.  
*Lepthyphantes tenuis* (Blackwall): Cl-Th., at several sites.  
*Lepthyphantes zimmermani* Bertkau: A; Miln. '85, '86; at Ward Hill and at Busta.  
*Lepthyphantes menzei* Kulczynski: Cl-Th.  
*Lepthyphantes ericaeae* (Blackwall): Miln. '85; at Ward Hill and at N. end of island.  
*Allomengea scopigera* (Grube): Miln. '84; at Ward Hill.

## Acknowledgments

I am grateful to J. R. Parker and Dr. P. Merrett for identifying some specimens and for checking the identification of others and to Professor John Cloudsley-Thompson for his comments.

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## The Natural History of the Muck Islands, North Ebudes

### 4. Beetles

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Records of beetles from the Inner Hebrides have been summarised by Welch (1983) who gives a full bibliography. Within the Small Isles of Inverness-shire (V.C.104, North Ebudes), Rum (10,000 ha), a National Nature Reserve, has been surveyed thoroughly (Wormell, 1982) and there are probably few beetles beyond the 533 (*sic.*) species recorded remaining to be discovered. Eigg (3,100 ha) and Canna (1,000 ha) have revealed 281 and 184 species respectively but Muck (514 ha), the smallest of the inhabited islands, together with its satellites, Horse Island (21 ha), Lamb Island (2.7 ha) and Eagamol (1.7ha), has, apart from visits by G.H. and J.W.H. Harrison in 1938 and 1939, been almost ignored by coleopterists and only 19 species were named by Welch (1983). The purpose of the present paper is to rectify this gap in the records.

### Methods

From 1977 to 1987 extensive studies of the Coleoptera of the Muck Islands were made, involving over 30 visits varying in duration from one to 20 days. All months, except October, were covered, and all parts of Muck and Lamb Island, except private gardens, were examined. The tidal Horse Island was visited whenever possible and Eagamol, accessible only by boat, was visited three times. The Islands are divided among four 10km squares of the National Grid, NM 37, 38 47 and 48 (Fig. 1) with by far the greatest area and the greatest diversity of habitat occurring in square 47. Consequently this square was worked more intensively and was recorded more completely than the others.

Methods of collecting included sweep-netting and beating of foliage; examination of bark, cliffs, etc.; lifting of stones, logs, driftwood and stranded seaweed; extraction of moss, lichen and litter samples by Tullgren funnel; year-round pit-fall trapping;

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netting and sieving in ponds and streams and the use of an ultra-violet light trap. Identifications were checked where necessary by dissection of genitalia and/or by reference to recognised authorities. Nomenclature follows the check-list of Kloet and Hincks, 1977.

## Results

Species are listed with details of their habitats, distribution and abundance. Indications of their occurrence in other vice-counties of the Inner Hebrides (Welch, 1983) and in the Outer Hebrides (Waterston, 1981) are also included. For completeness, 8 of the 19 species recorded previously, which were not found in the present survey, have been included. These are included in the list by a dagger †.

### List of species

Place names are as in Dobson & Dobson (1985) and Fig. 1; \* = not recorded from Small Isles by Welch (1983); + = recorded from Muck previous to present survey; BB-HH = ms. record in Balfour-Browne card index from material collected by G.H. and/or J.W. Heslop Harrison, (W) such record included by Welch (1983). M = Muck; L = Lamb Island; H = Horse Island; Ea = Eagamol; (C) = Canna; (E) = Eigg; (R) = Rum; (NE) = North Ebudes, V.C.104, but not Small Isles; (ME) = Mid Ebudes, V.C. 103; (SE) = South Ebudes, V.C. 102; (OH) = Outer Hebrides, V.C. 110; 37,38,47,48 = 10km National Grid square (NM).

#### CARABIDAE

- † *Cicindela campestris* L., rec. Harrison (1940); (C,R,E,ME,SE,OH).  
*Cychrus caraboides* (L.) s. *rostratus* (L.), M; 47,48; common in woods and heather; (C,R,E,ME,SE,OH).  
*Carabus arvensis* (Hbst.) s. *silvaticus* Dej., M; 37,47,48; common in woods and heather; (R,E,ME,SE,OH).  
*C. clatratus* L., M: 47,48; few, marshes nr. coast; (C,R,E,ME,OH).  
*C. granulatus* L., M: 37,47,48; locally abundant, in woods, heather and *Phragmites* swamp at Toaluinn; (C,R,E,ME,SE,OH).  
*C. problematicus* Hbst. s. *gallicus* Geh., M; 37,38,47,48; ubiquitous and often abundant on Muck only; (C,R,E,ME,SE,OH).  
+ *Leistus fulvibarbis* Dej., M; 47; uncommon, Port Mor and Central Wood.; prev. rec. Welch (1983); (C,R,E,SE,OH).  
*Nebria brevicollis* (F.), M,H; 38,47; very abundant locally in woods in Muck, few in Horse Is.; (C,R,E,ME,SE,OH).  
*N. salina* Fairm. & Lab., M,H; 38,47; widespread but not numerous (checked R.A. Crowson); (R,E,ME,SE,OH).  
*Notiophilus biguttatus* (F.), M; 47,48; common; (C,R,E,ME,SE,OH).  
*N. substriatus* Wat., M; 48; one near Camas na Cairidh; (C,R,ME,SE,OH).  
*Loricera pilicornis* (F.), M,H; 38,47,48; widespread but not common, mainly in woods; (C,R,E,ME,SE,OH).

- Dyschirius globosus* (Hbst.), M; 37; few near tideline on peninsula N. of Gleann Mhartein; (E,ME,SE,OH).
- Clivina fossor* (L.), M; 47; SW edge of field at Cnoc na Curran only (C,R,E,ME,SE,OH).
- \* *Trechus fulvus* Dej., M,H; 38,47; few, S.W. Muck and Horse Is.; (OH).  
*T. obtusus* Er., M,Ea; 38,47; few, Port Mor Wood, Eagamol; (C,R,E,ME,SE,OH).
- T. quadristriatus* (Schr.), M; 37,38,47; common; (R,ME,SE,OH).
- Bembidion lampros* (Hbst.), M; 47; one near Gallanach; (C,R,E,ME,SE).
- B. tetracolum* Say, M; 48; one, seaweed, Gallanach Beach; (C,R,E,ME,SE,OH).
- B. guttula* (F.), M; 47; few, Square & Wire Park Woods; (R,SE,OH).
- † *B. unicolor* Chaud., rec. Welch (1983); (SE).
- Pterostichus diligens* (Stm.), M; 37,38,47; few near coast; (C,R,E,ME,SE,OH).
- P. madidus* (F.), M,H; 37,38,47,48; ubiquitous and locally abundant; (C,R,E,ME,SE,OH).
- P. melanarius* (Ill.), M,H; 37,38,47,48; often the most abundant carabid in woods and heather; (C,R,E,ME,SE,OH).
- P. niger* (Schall.), M,H; 37,38,47,48; common; (C,R,E,ME,SE,OH).
- P. nigrita* (Pk.), M,H; 38,47,48; common; (C,R,E,ME,SE,OH).
- P. strenuus* (Pz.), M,H,L; 38,48; few in Muck, very abundant in Lamb Is.; (C,R,E,ME,SE,OH).
- Abax parallelepipedus* (P. & M.), M,H; 37,38,47,48; often commonest carabid; (C,R,E,ME,SE,OH).
- Calathus fuscipes* (Goeze), M; 38,47,48; common in woods & heather & on machair at Bagh; (C,R,E,ME,SE,OH).
- C. melanocephalus* (L.), 38,47; few in Muck, locally abundant in Horse Is.; (C,R,E,ME,SE,OH).
- C. mollis* (Marsh.), M; 48; one on Gallanach Beach; (R,E,ME,SE,OH).
- C. piceus* (Marsh), M; 47; common in Port Mor Wood; (R,ME,SE).
- Agonum albipes* (F.), M; 38,48; common, Bagh machair; (R,E,ME,SE,OH).
- A. fuliginosum* (Pz.), M; 47; two, on beach near Pt. Mor; (E,ME,SE,OH).
- A. marginatum* (L.), M; 48; one in seaweed at Gallanach; (C,R,SE,OH).
- A. muelleri* (Hbst.), M; 47; one, mid-Muck; (C,R,E,ME,SE,OH).
- + *Amara aenea* (Deg.), M; 47,48; one on Gallanach Machair, one mid-Muck; prev. rec. Welch (1983); (C,R,E,ME,SE,OH).
- A. aulica* (Pz.), M; 47; one, sheep fank S. of Gallanach; (E,SE,OH).
- A. bifrons* (Gyll.), M; 47; few, S.W. edge of field at Cnoc na Curran; (C,ME,SE,OH).
- A. plebeja* (Gyll.), M; 47,48; few, heather; (E,SE).
- Harpalus rufipes* Deg., M; 47; two, S.W. edge of field at Cnoc na Curran; (C,R,E,ME,SE,OH).
- H. affinis* (Schr.), M; 47; one in house at Port Mor; (C,R,E,SE).
- H. latus* (L.), M; 47,48; one in Port Mor Wood, one above beach S. of Am Maol; (C,R,E,ME,SE,OH).
- Bradycellus ruficollis* (Steph.), M; 47; one in heather; (R,ME,OH).
- Badister bipustulatus* (F.), M; 47; one in moss, Wire Park Wood; (C,E,ME,SE,OH).

## HALIPLIDAE

- † *H. lineaticollis* (Marsh.), rec. BB-HH (W); (R,E,ME,SE,OH).  
 + *H. ruficollis* (Deg.), M; 47; one in Central Lochan E.; prev. rec. BB-HH(W); (C,R,E,ME,SE,OH).

## DYTISCIDAE

- + *Hygrotus inaequalis* (F.), M; 47; common in Central Lochans E. & W.; prev. rec. BB-HH(W); (C,R,E,ME,SE,OH).  
 + *Hydroporus erythrocephalus* (L.), M,H; 38,47; common, in lochans and marshes; prev. rec. BB-HH(W); (R,E,ME,SE,OH).  
 + *H. gyllenhalii* Schdt., M; 47,48; one in Central Lochan E., one in swamp at Blar Mor; prev. rec. BB-HH(W); (R,E,ME,SE,OH).  
*H. nigrita* (F.), M: 47; few, bog N. of Beinn Airein; (R,E,ME,SE,OH).  
 + *H. obscurus* Strm., M; 47; few in Central Lochan E.; prev. rec. BB-HH(W); (C,R,E,ME,SE,OH).  
*H. palustris* (L.), M; 47; one in Central Lochan E.; prev. rec. BB-HH; (E,ME,SE,OH).  
 + *H. pubescens* (Gyll.), M,L; 48; few, pools near Camas na Cairidh & on Lamb Is.; prev. rec. BB-HH(W); (C,R,E,ME,SE,OH).  
 † *H. tessellatus* Drap., rec. BB-HH(W); (E,ME,SE,OH).  
 † *Agabus arcticus* (Pk.), rec. BB-HH(W); (R,E,ME,SE,OH).  
*A. bipustulatus* (L.), M; 47; common, pools; (C,R,E,ME,SE,OH).  
 †\* *A. melanocornis* Zimm., rec. BB-HH; (NE,ME,OH).  
*A. sturmi* (Gyll.), M; 47,48; one in Central Lochan W., one in swamp E. of Bagh; (E,ME,SE,OH).  
*Rhantus bistriatus* (Bergs.) Brit. auctt., M; 47; few, Central Lochan E.; (C,R,E,ME,SE,OH).  
 \* *Colymbetes fuscus* (L.), M; 47; common, Central Lochan E.; (NE,ME,SE,OH).  
*Acilius sulcatus* (L.), M; 47,48; few, Central Lochan E., Am Maol Loch.; (R,E,ME,SE,OH).  
*Dytiscus marginalis* (L.), M; 47; two, Central Lochan E.; (C,ME,SE,OH).  
*D. semisulcatus* O.F.Mull., M; 47; two, Central Lochan E.; (C,R,E,ME,SE,OH).

## GYRINIDAE

- Gyrinus caspius* Men., M.47; swamp, Beul nan Fang; (R,SE,OH).  
*G. minutus* F., M; 48; common, Am Maol Loch.; (R,E,ME,SE,OH).  
*G. substriatus* Steph., M,L; 47,48; common, Central Lochans & Aird nan Uan pool. Two were aberrant; a male from Central Lochan E. had raised areas around each elytral stria puncture and a female from Aird nan Uan had a dull appearance entirely due to punctures: it could have been teneral or lacking pigment (G.N. Foster, in litt.); prev. rec. BB-HH; (C,R,E,ME,SE,OH).

## HYDROPHILIDAE

- \* *Helophorus aquaticus* (L.), M; 48; two near Camas na Cairidh; (NE,ME,SE,OH).  
*H. brevipalpis* Bed., M; 47; one in Square Wood and one at S.W. edge of field at Cnoc na Curran; (C,R,E,ME,SE,OH).

- H. flavipes* (F.), L; 48; one in stagnant pool; (R,ME,SE,OH).  
 + *Sphaeridium scarabaeoides* (L.), M; 48; in cow dung; prev. rec. Welsh (1983); (C,R,ME,SE,OH).  
*Cercyon depressus* Steph., M,L; 47,48; in stranded seaweed, Camas Mor & Lamb Is.; (R,E,ME,OH).  
*C. lateralis* (Marsh.), M; 47; carrion, Druim Mor; (C,R,E,ME,SE).  
*C. littoralis* (Gyll.), M; 48; common in seaweed, Camas Mor; (C,R,E,ME,SE,OH).  
*C. melanocephalus* (L.), M; 47; Camas Mor; (C,R,E,ME,SE,OH).  
*C. pygmaeus* (Ill.), M; 47; sheep dung, Camas Mor; (C,ME,SE,OH).  
*Megasternum obscurum* (Marsh.), M,L,H; 37,38,47,48; common; (C,R,E,ME,SE,OH).  
*Hydrobius fuscipes* (L.), M,L; 47,48; widespread but not numerous; (C,R,E,ME,SE,OH).  
*Anacaena globulus* (Pk.), M,H; 38,47,48; common; (R,E,ME,SE,OH).  
*Laccobius bipunctatus* (F.), M; 48; one, swamp S.E. of Gallanach Beach; (R,ME,SE,OH).  
*Enochrus quadripunctatus* (Hbst.), M,H; 38,47; one each in Central Lochan E. & swamp on Horse Is.; prev. rec. BB-HH(W); (C,R,E,ME,SE,OH).  
 † *Chaetarthria seminulum* (Hbst.), rec. BB-HH(W); (R,ME,SE,OH).

## HISTERIDAE

- Saprinus semistriatus* (Scriba), M; 47; one on dead lamb in Wire Park Wood; (C,E,ME).  
*Hister striola* Sahl., M; 47; few, dead lamb in Square Park; (R,E).

## HYDRAENIDAE

- † *Ochthebius bicolon* Germ., rec. BB-HH(W); (ME,SE).  
 † *O. dilatatus* Steph., rec. Welsh (1983); (ME,OH).  
*Limnebius truncatellus* (Thnb.), M; 47; two near Central Wood; (R,E,ME,SE,OH).

## PTILIIDAE (all species determined by C. Johnson)

- \* *Ptenidium formicetorum* Kr., M; 47; few in Square Wood; (SE).  
*Acrotrichis atomaria* (Deg.), M; 47; abundant in Square Wood; (R,ME,SE,OH).  
*A. intermedia* (Gillm.), M; 47; few in Square Wood; (R,ME,SE,OH).

## LEIODIDAE

- \* *Triarthron maerkeli* Märk., M; 47; one in Central Wood; (ME).  
*Agathidium laevigatum* Er., M; 47; few in Square Wood; (C,OH).  
 \* *Ptomaphagus subvillosus* (Goeze), M; 47; few in Square Wood; (SE).  
*Nargus velox* (Spence), M; 47; common in Central Wood; (R,ME,SE).  
*Sciodrepoides watsoni* (Spence), M; 47; on dead bird, Camas Mor; (C,R,SE,OH).  
 \* *Catops coracinus* Kelln. M; 47; common in Central Wood.  
 \* *C. fuliginosus* Er., M,H; 38,47,48; Port Mor Wood, Am Maol, Uchd a' Ghralair, common on Horse Is.; (ME,OH).  
*C. tristis* Pz., M; 47; in Central & Rock Park Woods; (C,R,ME,SE,OH).

## SILPHIDAE

- Nicrophorus investigator* Zett., M; 38,47; common; (C,R,E,ME,SE,OH).  
*N. vespilloides* Hbst. M; 47; one on dead buzzard; (R,ME,SE,OH).  
*Necrodes littoralis* (L.), M; 48; one, at light, Toaluinn; (R,ME).  
*Thanatophilus rugosus* (L.), M; 47; on dead bird; (C,R,E,ME,SE,OH).  
*Silpha atrata* (L.), M,H; 38,47,48; common, brown form (*brunnea* Hbst.)  
 outnumbered black form 2:1; (C,R,E,ME,SE,OH).

## SCYDMAENIDAE

- Neuraphes elongatulus* (M. & K.), M; 37,47; few on ground vegetation;  
 (R,SE).  
*Stenichnus collaris* (M. & K.), M,H; 38,47; Central Wood & Horse Is.;  
 (R,ME,SE,OH).

## STAPHYLINIDAE

- \* *Micropeplus staphylinoides* (Marsh.), M,H; 38,47; few in Central Wood,  
 abundant in Horse Is.; (OH).  
*Megarthus depressus* (Pk.), M; 48; one near Camas na Cairidh;  
 (C,R,ME,SE,OH).  
*Proteinus brachypterus* (F.), M; 47; one in Port Mor Wood; (R,ME,OH).  
*Olophrum piceum* (Gyll.), M,H,L; 37,38,47,48; common, abundant on  
 Lamb Island; (E,SE,OH).  
*Acidota crenata* (F.), M,H; 38,47; few in Rock Park Wood and on Horse  
 Is.; (R,E,ME,OH).  
 \* *A. cruentata* Man., M; 47; few in Central Wood.  
*Omalium laeviusculum* Gyll., M,L; 38,47; on beach and in stranded  
 seaweed; (R,ME,SE,OH).  
*O. riparium* C. G. Thoms., M; 47,48; on beach and in stranded seaweed;  
 (R,ME,SE,OH).  
*O. rivulare* (Pk.), M; 47; on dead lamb by Square Wood;  
 (R,E,ME,SE,OH).  
*O. septentrionis* C. G. Thoms., M; 47; one in Central Wood; (R,OH).  
*Anotylus maritimus* C.G. Thoms., M; 48; one in stranded seaweed on  
 Gallanach Beach; (R,ME,SE,OH).  
*A. rugosus* (F.), M; 47,48; widespread, not numerous; (R,E,ME,SE,OH).  
*A. tetracarinatus* (Block), M; 47; one in Square Wood;  
 (C,R,E,ME,SE,OH).  
*Oxytelus laqueatus* (Marsh.), M; 47; few, sheep dung; (C,R,ME,SE,OH).  
*Stenus brunripes* Steph., M,L; 47,48; few, widely distributed;  
 (R,ME,SE,OH).  
 \* *S. canescens* Rosen., M; 47; one near Central Lochan E.  
*S. clavicornis* (Scop.), M; 47; few but widespread; (C,R,E,ME,SE,OH).  
*S. impressus* Germ., M; 47,48; widespread, infrequent; (R,ME,SE,OH).  
*S. juno* (Pk.), M; 47; one in Central Wood; (R,ME,SE,OH).  
*S. nanus* Steph., M; 48; one near Camas na Cairidh; (R,ME,OH).  
*S. nitidiusculus* Steph., M; 47,48; few, widespread; (C,R,ME,SE,OH).  
*S. picipes* Steph., M; 47; one by sweeping; (C,R,ME,OH).  
*S. similis* (Hbst.), M; 47; few at S.W. edge of Cnoc na Curran;  
 (C,R,E,SE,OH).  
*Euaesthetus bipunctatus* (Ljungh), M; 47; one at Port Mor; (R).

- Lathrobium brunnipes* (F.), M; 47; few, widespread; (R,E,ME,SE,OH).
- \* *L. elongatum* (L.), M; 38,47; widespread but infrequent; (OH).
- L. fulvipenne* (Gr.), M; 47; few in Central Wood; (R,E,ME,SE,OH).
- Othius myrmecophilus* Kies., M, H; 38,47,48; widespread but infrequent; (R,ME,SE,OH).
- O. punctulatus* (Goeze), M,H; 37,38,47,48; ubiquitous, locally abundant; (C,R,E,ME,SE,OH).
- Gyrophypnus fracticornis* (O.F.Mull.), M; 38; two on machair at Bagh; (R,ME,SE,OH).
- Xantholinus glabratus* (Gr.), M; 38,48; few, beach and machair; (C,E,ME,SE,OH).
- X. linearis* (Ol.), M,H,L; 38,48; few, widespread; (C,R,E,ME,SE,OH).
- Philonthus fimetarius* (Grav.), few in Central & Square Woods; (R,E,ME,SE,OH).
- P. laminatus* (Creutz.), M; 47; common; (R,E,ME,SE,OH).
- P. mannerheimi* Fvl., M; 38,47; few; (det. confirmed by R.A. Crowson); (R,E).
- \* *P. marginatus* (Strom), M; 47; one near Central Wood, one on carrion Druim Mor; (ME,SE,OH).
- P. sordidus* (Grav.), M; 47; one on dead sheep at Druim Mor; (R,ME,SE,OH).
- P. succicola* C. G. Thoms., M,H; 38; few on machair at Bagh and near shore on Horse Is.; (R,E,ME,SE,OH).
- P. varians* (Pk.), M; 47; one in carrion at Druim Mor, one in Square Wood; (C,R,E,ME,SE,OH).
- Gabrius trossulus* (von Nord.), M; 48; few at Toaluinn & near Camas na Cairidh; (R,OH).
- Cafius xantholoma* (Gr.), M; 48; few on stranded seaweed on Gallanach Beach; (R,E,ME,SE,OH).
- Staphylinus aeneocephalus* Deg., M,H; 38,47,48; widespread, locally abundant; (C,R,E,ME,SE,OH).
- S. ater* Grav., H; 38; few; (C,OH).
- S. erythropterus* L., M,H; 37,38,47,48; very common; (C,R,ME,SE,OH).
- S. olens* O.F. Mull., M,H,Ea; 37,38,47; common; (E,ME,SE,OH).
- Creophilus maxillosus* (L.), M; 47,48; few; (C,R,E,ME,SE,OH).
- Quedius curtipennis* Bern., M,H; 37,38,47,48; common; (R,SE,OH).
- Q. maurorufus* (Gr.), H; 38; one specimen; (R,ME).
- Q. molochinus* (Gr.), M; 47,48; few; (C,R,E,ME,SE,OH).
- Q. nitipennis* (Steph.), M,L; 48; one on machair at Bagh & one on Lamb Is.; (R,ME,SE,OH).
- Q. tristis* (Gr.), M,H; 38,47; common; (C,R,E,ME,SE,OH).
- Mycetoporus lepidus* (Gr.), M,H; 38,47; one each on Horse Is. and at Port Mor; (R,E,ME,OH).
- \* *M. punctus* (Gr.), M; 47; one in Central Wood.
- M. splendendus* (Gr.), H; 38; one on Horse Is.; (R,ME,SE,OH).
- \* *Bolitobius analis* (F.), M,H; 47; one in Port Mor Wood & one in Horse Is.
- Tachyporus atriceps* Steph., M; 38,47; one in Port Mor Wood & one on machair at Bagh; (R,E,ME,SE,OH).
- T. chrysomelinus* (L.), M; 47,48; widespread; (C,R,E,ME,SE,OH).
- T. nitidulus* (F.), H; 38; three on Horse Is., (C,R,OH).

- T. pusillus* Gr., M; 47; one in Central Wood; (C,E,ME,SE,OH).  
 \* *Tachinus corticinus* Gr., M; 47; one near Central Wood.  
*T. elongatus* Gyll., M; 47; few in Central Wood; (R,E,ME,SE,OH).  
*T. laticollis* Gr., M,L; 47,48; common in woods & under stranded seaweed; (R,E,ME,SE,OH).  
*T. marginellus* (F.), 37,38,47,48; common; (C,R,E,ME,SE,OH).  
 + *T. signatus* Gr., M,H; 38,47; common, most abundant staphylinid in Central Wood; prev. rec. Welch (1983); (C,R,E,ME,SE,OH).  
 \* *Encephalus complicans* Steph., M; 47; one each in Central & Wire Park Woods.  
*Autalia impressa* (Ol.), M; 47; one in Rock Park Wood; (R,ME,SE,OH).  
*A. rivularis* (Gr.), M; 47; few in cow dung and moss; (R,ME,SE,OH).  
 \* *Falagria thoracica* Steph., M; 47; one near shore on W. coast; (NE).  
*Amischa cavifrons* (Shp.), M; 47; common in moss above Port Mor; (R,E,ME,SE,OH).  
*Geostiba circellaris* (Gr.), M; 47; common in woods; (C,R,E,ME,SE,OH).  
 \* *Dinaraea angustula* (Gyll.), M; 47; few in woods.  
 \* *Liogluta granigera* (Kies.), M; 47; both sexes in Rock Park Wood.  
 \* *L. longiuscula* (Gr.), M; 47; few in woods; (NE).  
 \* *Atheta hepatica* (Er.), M; 47; few in Central Wood; (NE,ME).  
*A. monticola* (C. G. Thoms.), M; 47; one in Central Wood; (R,E).  
*A. indubia* (Shp.), M; 47; few in woods; (R,ME).  
 \* *A. clientula* (Er.), M; 47,48; few but widespread; (SE).  
*A. atramentaria* (Gyll.), M; 47; in dung & woodland litter; (R,E,ME,SE,OH).  
*A. longicornis* (Gr.), M; 47; few in dung; (R,E,ME,SE,OH).  
*A. vestita* (Gr.), L; 38; one under stranded seaweed; (R,E,ME,SE,OH).  
*Drusilla canaliculata* (F.), M; 37,47; few but widely distributed in heather; (R,E,ME,SE,OH).  
 \* *Ilyobates subopacus* Palm, M; 47,48; few by Central Wood & below Toaluinn.  
 \* *Oxypoda lividipennis* Mann., M,H; 38,47; few; (SE,OH).  
*Aleochara algarum* Fvl., M; 47; in stranded seaweed, Camas Mor; (R,E,ME,OH).  
*A. bipustulata* (L.), M; 48; common on Gallanach Beach; (E,ME,SE,OH).  
*A. lanuginosa* Gr., M; 47,48; in cow dung at Camas Mor & over beach S. of Am Maol; (C,R,E,ME,SE,OH).  
*A. obscurella* Gr., M; 38; one on machair at Bagh; (R,ME,SE,OH).

#### PSELAPHIDAE

- Bryaxis bulbifer* (Reich.), M; 47; common in woods; (C,R,E,ME,SE,OH).  
 \* *Pselaphus heisei* (Hbst.), M; 47,48; few near shore; (ME).

#### GEOTRUPIDAE

- Geotrupes stercorosus* (Scriba), M; 47,48; common; (R,E,ME,SE,OH).

#### SCARABAEIDAE

- Colobopterus fossor* (L.), M; 37,47; few near shore; (C,R,ME,SE,OH).  
*Aphodius ater* (Deg.), M; 37,47,48; common; (C,R,E,ME,SE,OH).  
*A. contaminatus* (Hbst.), M; 47; one in Port Mor Wood; (R,E,SE,OH).

- A. depressus* (Kug.), M; 47,48; widespread, red & black forms present; (C,R,E,ME,SE,OH).  
*A. fimetarius* (L.), M; 47,48; few, widespread; (C,R,E,ME,SE,OH).  
*A. rufus* (Moll), M; 47; one on dead sheep, Druim Mor; (R,ME,SE,OH).  
*A. sphacelatus* (Pz.), M; 47,48; common; (E,ME,SE,OH).  
*Serica brunnea* (L.), M; 37,47,48; common; (C,R,E,ME,SE,OH).

## DASCILLIDAE

- Dascillus cervinus* (L.), M; 47,48; abundant; (C,R,E,ME,SE,OH).

## SCIRTIDAE

- Cyphon hilaris* Nyh., M; 47,48; common; (R,ME,SE,OH).  
*C. padi* (L.), M; 47; common in Central Wood; (R,E,ME,SE,OH).  
*C. variabilis* (Thnb.), M; 47; common in Central Wood; (R,E,ME,SE).

## BYRRHIDAE

- Simplocaria semistriata* (F.), M; 47; few in woods; (R,E,ME,SE,OH).  
*Cylitus sericeus* (Forst.), M,L; 38,48; few near coast; (E,ME,SE,OH).  
*Byrrhus pilula* (L.), M; 47; one elytron in Kestrel pellet; (R,ME,SE,OH).

## DRYOPIDAE

- \* *Dryops ernesti* des Goz., M; 47,48; few, near shore; (SE).

## ELATERIDAE

- \* *Cidnopus aeruginosus* (Ol.), M,H; 38,47; few locally.  
*Athous haemorrhoidalis* (F.), M,H; 38,47,48; common; (C,R,ME,SE,OH).  
*A. hirtus* (Hbst.), M; 47; few; (C,E,ME,SE).  
*Ctenicera cuprea* (F.), M,L; 38,47,48; few, (R,ME,SE,OH).  
\* *Actenicerus sjaelandicus* (O. F. Mull.), M; 38; few near Bagh; (OH).  
*Selatosomus incanus* (Gyll.), M; 47; few in woods; (C,R,ME,SE,OH).  
*Agriotes obscurus* (L.), M,L; 37,47,48; common; (R,E,ME,SE,OH).  
*Dalopius marginatus* (L.), M; 38; one at Bagh; (C,R,E,ME,SE,OH).

## CANTHARIDAE

- Cantharis pallida* Goeze, M; 47,48; few, widespread; (R,ME,SE).  
*Rhagonycha femoralis* (Brulle), M; 37; one at Achadh na Creige; (R,ME,SE,OH).  
*R. lignosa* (O. F. Mull.), M; 47; one in Central Wood; (R,E,ME,SE).

## ANOBIIDAE

- Anobium punctatum* (Deg.), M; 47; common in buildings; (C,R,E,ME,SE,OH).

## NITIDULIDAE

- Brachypterus urticae* (F.), M; 47; common, nettles; (C,R,E,ME,SE,OH).  
*Meligethes aeneus* (F.), M; 47,48; common, charlock; (C,R,ME,SE,OH).  
*M. viridescens* (F.), M; 47; few on charlock; (R,E,SE,OH).  
*Epuraea aestiva* (L.), M; 47; few in Central and Port Mor Woods; (C,R,E,ME,SE,OH).  
*Nitidula bipunctata* (L.), M; 47,48; few on carrion; (R,ME,SE,OH).

## RHIZOPHAGIDAE

*Rhizophagus dispar* (Pk.), M; 47; few in Central Wood; (R,ME,SE,OH).

## CRYPTOPHAGIDAE

*Cryptophagus dentatus* (Hbst.), M; 48; one near Camas na Cairidh;  
(C,R,E,ME,SE,OH).

\* *Atomaria berolinensis* Kr., M; 47; few in Square Wood (det. C. Johnson);  
(OH).

*A. nitidula* (Marsh.), M; 47; few in Square Wood (det. C. Johnson);  
(R,ME,SE,OH).

## COCCINELLIDAE

\* *Nephus redtenbacheri* (Muls.), M; 47; one on heather; (ME,OH).

*Aphidecta obliterated* (L.), M; 47; few in Central Wood; (R,ME,SE).

\* *Coccinella septempunctata* (L.), M; 47; one at Camas Mor; (NE).

\* *Propylea quattuordecimpunctata* (L.), M; 47; one at Port Mor.

## LATHRIDIIDAE

\* *Stephostethus lardarius* (DeG.), M; 48; few in rough grass; (SE).

*Aridius nodifer* (West.), M; 47,48; common; (C,R,ME,SE,OH).

*Lathridius minutus* (L.), M; 47; one near Central Wood; (C,SE,?OH).

\* *Corticaria umbilicata* (Beck), H; 38; one near shore.

## MYCETOPHAGIDAE

*Typhaea stercorea* (L.), M; 47; one in Square Wood; (R,SE).

## SALPINGIDAE

*Rhinosimus planirostris* (F.), M; 47; one in Square Wood; (R,SE).

## CHRYSOMELIDAE

*Plateumaris discolor* (Pz.), M; 47; common, lochans; (C,R,E,ME,SE,OH).

*Chrysolina staphylea* (L.), M; 37,38; few; (C,R,ME,OH).

*Gastrophysa viridula* (Deg.), common on *Rumex*; (C,ME,SE).

*Phaedon tumidulus* (Germ.), M; 47; few on *Heracleum sphondylium*;  
(C,E,ME,SE).

*Lochmaea suturalis* (C. G. Thoms.), M; 47; few on heather;  
(C,R,ME,SE,OH).

\* *Phyllotreta flexuosa* (Ill.), H; 38; one near swamp.

*Longitarsus luridus* (Scop.), M; 47; common locally; (C,R,E,ME,SE,OH).

*L. succineus* (Foud.), M; 47; common on grass; (C,E,ME,OH).

*Crepidodera ferruginea* (Scop.), M; 47,48; on Gallanach Beach & in hay  
in Wire Park; (C,E,OH).

*C. transversa* (Marsh.), M; 47; abundant in Beul nam Fang; (R,E,ME).

*Chaetocnema hortensis* (Fourc.), M; 47; few, widespread; (E,SE,OH).

*Psylliodes napi* (F.), M; 47; one in Port Mor Wood; (R,SE).

## APIONIDAE

*Apion curtirostre* Germ., H; 38; few; (C,R,ME,SE).

- A. violaceum* W. Kirby, M; 47; one at edge of field N. of Central Wood; (C,R,E,ME,SE).  
*A. carduorum* W. Kirby, M; 47; one at S. W. edge of field Cnoc na Curran; (ME,OH).  
*A. assimile* W. Kirby, M; 47,48; few in Wire Park & at Toaluinn; (C,R,ME).

## CURCULIONIDAE

- Otiorhynchus arcticus* (O.F.), M,H; 38,47; common; (C,R,E,ME,SE,OH).  
*O. rugifrons* (Gyll.), M; 38; one on machair at Bagh; (R,SE,OH).  
*O. singularis* (L.), M,H; 38,47,48; common; (C,R,E,ME,SE,OH).  
*O. sulcatus* (F.), M,H; 38,47,48; common; (C,R,E,ME,SE,OH).  
 \* *Sciaphilus asperatus* (Bons.), M; 47; few in Central Wood; (NE,SE).  
*Strophosomus melanogrammus* (Forst.), M; 47,48; few; (R,E,ME,SE,OH).  
*Philopedon plagiatum* (Schal.), M; 48; two on Gallanach Machair; (R,E,ME,SE,OH).  
*Barynotus moerens* (F.), M; 47; locally common; (C,R,ME,OH).  
*B. squamosus* Germ., M; 47,48; few, widespread; (C,R,E,ME,SE,OH).  
 \* *Tropiphorus terricola* (Newman), M; 47; one in Square Wood.  
*Sitona lepidus* Gyll.; M; 37,47; locally common; (C,R,E,ME,OH).  
 \* *S. sulcifrons* (Thnb.), M; 47; in hayfield; (ME,SE).  
*Hypera plantaginis* (Deg.), M; 47; one at Camas Mor; (C,R,E,ME,SE,OH).  
*H. punctata* (F.), M; 47; one at Camas Mor; (C,R,ME,SE,OH).  
*H. rumicis* (L.), M; 47; common locally on *Rumex*; (R,E).  
 \* *Alophus triguttatus* (F.), M; 48; few near N. coast; (NE,SE,OH).  
*Hylobius abietis* (L.), M; 47; few in Central Wood; (R,ME).  
 \* *Leiosoma deflexum* (Pz.), M; 47; one on carrion beside Square Wood & one at S. W. edge of field at Cnoc na Curran; (NE,SE,OH).  
 \* *Pentarthrum huttoni* Woll., M; 47; several in house at Port Mor.  
*Mesites tardii* (Curt.), M; 48; one dead in flotsam timber on Aird nan Uan; (R,ME,OH).  
 \* *Caulotrupodes aeneopiceus* (Boh.), one in house at Port Mor; (OH).  
 \* *Orthochaetes setiger* (Beck), M; 47; one in Central Wood.  
*Micrelus ericae* (Gyll.), M; 47; one by Central Lochan E.; (C,R,E,ME,SE,OH).  
*Cidnorhinus quadrimaculatus* (L.), M; 47; few; (C,R,ME,SE).  
*Ceutorhynchus contractus* (Marsh.), M; 47; common at S.W. edge of field at Cnoc na Curran; (C,R,E,ME,SE,OH).  
 \* *C. litura* (F.); M; 47; few, in Wire Park & N. of Central Wood.  
*C. pollinarius* (Forst.), M; 47; one at Camas Mor; (R,SE,OH).  
*C. quadridens* (Pz.), M; larvae in Muck-grown turnip petioles; (E,ME,OH).  
*Rhinoncus pericarpus* (L.), M,H; 38,48; few near beach; (R,ME,OH).  
*Phytobius quadrituberculatus* (F.), M; 47; few in Square Wood; (R,E,OH).

## SCOLYTIDAE

- Hylurgops palliatus* (Gyll.), M; 47; one in Rock Park Wood; (R,ME).  
 \* *Hylastes brunneus* Er., M; 47; one in pine bark, Central Wood.  
*Tomicus piniperda* (L.), M; 47; in pine bark, Central Wood; (R,OH).

## Discussion

Altogether 289 species have been recorded from the Muck Islands. Of these, 17 appear not to have been recorded from either the Inner or Outer Hebrides, and 6 were previously known, within these areas, from the Outer Hebrides only. Within the Inner Hebrides, 37 species are new to V.C. 104 and a further 9 had not been recorded from the Small Isles. Amongst the Small Isles, 82 known species are common to all four main islands (Rum, Eigg, Canna and Muck). Muck has 210 recorded species in common with Rum, 152 with Eigg and 120 with Canna. Hitherto only Rum amongst the Inner Hebrides has had its total beetle fauna studied in detail (Welch, 1983) so the data from Muck invite comparison.

Rum, although only 9km from Muck, differs from it in many ways. It is about 18 times as large and is more varied geologically having extensive areas of Torridonian sandstone and some Triassic limestone in addition to the Tertiary igneous rocks which are almost ubiquitous in Muck. Rum, with several peaks reaching 700m and most of its area exceeding 150m, is essentially mountainous whereas Muck is low and mostly lies below 50m. Rum is also far wetter and its rainfall (250-300cm p.a. – Wormell, 1983) is more than double that of Muck (122cm p.a. – MacEwen, 1985). Both islands have areas of boulder clay, shell-sand enriched soils and extensive *Agrostis/Festuca* grasslands but impoverished wet grasslands, heather moorlands and areas of blanket bog are proportionately much more extensive on Rum than on Muck where a greater percentage of the land has been utilised for arable farming and grazing.

Rum has lochans of up to 2.42ha in area (Wormell, 1983) and has a well-developed river system associated with extensive alluvial deposits; the largest area of standing water on Muck is less than 0.4ha in area and drainage is through a few small burns. Both islands are largely devoid of natural woodland but have been subjected to extensive planting operations during the last few decades. In Rum the policy has been to recreate woodland and scrub habitats of native species whereas in Muck the emphasis has been on utilitarian species such as alien conifers and sycamore.

As might be expected, the greater area and habitat diversity of Rum supports a somewhat more varied flora than that of the Muck Islands with 470 recorded species of flowering plants and ferns on Rum (Wormell, 1983) compared to 400+ species on the latter

(Dobson & Dobson, 1986). The known beetle fauna of the Muck Islands (289 species) also seems considerably less rich than that of Rum (533 species) although closely comparable to that of Eigg (281 species) its nearest neighbour.

Apart from differences in absolute numbers of species in the Muck group and Rum, there were considerable differences in the relative abundances of numerous species, even amongst those usually regarded as common and generally distributed. For instance, the ground fauna of many sites in Muck was dominated by the carabids *Abax parallelepipedus* and *Pterostichus melanarius*, yet both these were uncommon on Rum. *Carabus clatratus*, *C. granulatus*, *Calathus fuscipes*, *Hygrotus inaequalis*, *H. erythrocephalus*, *Megasternum obscurum*, *Micropeplus staphylinoides*, *Philonthus mannerheimi*, *Staphylinus aeneocephalus*, *S. olens*, *Quedius tristis*, *Tachinus signatus*, *Geotrupes stercorosus*, *Serica brunnea*, *Agriotes obscurus*, *Meligethes aeneus*, *Sitona lepidus*, *Hypera rumicis* and *Micropeplus staphylinoides* were all common on Muck but were rare or relatively uncommon on Rum. In contrast, *Cicindela campestris*, *Elaphrus cupreus* and *Broscus cephalotes*, all common on Rum, were not found on the Muck Islands although the first-mentioned was present earlier (Harrison, 1940), and the following, all common on Rhum, seemed rare on Muck: *Agonum muelleri*, *Amara aenea*, *Harpalus latus*, *Megarhtrus depressus*, *Proteinus brachypterus*, *Dalopius marginatus*, *Rhagonycha femoralis*, *R. lignosa*, *Lochmaea suturalis* and *Micrelus ericae*.

The three satellites of Muck are much smaller than the main island and present widely contrasting and much less diverse botanical environments. As might be expected, their beetle faunas were less varied too. Some differences in species predominance were worthy of special note. *Carabus problematicus* and *C. granulatus*, both common and widespread on Muck were confined to this island whereas *Abax parallelepipedus* and all the *Pterostichus* spp. except *P. diligens* were common on both Muck and Horse Island. *Calathus melanocephalus* and *Micropeplus staphylinoides*, though present on Muck in small numbers, were abundant on Horse Island and the former was dominant at several sites there. *Olophrum piceum*, though common on both Horse Island and Muck was exceptionally abundant on Lamb Island.

## Acknowledgments

I am grateful to Mr and Mrs Lawrence MacEwen for their generous hospitality and for permission to work on the Muck Islands, to Dr G. N. Foster for checking and, where necessary, correcting my identifications of water beetles and for providing records from the card index of the late Prof. F. Balfour-Browne. I am also indebted to other experts whose assistance has been acknowledged in the text and to my wife, Ruth, for her constant encouragement.

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## Short Notes

COMPILED by A. McG. STIRLING

### Botanical

*Woodsia alpina* (Bolton) S. F. Gray  
on Beinn Bhuidhe, Argyll

B. H. THOMPSON

In August 1986 my brother and I visited the above mountain (NN203187) and came upon a few plants of *Woodsia alpina* on the north-east ridge at an elevation of some 780 metres. Faces of convoluted schist had groups of two and five plants while a detached boulder below had two more – a total of only eight plants.

This occurrence on Beinn Bhuidhe represents a slight south-westward extension of the fern's range in V.C. 98 and the most southerly station so far reported for the Scottish Highlands.

Elsewhere in Argyll, V.C. 98, *Woodsia alpina* is known from seven main sites disposed on the following mountains: Beinn an Dothaidh, Beinn Dorain, Beinn Laoigh, Beinn Udlaidh and Meall nan Tighearn.

**Keeled-fruited Cornsalad in  
the Bellahouston Nursery**

P. MACPHERSON  
and E. L. S. LINDSAY

In June 1987, approximately 12 square yards of Keeled-fruited Cornsalad (*Valerianella carinata*) was seen along one angle of a large square plot in the Bellahouston Nursery, Glasgow (Lanarks, V.C. 77).

The first Lanarkshire record for the closely related but more common species, *V. locusta*, was from Calderwood by Ure (*The History of Rutherglen and East Kilbride*, 1793) and there are three recent records from central Lanarkshire. In addition, it has recently been seen within the 'Glasgow Rectangle' at Cadder by Dr J. H. Dickson during recording for the Flora of Glasgow project.

*V. carinata* is described as being very local, mainly in the south of the British Isles, and Rose (*The Wild Flower Key*, 1981) states that it is absent from Scotland. In the *Atlas of the British Flora* (1962) Perring and Walters give no records north of Yorkshire.

The Nursery is at present sub-let for the 1988 National Garden

Festival, but belongs to the City of Glasgow District Council. In its normal use approximately three quarters of a million plants per year are brought in, mostly from England. This is the probable source of the introduction of the *Valerianella*. The staff had not noticed the plant and so have no idea when the introduction took place.

Morphologically *V. locusta* and *V. carinata* are very similar. The main difference is in the fruits, that of *V. locusta* being flattened, more or less orbicular in side view, and with the fertile cell corky on the back (Fig. 1). *V. carinata* fruits are narrowly oblong and more or less 4-sided, with a deep groove on one side and slightly keeled on the other. The fertile cell is not corky on the back (Fig. 2).

As the plant may now be spread to plots in the Glasgow Parks the illustrations provided may assist in the identification of further occurrences of this species previously absent from the recorded Scottish flora.

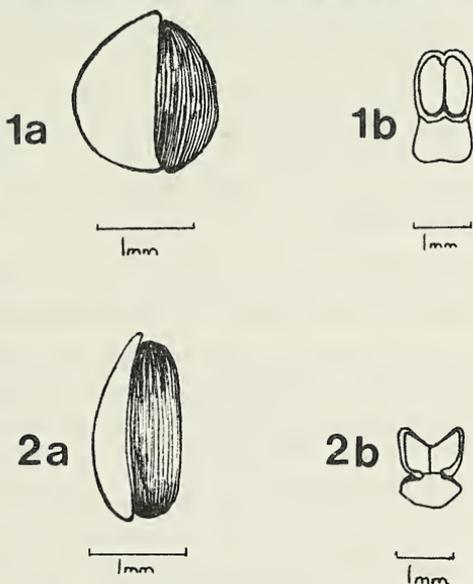
Cornsalad, also called Lamb's Lettuce, is so named because it was sometimes eaten as a salad.

## Warty Cabbage

P. MACPHERSON

In July 1986 two plants of Warty Cabbage (*Bunias orientalis*) at the fruiting stage were seen in a rectangle of industrial waste ground adjacent to Craigton Cemetery, Glasgow (V.C. 77).

A return visit was paid to Craigton in June 1987 to ascertain whether the plants had persisted and, if so, to obtain a photographic record. It was discovered that the whole area was now surrounded by a 10-foot fence. An attempt to gain access via the adjacent railway line failed, but careful scrutiny revealed a small low gap in the old



Figs. 1-2. Seeds of *Valerianella* spp.: (1) *V. locusta*; (2) *V. carinata*. (a = side view; b = transverse section.)

section of fence which separated the ground from the cemetery. Having gained admission by this route it was found that there were now twelve plants, six at the original site and the others scattered within a 25 yard radius. Presumably the fencing is a prelude to development, in which case the plants are in grave danger. As some are almost at the old fence, survival of the *Bunias* at the site may well depend on its ability to spread into the adjacent cemetery.

Grierson recorded *B. orientalis* from Bishopbriggs in 1919 and noted that it had been found beside the railway at Symington (*Glasg. Nat.* 9: 18; 1931). In the *Atlas of the British Flora* (1962) Perring and Walters give only three records for Scotland, all in the east of the country.

### *Euphorbia x pseudovirgata* – lost and found P. MACPHERSON

Having monitored the spread of a Twiggy Spurge at Carmyle (V.C. 77) from 1974 (*Glasg. Nat.* 19 : 203; 1975 and 20: 184; 1981) we were disappointed to discover in 1983 that the site had been destroyed by redevelopment. However, in June 1986 a further patch was found on a sloping grassy bank in Govan, also within V.C. 77. By July 1987 the colony had a diameter of five yards. As the bank is on the main Glasgow to Paisley railway line there is little likelihood of similar destruction at this site, so that the plant should survive and spread.

### A Giant Ivy from South Uist

ALISON RUTHERFORD

In the summer of 1979, during the Botanical Society of the British Isles Irish Ivy Survey, Dr Hugh McAllister and his wife found an ivy on the lip of a miniature cliff at South Glendale, at the southern tip of South Uist. They realised it was larger than usual and, since being planted out in the Liverpool University Botanic Gardens at Ness on the Wirral peninsula, it has proved to be a real giant. Hugh McAllister counted its chromosomes, identifying it as *Hedera helix* L. and not the Atlantic Ivy (*H. hibernica* Kirchner Bean), a generally much faster-growing, larger-leaved species, of which the garden Irish ivy is a horticultural form. The Atlantic species is tetraploid ( $2n = 96$ ) while common ivy is diploid ( $2n = 48$ ).

'Glendale', as this ivy is to be in commerce, has grown about six metres up an oak tree in less than eighteen months. It appears to be, like the so-called Irish ivy, at the sub-fertile stage, and its

leaves bear a strong resemblance to that plant, being broad, with shallow sinuses and short, wide lobes. The colour is a fresh, bright green, and the leaf margins are undulate in the manner of a *helix* ivy. Leaf size varies from 6cm to 12.5cm wide and 5.5cm to 9cm long. Local Nature Conservancy staff are conducting a survey of the site and will look for this ivy in other places. It is such a striking form that its commercial future is assured.

### **Ardtur Pond, Appin, Argyll**

B. H. THOMPSON

During the autumn of 1986 A. A. Slack chanced upon a most interesting pond at the above location (NM 917466). Further visits were made by A. A. Slack and B. H. Thompson on 29 September 1986 and 25 July 1987, and by A. A. Slack, A. McG. Stirling, T. Rich and others on 8 September 1987.

The pond is shallow and only some one hundred metres across. The adjacent limestone provides base-rich water while the bed is heavily silted. Cattle have access to the north and east shores and on the west side there is an area of willow carr.

The 1986 visits to the pond produced first V.C. 98 records for *Lemna trisulca* (abundant) and *Rorippa islandica* (det. T. Rich). The latter plant is present in some abundance on the north and east sides and seems to benefit from the trampling of cattle on the soft ground. Its occurrence there also seems to relate to the pond being frequented by wintering wildfowl. The September 1987 visit produced yet another apparently new V.C. 98 record in *Polygonum minus* which was growing plentifully in the same area as the *Rorippa*.

Other plants growing at the pond and which are rare in Argyll are: *Bidens cernua* (plentiful); *Juncus foliosus* (occasional); *Lythrum portula* (plentiful) and *Veronica anagallis-aquatica*. Some three hundred metres to the south another local rarity, *Scutellaria minor*, grows quite plentifully in boggy pasture.

It was heartening to learn from the local farmer that he values the pond as a watering place for livestock. He informed us that the pond's *Typha latifolia* was planted by the estate in earlier days.

### ***Elodea nuttallii* (Planchon) St John in the Forth & Clyde Canal**

A. McG. STIRLING

On 6 September 1987, during a field excursion in connection with

the Botanical Society of the British Isles Recorders' Conference in Glasgow, the water-weed *Elodea nuttallii* was taken in some quantity from the Forth & Clyde Canal between Old Kilpatrick and Bowling, Dunbartonshire (NS 45-73-) when sampling by grapnel for pondweeds (*Potamogeton* spp.).

*E. nuttallii*, like the related *E. canadensis* (Canadian Pondweed), is an introduction in the British flora which is rapidly becoming widespread and frequent in aquatic habitats in this country. It differs from the commoner species in its leaves which are more flaccid, of a lighter green colour and more gradually narrowed to an acute apex. So far, there seem to be rather few records from Scotland. One of these is also from the Forth & Clyde Canal, at Castlecary, Stirlingshire, collected by N. F. Stewart in 1983 (Herb. RBG, Edinburgh). It therefore seems likely that *E. nuttallii* will be found to occur in other parts of the canal and should also be looked out for in other aquatic sites in Scotland.

### A Sea-bean from Blackpool promenade

J. H. DICKSON

While on holiday during the stormy weather of 14 August 1987 Mrs Rose Zonfrillo collected a sea-bean left behind after a wave had crashed onto the promenade near the north pier at Blackpool. This seed is the most commonly encountered drift seed (Nelson, E.C. 1978. Tropical drift fruits and seeds on coasts in the British Isles and western Europe. 1. Irish beaches. *Watsonia* 12: 103-112.) and was shed at least 4500 miles away by *Entada gigas* (L.) Fawc. & Rendl. (often called *E. scandens* L.).

Belonging to the Leguminosae, the plant is a "high-climbing woody tropical vine" (liana) with pods "usually one to two metres long and eight to twelve centimeters broad" (Gunn, C.R. & Dennis, J.V. 1976. *World Guide to Tropical Drift Seeds and Fruits*. New York. (p. 142)). It grows in tropical Africa, central and southern tropical America, as well as in the West Indies. The seeds can remain afloat for two years or more and some have been found to be viable. The Gulf Stream brings these sea-beans and other plant propagules across the Atlantic to north-western Europe. Sea-beans travel the oceans of the world; the first *Entada* seed seen by the author was on Tristan da Cunha in 1966.

**Bunhouse Road – 1987**

JEAN M. MILLAR

At the end of our article in 1984 (Records for the Flora of Glasgow 2. Waste ground at Bunhouse Road. *Glasg. Nat.* 20: 473) we pointed out that one of the reasons for detailed recording was the uncertain future of the area. This spring the earth-moving machines moved in and the area is now a car park for the Kelvin Hall, with no open space for plants. The 127 species we recorded then has been reduced to less than 20, which is a good indication of the ephemeral nature of recording in an urban area.

**Zoological****Death's head Hawk-moth in Renfrewshire**

R. SUTCLIFFE

A specimen of a Death's-head Hawk-moth, *Acherontia atropos* (L.) (Fig. 3) was discovered alive in Hangar 12, Glasgow Airport on 22 June 1987. It is unclear whether or not the moth had arrived with a plane-load of cargo from abroad. The hangar in which it was found was not being used for the storage of any cargo at the time.

The specimen is now in the collections of Glasgow Museums and Art Galleries (Registration No. Z1987-80).

The species, which gets its name from the yellow-coloured markings on its thorax, is a native of Africa and is found throughout Europe and the Middle East. It is a regular migrant to this country, small numbers turning up every year – mainly in the south of England. (For notes on previous records from Clyde Area see *Glasg. Nat.* 18: 573; 1971).

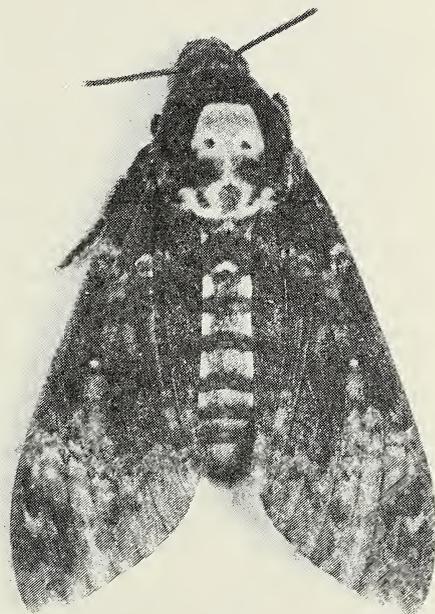


Fig. 3. Death's-head Hawk-moth from Glasgow Airport (Life-size).

## Some crane-fly (Diptera, Tipulidae) records from the River Clyde at Carmyle, Glasgow E. G. HANCOCK

There has been a remarkable local history of studies of the crane-flies from the Clyde area which has been summarised by Dobson, 1973 (*Glasg. Nat.* 19: 45-54). This past activity facilitates the assessment of unusual or new records as well as any change of status in the west of Scotland. The following records are of species observed on the south bank of the River Clyde at Carmyle (NS 643612) during part of the botanical survey work carried out there in connection with the Flora of Glasgow project. Those species which are widespread and common are listed without comment.

*Tipula lateralis* Meigen

*Nephrotoma quadrifaria* (Meigen)

*N. analis* (Schummel). Henderson, 1901 (in Elliot et al., *Fauna, Flora and Geology of the Clyde Area*. British Association, Glasgow) was dubious about the identity of his examples of this uncommon species. These had been collected by A. A. Dalglish from Cambuslang so its presence can be confirmed in this same general area of Glasgow.

*Limonia modesta* (Meigen)

*L. ornata* (Meigen). Earlier records (Henderson, 1901, *l.c.*) are from Crookston and Gorge of Avon. This well-marked crane-fly was seen in very large numbers flying beneath the canopy formed by the leaves of Butterbur at Carmyle. Edwards, 1921 (*Trans. ent. soc. Lond.*, 1921: 196-230) lists this species as rare, there being only two English localities represented by specimens in the British Museum (Natural History) at the time.

*L. trivittata* (Schummel). This species has been reared from the stem bases of Giant Hogweed collected during the winter at Carmyle. It is normally found in association with Butterburn, a foodplant it shares with *L. ornata*, *L. nubeculosa* Meigen and *L. duplicata* (Doane) also emerged from this plant.

*L. omissinervis* (de Meijere). The only previous Scottish record is that of Edwards (1921, *l.c.*) when he introduced it as British on the basis of a female from Inverness under the name *patens* Lundstroem. There have been occasional records in the British Isles since the Crane-fly Recording Scheme has been in operation but it remains a rarity.

*Hexatoma fuscipennis* (Curtis). As with *N. analis* this was recorded at Cambuslang by A. A. Dalglish (Henderson, 1901 *l.c.*). The aquatic larval association is with the sandy banks of streams or rivers. At Carmyle the sand-filled flood channels parallel with the Clyde at this point provide an ideal habitat.

*Austrolimnophila ochracea* (Meigen)

*Gonempeda flava* (Schummel)

*Cheilotrichia imbuta* (Meigen)

*Erioptera maculata* (Meigen)

*E. stictica* (Meigen)

*E. hybrida* (Meigen). This species is infrequently recorded at a national level.

There are two previous records from the Clyde area (Henderson, 1901, *l.c.*)

*Molophilus griseus* (Meigen)

From this short list the potential of the sites along this part of the

River Clyde is indicated by the proportion of interesting records worthy of comment. Further investigations upstream and downstream from this area in all branches of natural history appear to be warranted.

As a corollary to this note, the *British Red Data Book: 2. Insects* (Shirt, D.B. (Ed.) 1987) has just been published and includes two of the species from Carmyle. *Limonia ornata* is in Category 3 (Rare) and *L. omissinervis* Category 2 (Vulnerable). The commentary for the latter crane-fly gives it as sporadic in occurrence and occurring principally on the River Spey at sites which may be threatened by amenity development. The habitat preference is given as shaded river banks as occur at this part of the Clyde.

### **Glowworms (*Lampyris noctiluca* (L.)) on Mull E.G. HANCOCK**

An enquiry to Glasgow Museum in late September 1987 has brought a new record of this beetle under unusual circumstances. The summary of previous Scottish records, which appears in *Glasg. Nat.* 20: 84; 1980, includes localities on the mainland at the same latitude but none for the Western Isles. The curious aspect of this sighting is that the females were in the branches of trees at approximately twenty feet from the ground. Mr Edwin Blake of Edinburgh Zoo was on the road behind Carsaig (NM 53-22-) at which point the tops of the trees of the steeply sloping woodland below the road rise above it. The glowworms were seen about five feet above the observer's position on the road, at which point the base of the tree was fifteen feet below. It appears therefore that these wingless insects had crawled up the tree to reach this position. The lights were strong and steady and could not have emanated from the males which can fly and occasionally produce a weak light. Glowworms are normally found in open areas of grassland or heath and this observation seems worth recording in order to find out if similar behaviour has been noted before. It does not appear to be mentioned in any of the standard entomological texts.

### **The Azure Damselfly on Loch Lomondside J. MITCHELL**

On 16 June 1987 a single freshly emerged male Azure Damselfly (*Coenagrion puella* (L.)) was captured and identified at a recently created dragonfly pool on the Loch Lomond National Nature Reserve mainland (NS 48). At the next visit on 28 June a number of

males were present, and the first mating pair was observed. Both males and females were subsequently seen at several spots in both the Stirlingshire and Dunbartonshire portions of the mainland reserve, in every case associated with the presence of the Broad-leaved Pondweed (*Potamogeton natans*).

Several other apparently suitable sites in the surrounding area were examined during the course of the summer, the species being found again only at the well-vegetated western end of Loch Ardinning above Strathblane (NS 57). There are no previous records of the Azure Damselfly for Stirlingshire (V.C. 86) or Dunbartonshire (V.C. 99) in the Scottish Insect Records Index (Royal Museum of Scotland).

## Molluscan Notes

F. R. WOODWARD

### *Pinna fragilis* Pennant

Following my 1985 note, The Fan-mussel, *Pinna fragilis* Pennant, in Scotland (*Glasg. Nat.* 21: 63-69), a further Scottish locality has been drawn to my attention by Miss M. Child of Eastwood Sub-aqua Club.

During a dive in Tobermory Bay, Mull, at a depth of twelve metres in May 1982 she came across a damaged example measuring 260mm long and 127.5mm wide. The individual may have been introduced into the area from deeper water by storms or thrown overboard from a passing fishing boat. It still retained its animal which was being eaten by a common shore crab, *Carcinus maenas* (L.). The shell was brought back to Glasgow and has since been presented to the Museum (Reg. No. NHZ 1986-133).

### *Anodonta cygnea* (L.)

Five apparently live caught examples of this species (Reg. No. NHZ 1985-173-1-5), were presented to the Museum by Dietrich Burkel in 1971. They were obtained during the cleaning of the northern drainage ditches at Possil Marsh and are of particular significance since they are, as far as I am aware, the most north-westerly record for this species in the British Isles.

On the east coast the furthest northern locality would appear to be the boating lake Saltwell Park, Gateshead, Tyne and Wear, a thriving colony having been discovered there by me in June 1987. Voucher specimens, Reg. No. NHZ 1987 - 90 are in the Museum.

### *Margaritifera margaritifera* (L.)

It is worth placing on record the field collection of an example of this species, measuring 9.6mm in length, from the River Kilmartin, near Staffin, Isle of Skye. The specimen was collected by me on 14 July 1986 and is significant since only four other British examples are recorded under 20mm. They were obtained from the River Conway at Llanrwst, Denbighshire and are now in the J. W. Jackson Collection, Merseyside County Museums, Liverpool.

A further record for this species is the confirmation of its presence in the Girvan Water, near Girvan, Ayrshire, by the collection of a fairly recently dead

valve (Reg. No. NHZ-1987-46-1) by E. G. Hancock and myself on 8 May 1987. The species was last recorded from this locality by a founder member of this society, Robert Gray, as long ago as the 1870s. Robert Gray died in 1887. A small fresh example of *Anodonta anatina* (L.), (Reg. No. NHZ-1987-46-2) was also obtained from the Girvan Water on the same date.

*Arianta arbustorum* (L.)

An unusual example of this species is preserved in the David Robertson Museum at Millport. It is labelled '*Helix nemoralis* Linn. from Girvan, Reg. No. 62' and bears a note on the reverse of the tablet in Robertson's hand "*Helix nemoralis* (Linn.) Girvan. R. Gray 75" indicating it had been collected by Robert Gray in 1875 and given to David Robertson.

The shell is remarkable in that it belongs to the monstrosity *scalare* of Ferussac, i.e. its shell whorls being more or less dislocated. As far as I am aware only one other British example, collected in May 1912 from Whaley Bridge, Cheshire by Mr Harry Allan, is recorded. This latter shell is illustrated by J. W. Taylor in his *Monograph of the Land and Freshwater Mollusca of the British Isles*, Volume 3, page 443, figure 504.

The dimensions of the Girvan example are, height 24.0 mm, width 18.5 mm.

*Simnia patula* (Pennant)

A living example of this relatively rarely recorded species was obtained by Morag McKinnon during an Eastwood Sub-aqua Club dive at Cairns of Coll on 25 May 1985. The specimen has been preserved in spirit and presented to the Museum (Reg. No. NHZ 1985-84-3).

**Close Nesting of Peregrines in Stirlingshire**

J. MITCHELL  
& R. A. BROAD

Expansion of the Peregrine *Falco peregrinus* population in central Scotland has been a feature of recent years (*Glasg. Nat.* 20: 389-399; 1984), one part of Stirlingshire (V.C. 86) being particularly well favoured in 1987. Using linear measure for determining spacing between occupied Peregrine sites, no less than five pairs nested within six miles (9.65km) giving a mean minimum distance of 1.2 miles (1.93km) between the five eyries. Despite the closest two pairs nesting less than half a mile (750m) apart, territorial aggression towards one another was noted only on the last of five site visits, but even this probably represented displacement activity triggered off by the observers positioning themselves immediately in between the two eyries which both contained well-grown young.

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## Proceedings 1986

The chairman, place\* and number present, lecturer's name, title of lecture and note of any exhibits are given for each meeting.

\*GMK: Glasgow Museum and Art Gallery, Kelvingrove

UGBD: University of Glasgow, Botany Department

- 7 JANUARY.** Dr P. Macpherson, UGBD, 52.  
Mr Duncan I. McEwan, Paisley Colour Photographic Club. The 17th Paisley International Colour Slide Exhibition (Nature Section).  
Exhibits: Maps showing distribution of 7 orchids growing in Glasgow (Dr J. H. Dickson).
- 11 FEBRUARY.** Dr P. Macpherson, UGBD, 45. 56th A.G.M.  
Reports on activities during 1985 were read, elections were held (see page 000), and appointments made by Council were announced. The Report of Council stated that there were 317 members (264 Ordinary members, 29 Family members, 6 Junior members, 11 School members and 7 Honorary members). There were 30 excursions held during the summer.  
The film 'The Isle of Rhum' was shown.  
Exhibits: Barytes from Muirshiel Mine (Mr R. Sutcliffe), Dandelion (*Taraxacum* sp.) in flower found at Baillieston on 11 February (Mr J. R. S. Lyth).  
An album of press cuttings etc. relating to the Andersonian Centenary Celebrations and the Society's new Display boards (Mrs A. V. Sutcliffe).  
A map showing the progress of the Flora of Glasgow Project (Dr J. H. Dickson).
- 25 FEBRUARY.** Mr I. C. McCallum, UGBD, 50.  
Carmen Placido, 'Bats'.  
Exhibits: Mounted bats and 2 voles (Mr R. Sutcliffe).
- 11 MARCH.** Dr P. Macpherson, UGBD, 54.  
Sir Peter Hutchison 'Quest for Plants in the Footsteps of George Forrest'.  
The death of Mr Charles E. Palmar was announced.  
Exhibit: A fieldfare (Mr I. C. Christie).
- 8 APRIL.** Dr P. Macpherson, UGBD, 45.  
Mr Alfred A. P. Slack. 'The Map Flora of Inverness-shire'.  
Exhibit: *Sonchus canariensis* from Gran Canaria (Mr J. R. S. Lyth).
- 13 MAY.** Dr P. Macpherson, UGBD, 37.  
Dr Roy Watling '150 years + of Paddock-stool Picking'  
Exhibits: Yellow Archangel (*Lamistrum galeobdolon*) (Mr A. McG. Stirling). Rue-leaved Saxifrage (*Saxifraga tridactylitis*) (Dr E. L. S. Lindsay).

- 10 JUNE.** Lochwinnoch. 37.  
Natural History Social Evening.
- 12 SEPTEMBER.** GMK 44.  
Annual Exhibition Meeting and Cheese and Wine.  
Colour Photographs and publicity stand – Mrs A. V. and Mr R. Sutcliffe. Centenary of the Microscopical Society of Glasgow – Mr R. Sutcliffe. Insects from Ben Lui and Ailsa Craig – Natural History Department. Agates from the Isle of Arran – Miss M. M. H. Lyth. 'Prudential Acrostic' and 10 plants for identification – Mr J. R. S. Lyth. Colour Photographs and Dye Garden – Mr W. MacLaren. Botanical Surveys of Glasgow and specimens from Glasgow's disused railways – MSC Community Project. Selection of aliens VC77 – Dr P. Macpherson. Hybrid Orchids at Dumbrook Loch, SW Stirlingshire – Mrs C. Dickson/Mr T.N. Tait. Recording the Flora of Glasgow (Herbarium specimens, charts and maps) – Dr J. H. Dickson. Willows – Dr A. Walker. 'Which are which' Quiz, (leaves of butterbur and burdock) – Dr A. Walker and Mrs J. M. Millar. Scottish Natterjack Toads – Mr T. N. Tait. Pipewort – Mrs J. Christie. Fresh fungi – Mr R. Hunter and Mrs E. Stewart. Small Mammals – Mr I. C. McCallum.
- 14 OCTOBER.** Dr P. Macpherson, Dean Park Hotel, Renfrew 35.  
Presidential Address II. 'Plant Recording at the Tip of Lanarkshire's nose'.
- 1 NOVEMBER.** With Botanical Society of the British Isles and Botanical Society of Edinburgh.  
Dr P. Macpherson, UGBD, 62.  
Exhibition Meeting and Lecture 'Man and Nature in North East Scotland' – Peter Marren.
- 11 NOVEMBER.** Dr P. Macpherson, UGBD, 39.  
The Goodfellow Lecture: Dr Patrick Echlin 'Imaging Biological Material'.  
Exhibits : Microscope slides and Minute Books of the Microscopical Society of Glasgow (Mr R. Sutcliffe).  
Weasel (Mr I. C. Christie).
- 25 NOVEMBER.** Dr T. N. Tait, UGBD, 49.  
Mr Jim Brockie 'Chatelherault Country Park'; Mr T. Norman Tait 'The Changing Countryside' (Audio-visual presentation).
- 9 DECEMBER.** Dr P. Macpherson, UGBD, 42.  
Dr Hector Galbraith 'The Interaction between Agriculture and Birds'.  
Exhibits: Polished pebbles from volcanic rocks from Ballantrae Beach (Mr A. McG. Stirling).

# The Glasgow Naturalist

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# The Glasgow Naturalist



**Volume 21**

**Part 4  
1988**



## **The Glasgow Natural History Society (formerly The Andersonian Naturalists of Glasgow)**

The object of the Society is the encouragement of the study of natural history in all its branches, by meetings for reading and discussing papers and exhibiting specimens, and by excursions for field work. The Glasgow Natural History Society meet at least once a month except during July and August, in the University of Glasgow, the University of Strathclyde or the Glasgow Art Gallery and Museum.

The present rates of subscription per annum are: for Ordinary Members, £8; for Junior Members, £5; for Family Members, £2; and for School Members, £1. Further information regarding the Society's activities and membership application forms are obtainable from the *General Secretary*:

Mr RICHARD SUTCLIFFE,  
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### **The Glasgow Naturalist**

Published by the Glasgow Natural History Society  
ISSN 0373-241X

December 1988  
Price £5.00

Edited by R. M. Dobson with the assistance of J. H. Dickson, R. H. Dobson, A. McG. Stirling and I. C. Wilkie.

Contributions are invited, especially when they bear on the natural history of Scotland. A note of information for contributors is available from *The Editor*.

Smaller items are also welcome from members and others. These may cover, for example, new stations for a species, rediscoveries of old records, additions to records in the *Atlas of the British Flora*, unusual dates of flowering, unusual colour forms, ringed birds recovered, weather notes, occurrences known to be rare, interesting localities not usually visited by naturalists. (The nomenclature of vascular plants should be as in Clapham, A.R., Tutin, T. G. & Warburg, E. F. 1981. *Excursion Flora of the British Isles, Ed. 3*. Cambridge.

All communications on editorial matters should be sent to:

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GLASGOW G12 8QQ.

A limited number of advertisements can be accepted and enquiries should be sent to *The Editor*.

Back numbers available are listed on the inside back cover.

## **Glasgow Naturalists at the Garden Festival 1988**

**JAMES H. DICKSON and T. NORMAN TAIT**

Botany Department, University of Glasgow, G12 8QQ

With four and a quarter million visits, the Glasgow Garden Festival was easily the most successful yet held. From the legions of school children to many foreigners, there was something for everyone. Light-hearted aspects included street theatre, floral peacocks and rides on tramcars. There were serious-minded indoor exhibitions, horticultural competitions, magnificent gardens and musical concerts.

The varied contributions made by members of the Glasgow Natural History Society are outlined below.

### **Britoil's Timetrek**

Well over 300,000 visits were made to Timetrek, which displayed the vast history of the Earth and plants by means of many fossils, video, reconstructions and a "talking head" of Hugh Miller, the 19th Century Scottish palaeontologist. The fossils came from all geological periods and continents, with due prominence given to Scotland with Rhynie, Craigleith and the Fossil Grove as important parts of the display. Many admired the flower in amber (about 25 million years old), the leaves from Mull (about 60 million years old), the tree trunks from Arizona (about 225 million years old) and the reconstruction of a Carboniferous forest of some 330 million years ago. Young and old alike were fascinated by Hugh Miller's chat on fossils. Jim Dickson was the scientific consultant to Timetrek, which gained two awards, including a gold medal.

### **Wild Plants of Glasgow**

Based on the data gathered during the Flora of Glasgow project, this interactive display was a popular part of the University of Glasgow's exhibition in the High Street, the shopping area at the Festival. It was a computerised carousel of plant photographs

relevant to the ninety tetrads of the Glasgow rectangle. Over 100,000 visits were made to the University's exhibition. Many Glaswegians and non-Glaswegians alike, including foreigners, admired the slides and read the captions. One Swedish family was observed taking photographs of many of the 80 slides.

### **The Trades House of Glasgow Expedition to Papua New Guinea 1987**

Stimulated by the Garden Festival, the Expedition had the Trades House of Glasgow as sponsors and the Royal Society of Edinburgh as patrons. Many of the begonias, ferns, orchids and other plants collected in Papua New Guinea during April and May of 1987 were on display as part of the Hugh Fraser Tropicarium which attracted nearly one million visits and won three awards, including a Caithness Oscar for innovation. The Expedition team members were Jim Dickson, Ewen Donaldson, Keith Watson, Graham Steven and Norman Tait, whose photographs, including two five-foot high enlargements, were on display. Staff of the Botanic Gardens, led by the Curator, our past editor, Eric Curtis, set up the display.

### **The Wildlife Garden**

With core funding from the Nature Conservancy Council, the Wildlife Garden drew about one million visits and was awarded a gold medal. The Project Officer, Debbie Gourlay, oversaw teams financed by the Manpower Services Commission as well as many volunteer helpers from organisations such as the Society and the Scottish Wildlife Trust. Our member, Jean Millar, became Horticultural Co-ordinator and played a prominent part in stocking the garden with plants. Helping in a variety of ways, many other members of the Society included Nancy Craib, Moyna Gardner, Alison Rutherford, Edna Stewart, Jean Stevenson, Agnes Walker, Iain Christie, Nigel Gardner, Dick Hunter, Robin Knill-Jones, Alan McCrae, Peter Macpherson and John Lyth.

### **Acknowledgments**

The Glasgow Natural History Society is grateful to **BRITOIL PLC** for a grant of £200 to enable this article to be published and for providing the photograph, Fig. 1. All other photographs were supplied by Mr T. Norman Tait. Messrs. D. C. Thomson and Glasgow Garden Festival kindly allowed "Oor Wullie" and the Festival logo to appear on the front cover of this issue.

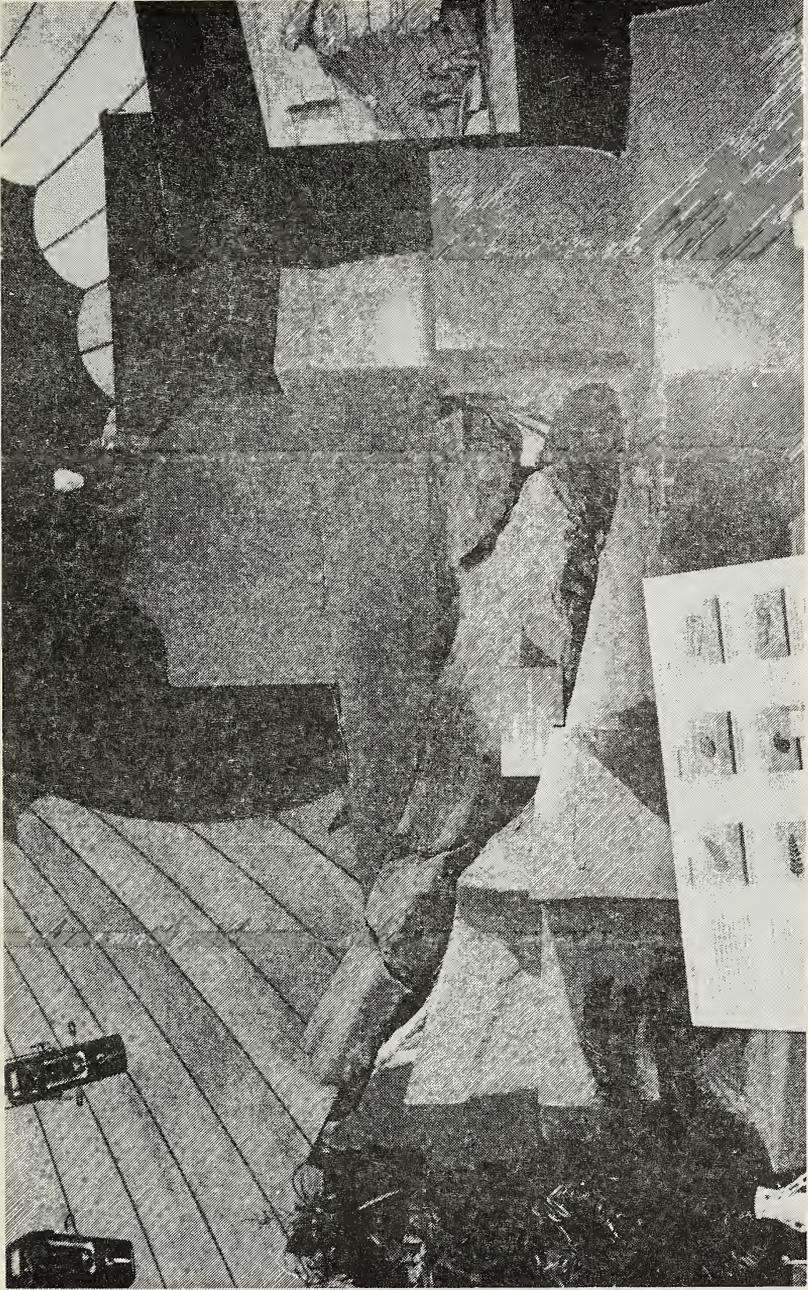


Fig. 1. Hugh Miller sits on top of a reconstruction of Craigeith Quarry with one of the famous 340-million year old trees, the largest fossils ever found in Scotland.

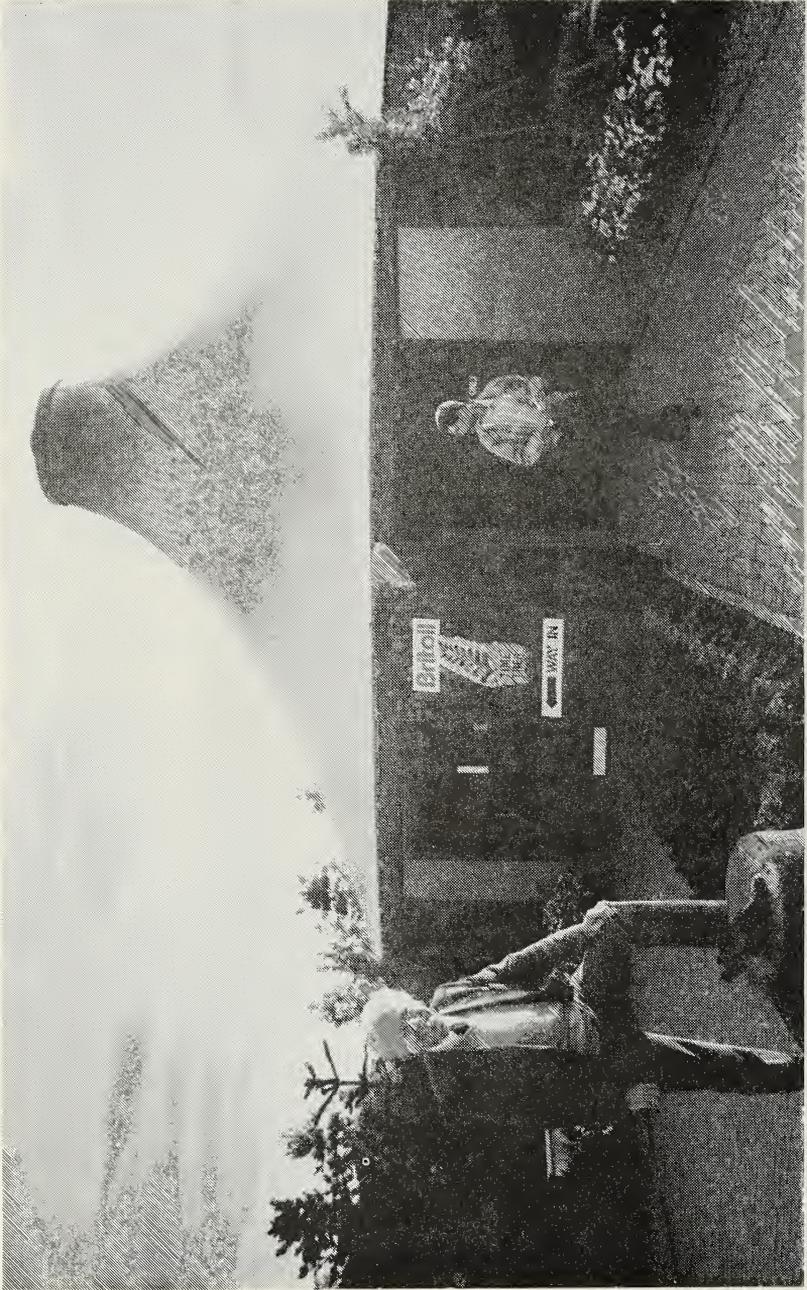


Fig. 2. Jim Dickson, one foot on a Stigmarian stump over 300 million years old, outside the Britoil pavilion.

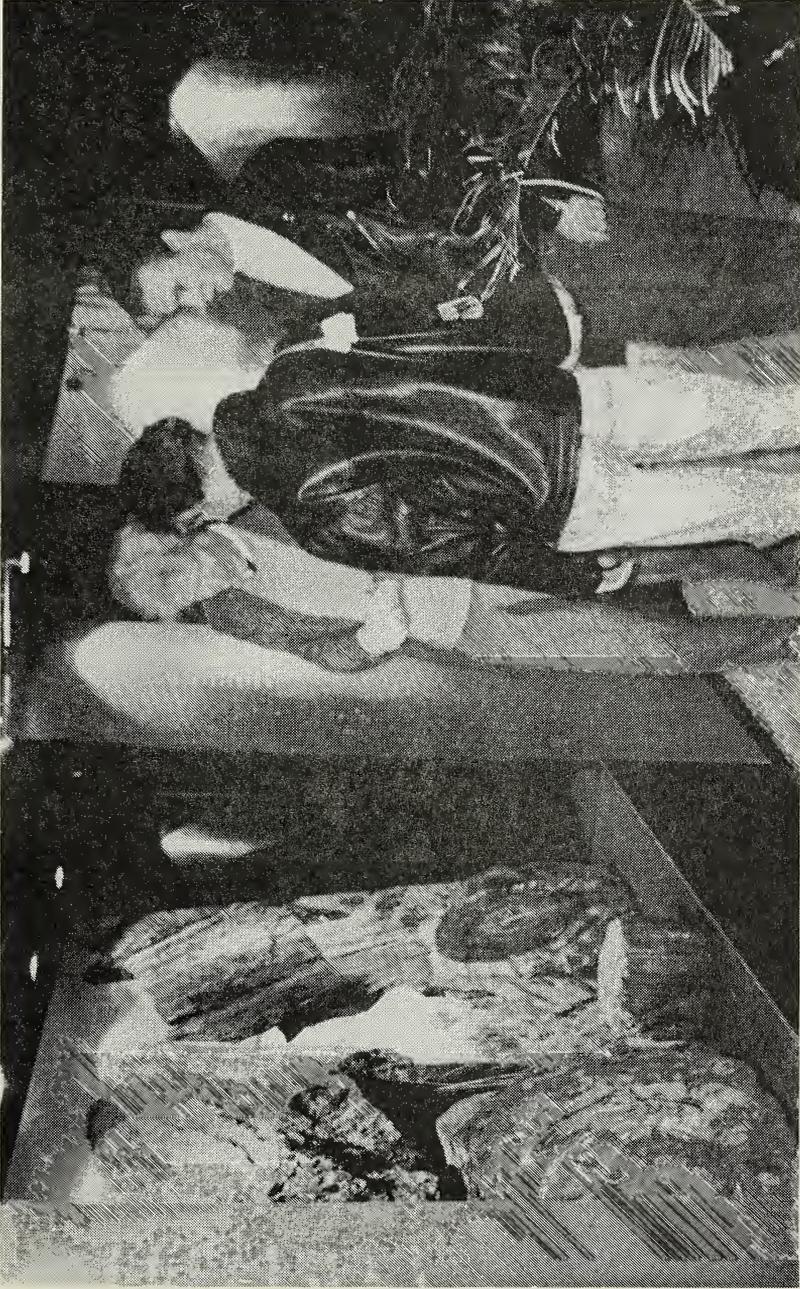


Fig. 3 Two young men being instructed on the spectacularly beautiful polished slabs of Monkey Puzzle trees from the Petrified Forest of Arizona.



Fig. 4. Norman Tait, convener of the photographic section, and Peter Macpherson, twice past president, provided the majority of slides of the Glasgow area plants. Keith Watson and Alan Dick contributed a few slides.

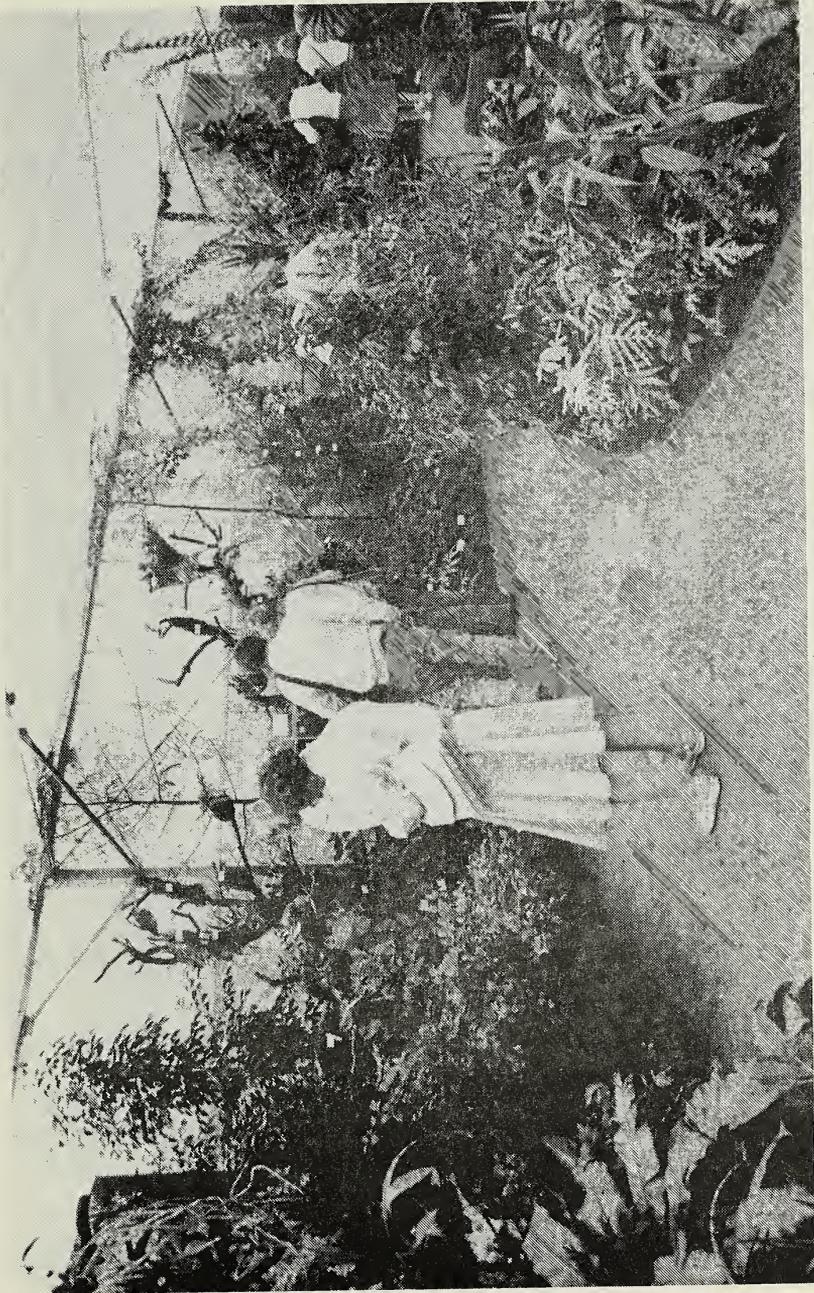


Fig. 5. Members of the public admiring the plants from Papua New Guinea in the Tropicarium.



Fig. 6. In a leafy part of the Tropicarium are, left to right, Normal Little (Garden Festival Official), Jim Dickson, Ilimome Tarua (High Commissioner for Papua New Guinea) and Blair Agnew (Deacon Convener of Trades House).

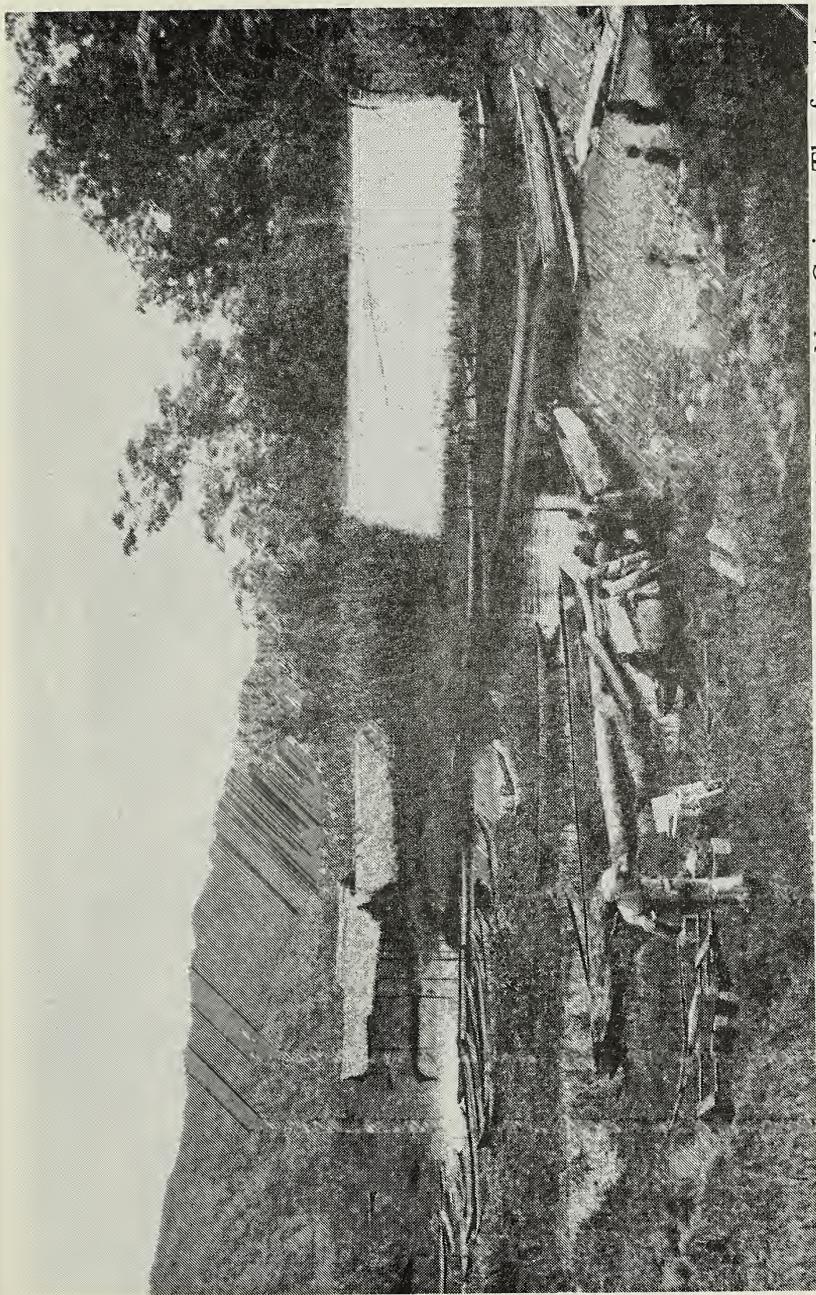


Fig. 7. At the east end of Lake Kutubu, Southern Highlands, Papua New Guinea. The forests around this lake were one of the happiest of hunting grounds of the expedition.

Notice the outboard-motor on the large dugout canoe being loaded for the expedition.



Fig. 8. In the Wildlife Garden, left to right, are Jean Millar, Oor Wullie, John Lyth, Policeman, Margaret Lyth, Irene Nove, Jim Dickson, Nancy Craib, Pearl Tait and Lorna Smith

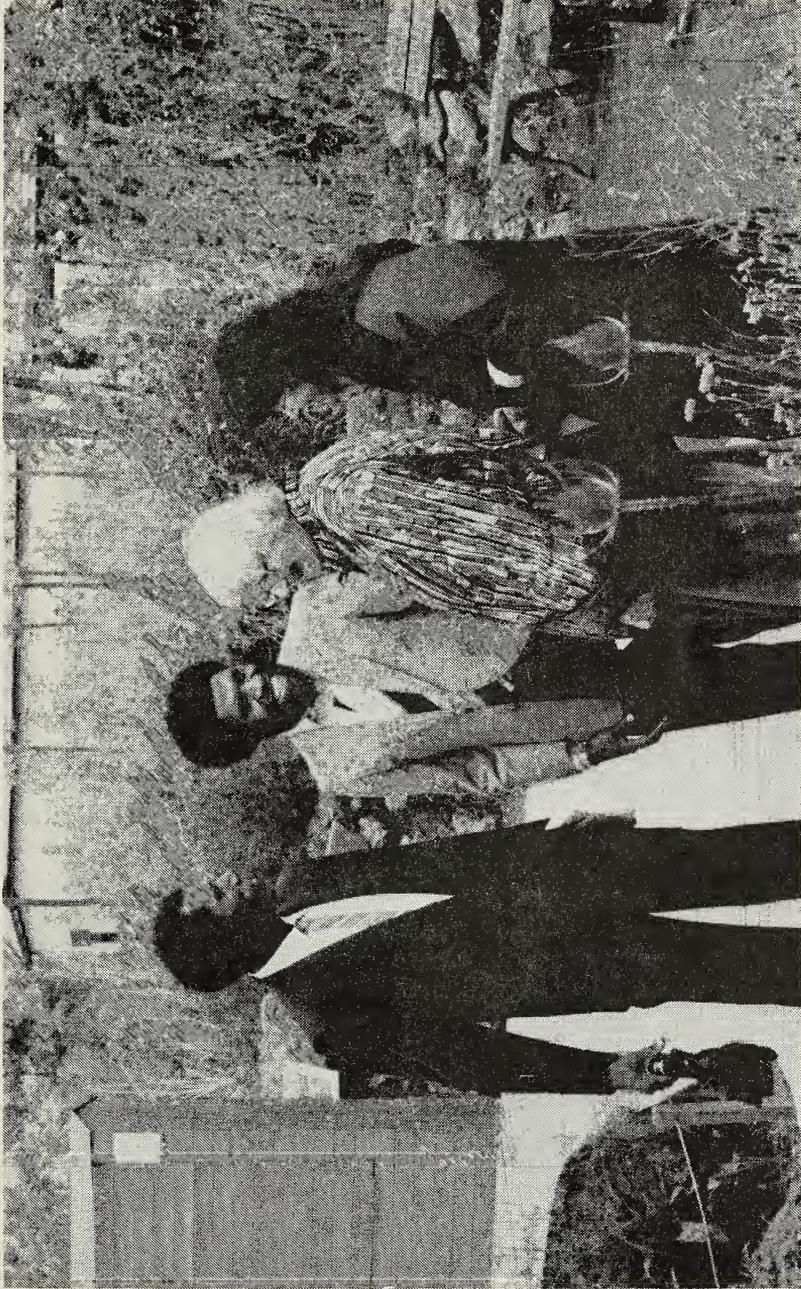


Fig. 9. In the Wildlife Garden, left to right, are the Papua New Guineans, Kipling Naomi and Karl Kerenga (both Trades House Scholars), Irene Nove and Debbie Gourlay.

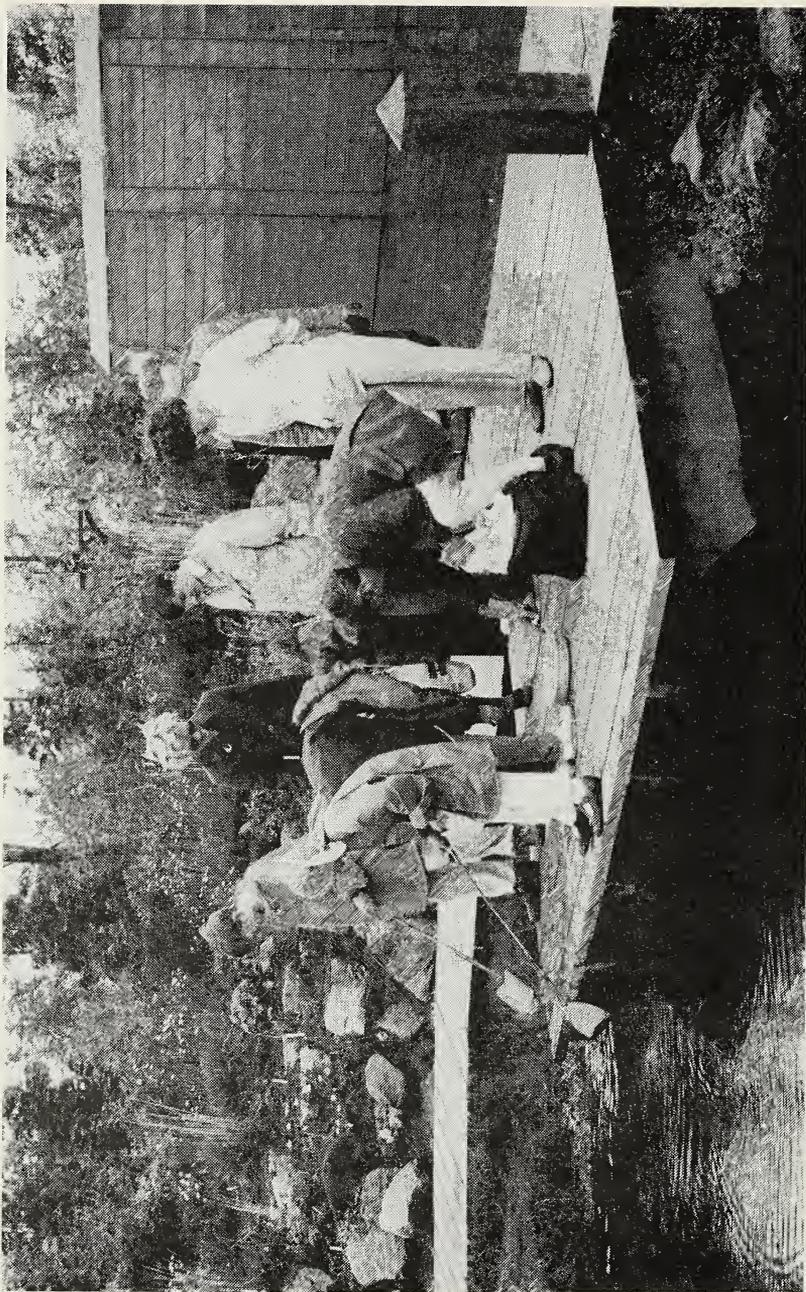


Fig. 10. Members of the public at the pond in the Wildlife Garden.

## Plants from the Kenmuir District of the Clyde 1815-1987

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This paper is an historical survey of the flora of a small part of the region covered by the *Flora of Glasgow* project, extending along the Clyde from Dalbeth, by way of Carmyle and Kenmuir Wood, to the sewage works which now occupy part of the old estate of Daldowie, and following the loops of the river as far as Haughead Bridge (Figs 1 & 2). This area, long walked and written about by earlier artists, naturalists and botanists, is one of great interest, reflecting as it does much of Glasgow's socio-economic past in its many transformations from an earlier agricultural community of prosperous estates and farms, on unusual soil types of high fertility, to the heavy industry of the later 19th and 20th century. Because of this there is an unusual amount of information on the flora, on what would now be called ecology, and on land use, from throughout the 19th and 20th centuries. We have therefore attempted a reconstruction of the area's floristic history and of some of the changing relationships between flora and habitat in the past 175 years. Such a reconstruction could form a baseline for future studies in floristic change influenced by the spread of introduced plant species, by Dutch Elm Disease and by man.

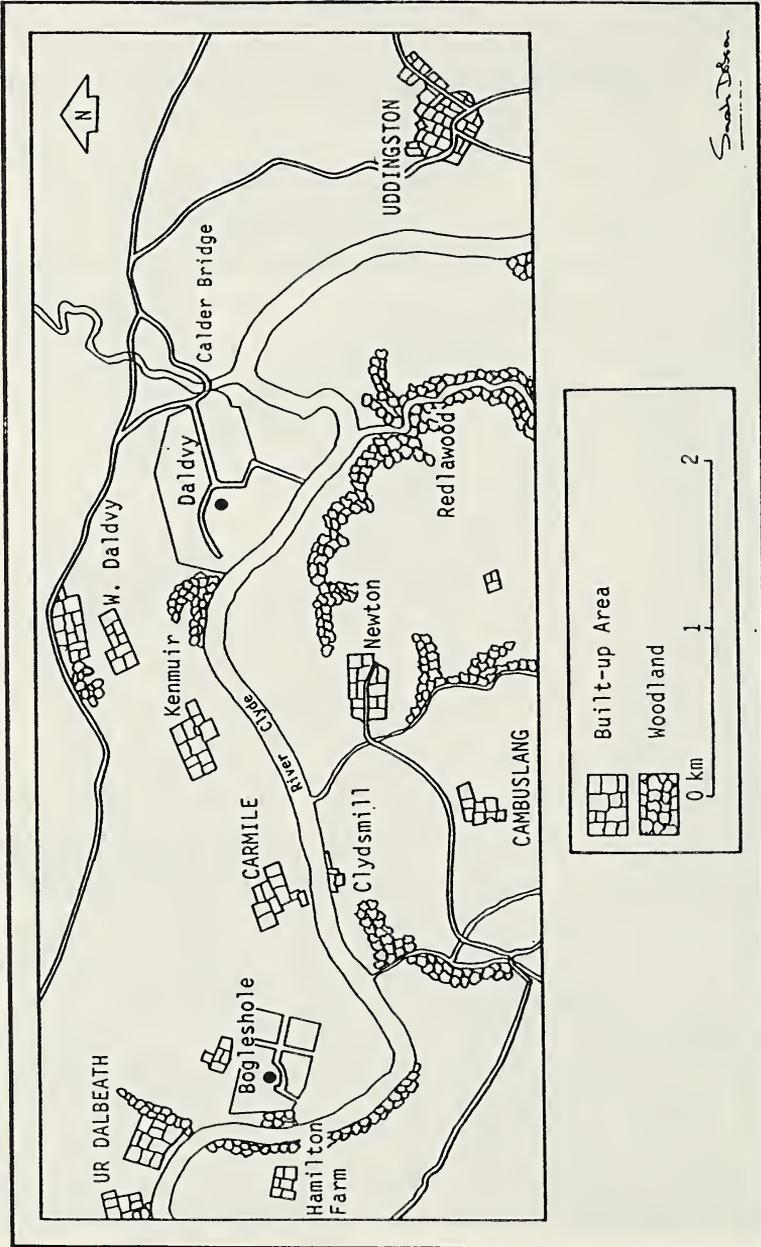
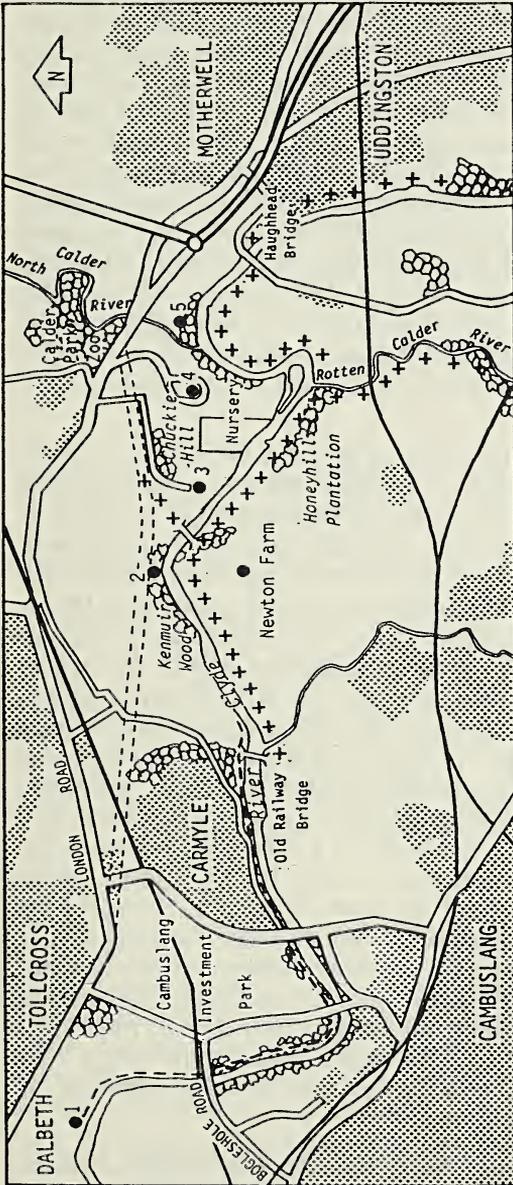


Fig. 1 (Above.) The Kenmuir District of the Clyde – Taken from Roy's Map of 1755.

Fig. 2 (Opposite) The Kenmuir District of the Clyde in 1987.

*Sue Deane*



	Built-up Area	1	Hopkirk's Home
	Woodland or Parks	2	Site of Marriage Well
	Railway	3	Daldowie Sewage Works
	Proposed Motorway Extension	4	Crematorium
	River Clyde Walkway	5	Clydeside House
	Proposed Route of Walkway		

0 km      1      2

## Early and later Botanical Records

The first plant records for Kenmuir are found in Thomas Hopkirk's *Flora Glottiana* (1813), one of the earliest of all the British local floras. Hopkirk lived at Dalbeth House, and is known to have had many interesting plants in his garden: all or most of these were donated to the new Glasgow Botanic Garden in the 1820's (Turner, 1885), but we did look for survivors. Hopkirk mentions about 70 species from the Kenmuir area, with sites and habitat information. An interleaved copy of *Flora Glottiana* is in the library of the Royal Botanic Garden, Edinburgh and this has been copiously annotated in what appears to be Hopkirk's own hand. It is hoped to publish these annotations at a later date. Hooker (1821) incorporated them, so they must date from between 1813 and 1821. They give several additional plants from Kenmuir and nearby. Some are accredited by Hopkirk to 'D.' or sometimes 'D.D.', and attributed to David Don by Hooker (1821).

Professor William Hooker, in his *Flora Scotica* (1821), quotes from Lightfoot (1777), Hopkirk (1813) and others but does not add any fresh records for this area. It would be interesting to know if there were specimens in Hooker's herbarium from the area, but since this collection is at Kew it has not been consulted. Several new local records are to be found in 'Popular Description of Indigenous Plants of Lanarkshire' (Patrick, 1831), and in Professor J. H. Balfour's accounts of excursions with his students (Balfour, 1844). A popular guidebook by Hugh Macdonald (1854) gives useful information on contemporary habitats. Macdonald tells us that Kenmuir bank was a favourite haunt of herbalists in search of medicinal rarities and that botanists, complete with vasculum, were also to be seen. They probably included Roger Henedy (1865) whose *Clydesdale Flora* ran to five editions, latterly being revised by Professor Thomas King. In 1895 John R. Lee, as a young man, wrote in the *Annals of the Andersonian Naturalist's Society* an account of the *Plants of the Kenmuir district of the Clyde* (Lee, 1900) in which he said that it was 'customary for some time past for the botanists of our Society to pay at least one visit annually to this part of the Clyde'. Lee makes only a few references to the Kenmuir area in his *Flora of the Clyde Area* (1933), but in 1938 he deposited specimens from the Kenmuir/Carmyle area in the herbarium of the Department of Botany, University of Glasgow.

In a review of *Plant Recording in Clydesdale* Robert MacKechnie (1958) wrote about the changes that had taken place

in this part of the Clyde. 'What once were pleasant river banks have become, apparently, the battle ground of a variety of conflicting human interests. . . For the botanist there remains little but the hardier species of roadside plant and the weeds of cultivated ground and railway embankment. Within living memory the river bank between Carmyle and Cambuslang, and the sandpits of Tollcross and Shettleston, have lost all but a few of their more interesting plants.' This seems a pessimistic view of what was happening. Although at that time some plants such as *Trollius europaeus* (Globe Flower) and *Thalictrum flavum* (Common Meadow Rue) had probably disappeared, others such as *Hyacinthoides* (Bluebell), *Saxifraga granulata* (Meadow Saxifrage) and *Adoxa moschatellina* (Moschatel), and many of the riverside trees were still to be found and *Petasites hybridus* (Butterbur) and *Symphytum x uplandicum* were probably just becoming established. Mackechnie however pointed out that man-made habitats like the bings and coups, although previously neglected by botanists, added to the flora such plants as *Senecio viscosus* (Sticky Groundsel), *Chamerion angustifolium* (Rosebay Willowherb), *Linaria vulgaris* (Yellow Toadflax), *Echium vulgare* (Viper's Bugloss) and *Reseda lutea* (Wild Mignonette). *Reseda luteola* (Weld), which is also present in open sites, had already been reported by Hopkirk as frequent in the area.

More recently various members of this Society including Morton (1964) and Percy (1964; 1966; 1971) have published plant records for the area. A number of the species concerned had in fact been recorded previously, and were included because they did not appear in the *Atlas of the British Flora*. The following, however, are of interest: *Cicerbita macrophylla* (Blue Sow-thistle), *Melilotus alba* (White Melilot), *Dipsacus fullonum* (Teasel), *Carex acutiformis* (Lesser Pond-sedge), and *Chenopodium polyspermum* (All-seed).

### Floristic Change

So far as problems of identification and changing nomenclature would allow (e.g. *Festuca elatior*, described variously as *F. pratense* and *F. arundinacea* – see Table 1), we have collated the past records mentioned above, and specimens from the area in the Glasgow University and Glasgow Museum Herbaria, to show how the present assemblage of plants has developed over the past 170 years. But the records are inevitably selective, because except for Lee (1865) these Floras cover varying large sections of West Central Scotland and do not give information on individual sites in this area for most species. Those species that are attributed to the Kenmuir district

or to specific sites within it are mainly plants that are or were unusual in the Glasgow area, or associated with distinctive habitats. Thus except for the present day there is no question of constructing complete species lists of the type used in ecological studies. Instead we have partial lists of plants interesting to botanists, which vary a little with the preferences and interests of the individual authors. It needs care, therefore, to extract information on floristic – let alone ecological – change from data of this kind.

## Land Use

The Carmyle area is notable for rich but very sandy soils; sandy alluvium and estuarine and river terrace soils of the Dreghorn and Darvel Series. It is inherently some of the best agricultural land in the West of Scotland, but its quality led at an early stage to the development of estates like Dalbeth, Bogleshole and Daldowie – the last two owned by generations of Bogles from the 16th century. The estates preserved areas of old woodland, especially on the steep edges of the river terraces. Most of these old woods can be traced to the mid-18th century or earlier from old maps; but elsewhere, as at Daldowie, successive landscaping projects by the Bogles and later owners led to complex changes in the distribution of woodland, farmland and grass. Exotic trees and probably other plants have been introduced to the flora in this way. *Humulus lupulus* (Hop) was found by Hennedy at Carmyle and grows now at Clydeside House, possibly having escaped from cultivation. It is possible that *Petasites albus* (White Butterbur), found at Dalbeth by Hennedy but not since, was an escape from Hopkirk's garden. *Centaurea montana*, found at Dalbeth House in the present survey, and less probably *Cardaria draba* (Hoary Cress), may have arrived in the same way.

The area has a long history of sand-quarrying and coal-mining. The introduction of heavy industry, the Clyde Iron and Steel Works, completely changed the area west of Carmyle and mining on the south bank took over much farmland. Today there is no heavy industry or mining, and after a period of dereliction the land is being reclaimed for various uses. The Cambuslang Investment Park west of Carmyle has been landscaped, and a good walkway with recreation areas has been constructed along the river. Enormous quantities of sand are being removed north of Kenmuir Wood preparatory to the building of the extension to the Motorway. The Daldowie estate is divided into three areas; the sewage works, a modern, well run plant; a nursery, which used to belong to

Strathclyde Region but is at present for sale; and Daldowie Crematorium, with spacious tree planted grasslands sweeping down to the river. The river bank below these properties is peaceful and probably little changed from Hopkirk's day. Much of the land south of the river opposite Carmyle and Daldowie remains in agricultural use, with some light industry.

The proposed River Clyde Walkway (Figure 2) crosses over the disused railway bridge at Carmyle, continues upstream on the south bank of the river, and will either turn up the Rotten Calder River, or continue along the south bank of the Clyde to Uddingston. Part of the proposal is that an arm of the walkway giving access to Calderpark Zoo crosses the Clyde by a new pedestrian bridge at Daldowie, making use of a structure that at present supports a sewage pipe. It is hoped that these developments will take account of the present areas of botanical interest, and the floristic changes that can be predicted as a result, for example, of Dutch elm disease.

## Habitat Types

### THE RIVER

By 1872 the Clyde was one of the most heavily polluted rivers in Britain, and indeed the Clyde and the lower reaches of all its tributaries downstream of Motherwell were still grossly polluted by the early 1960's (Hammerton, 1986). Prior to the industrial development of the late 19th century a number of aquatic plants typical of unpolluted water were recorded. In 1813 Hopkirk reported *Zannicella palustris* (Horned Pondweed) in the river near Bogle's Hole Ford, and it was again found near Cambuslang by Lee (1933). Patrick (1833) reported the rare *Groenlandia densa* (Opposite-leaved Pondweed) from the Clyde below Hamilton Bridge. Near the Kenmuir area Patrick identified *Potamogeton natans* (Floating Pondweed), *P. gramineus* (Various-leaved Pondweed), *P. x fluitans* (*P. lucens* x *natans*), *P. perfoliatus* (Perfoliate Pondweed) and *P. lucens* (Shining Pondweed). Hopkirk also reported the Charophytes *Chara vulgaris* and *Nitella fluitans* which, though more cosmopolitan than some of the other species, are still always found in clear water. Later, according to Henedy (1865), what he identified as *Ranunculus fluitans* was frequent in the river from Dalmarnock upwards and this was still luxuriant in the same area at the end of the century (Lee, 1900). Some of this has been re-identified by H. Noltie as *Ranunculus penicillatus* var. *calcareus*, which has been refound today.

Considering that the Clyde was still heavily polluted in the 1960's, it is surprising how many aquatic species have been found in the present survey. *Potamogeton pectinatus* (Fennel-leaved Pondweed) and *Ranunculus* sp. are frequent opposite and below Carmyle and *Potamogeton lucens*, *P. x sparganifolius* and *P. natans* have all been found. *Callitriche stagnalis* and *C. platycarpa*, *Lemna minor*, *Elodea canadensis* and *E. nuttallii*, which is spreading in the Glasgow area; *Alisma* spp., *Sparganium emersum* and *Eleocharis palustris* were all found, some being locally frequent. The rare *Alisma lanceolata*, noted by Hopkirk in the Glasgow area without specific locality, was found at Carmyle in 1962 (Percy, 1966). The moss *Fontanalis antipyretica* and the alga *Cladophora* sp. are very common. This assemblage suggests a mesotrophic river, as the local geology suggests. This is supported by the presence of several species of insects whose aquatic larvae require these conditions, and confirmed by the fact that there are now fish in this part of the Clyde.

## RIVER BANKS

Much of the edge of the river is sandy and large patches of *Phalaris arundinacea* (Reed-grass), which appear to be able to withstand the rise and fall of the water, are helping to stabilise the bank along most of the length of the river. Behind this is an area which is also regularly flooded, over which sand appears to be deposited and removed from time to time. Large areas like this are stabilised by a network of creeping underground rhizomes of Butterbur growing between the large 'saughs' or willows, and are probably not very different from the 'Waterburs . . . on the alluvial flats' seen by Macdonald in 1854, but without the accompanying *Thalictrum flavum*. The Meadow-rue, Primroses, Cowslips etc. he described are however not now to be found, having probably been crowded out by an increase in Butterbur and some of the more recently arrived adventives.

*Impatiens glandulifera* (Himalayan Balsam), for example, is very common on less stable parts of the bank. The common willows here are *Salix fragilis* (Crack Willow), *S. alba* (White Willow), and their hybrids. Behind the low sandy bank there is often a wetter area and here *Cardamine amara* (Large Bitter-cress), first recorded as frequent by Henedy, is now common. In some places, such as between the bridges on the south bank below Cambuslang, the sandy areas are quite extensive. From a study of old maps the bank here appears to have been added to. In this new area are many other

interesting plants such as *Brassica nigra* (Black Mustard), *Limosella aquatica* (Mudwort), which was reported by Lyth (1986), *Coriandrum sativum* (Coriander), *Geranium phaeum* (Dusky Cranesbill) and *Senecio fluviatilis* (Broad-leaved Ragwort). There is also some *Polygonum bistorta* (Bistort) which Lee said was abundant here. Also common here, as at other places on the bank, are *Tanacetum vulgare* (Tansy), *Senecio squalidus* (Oxford Ragwort), *Alliaria petiolata* (Garlic Mustard), *Heracleum mantegazzianum* (Giant Hogweed) and *Symphytum x uplandicum*. The common willows in the more stable parts of the bank are *Salix purpurea* (Purple Willow), and the hybrids *S. x rubra* and *S. x mollissima*, all common basket-making willows and probably planted for this purpose. In a few sandy areas the aggressive *Reynoutria japonica* (Japanese Knotweed) has obtained a foothold.

Behind the sandy area, in places, is a narrow strip of open woodland with many shrubs and perennial herbs. This is bounded behind by farmland or factories or in places by the new walkways. On this part of the bank there is a mixture of trees, shrubs and perennial herbs. *Salix caprea* (Goat Willow) is as common here as *S. fragilis* and most of the trees are female which suggests that they were not planted. *Fraxinus excelsior* (Ash) is common immediately behind the sand banks and *Ulmus glabra* (Wych Elm), *Quercus* spp. (Oaks), *Alnus glutinosa* (Alder) and *Acer pseudoplatanus* (Sycamore), *Corylus avellana* (Hazel), *Crataegus monogyna* (Hawthorn) and *Sambucus nigra* (Elder) are all typical of this area, with occasional *Prunus padus* (Bird Cherry) and *P. spinosa* (Blackthorn).

*Melandrium rubrum* (Red Campion) and *Symphytum tuberosum* (Tuberous Comfrey), which was reported by Lee in 1895, are still abundant in undisturbed wooded places, while *S. x uplandicum* is now one of the most common plants on disturbed areas. Many of the plants on such sites are similarly recent introductions to the Clyde area including *Brassica napus* (Rape), *Hesperis matronalis* (Dame's Violet), *Reynoutria japonica* and *Heracleum mantegazzianum*. *Alliaria petiolata* is locally abundant here on more sandy places. Where the new walkways have been made there are more areas of disturbed ground but when planting has taken place much has been carried out sympathetically with trees and shrubs native to this part of the riverside.

A number of plants now present appear to have spread from sites further up-river. *Senecio fluviatilis* was quoted by Hopkirk as

growing 'in a small island in the Clyde, a little below Bothwell Bridge'. Lee (1900) reported that it had recently obtained a foothold at various points along the North bank below Kenmuir, the only large bed being below Cambuslang Bridge, where it has been refound in the present survey. It also grows on the South bank above Cambuslang Bridge with *Geranium phaeum*, of which there are several stands. In Hopkirk's time as now, this was a rare plant in the Glasgow area, but it grew on the river banks at Blantyre Priory, and there is a herbarium specimen from the bank below Hamilton. *Chamerion angustifolium*, at that time a comparative rarity, was to be found on the banks of the Clyde at Barncluith, also near Hamilton. Later in the century Hennedy (1865) reported it as 'not common, but where found an escape from cultivation'. It was still uncommon, as late as 1958, in the area (MacKechnie, 1958). Although it is not specially common today at Kenmuir there are some stands, which may have spread downstream. *Vinca minor* (Lesser Periwinkle) was reported by Hennedy (1865) from the woods around Hamilton, and was later noted by Lee (1933) at Carmyle: there is also a herbarium specimen dated 1919 from the river bank at Cambuslang. As early as 1777 the Rev. John Lightfoot recorded *Trollius europaeus* and *Saxifraga granulata*, both reported as common by Hopkirk at Kenmuir, from further up the Clyde at Corra Linn (Lightfoot, 1777). Lightfoot also found *Vicia sylvatica* (Wood Vetch) upriver at Lanark. This was found beside a footpath in Kenmuir Wood by 'D. D.', where it seems likely to have been a new arrival as it is unlikely to have been overlooked by Hopkirk (1813).

## MARSHY GROUND AND BOGS

The marsh beside Kenmuir Wood, often mentioned by Hopkirk and Hennedy has been invaded by a large, almost pure stand of *Phalaris arundinacea*. *Carex remota*, once frequent, *C. acutiformis* and *C. ovalis* are present but uncommon, while *C. flacca*, *C. elata*, *C. curta*, *C. panicea* and *C. pulicaris*, all recorded by Hopkirk, have not been refound. Nor has *Platanthera bifolia* (Lesser Butterfly Orchid), which was once frequent in moist meadows around Kenmuir. Dumping associated with road construction behind the marsh has probably changed the drainage pattern.

On the South side of the river near Bogle's Hole Bridge there is a shallow pool and marshy area with a varied assemblage of species including *Hippuris vulgaris* (Mare's Tail), which was rare in Hopkirk's time, *Typha latifolia* (Reedmace), *Sparganium erectum*

(Bur-reed) and *Ranunculus sceleratus* (Celery-leaved Crowfoot). Tussocks of *Festuca arundinacea* (Tall Fescue) occupy much of the area. Most of these species are uncommon today in the district.

To the west of Carmyle is a wet area, the flora of which has become less varied since the drainage was affected by roadworks (Percy, personal communication). Here the common plants are *Iris pseudacorus* (Yellow Flag), *Glyceria fluitans* (Flote-grass) and *Equisetum fluviatile* (Water Horsetail).

## WOODLAND

Woods known to be old, in the Flora of Glasgow region, are very often now dominated by beech and sycamore like those of recent origin. Their age shows only in the ground flora, if at all, and sometimes in signs of former management like coppicing or more often pollarding of the older trees. Coppiced trees are cut at intervals and allowed to grow from ground level, while pollarding involves regular cutting 2-4m above ground to protect the new growth from browsing animals. While a number of woods around Daldowie and on the south bank of the Clyde can be traced to the 18th century, only the following three now show evidence of their early origins.

### *Daldowie Estate, North Bank of the River*

The trees here are mainly beech, apparently planted and in some cases pollarded. All the length of the wood is a steep bank and this is completely carpeted with *Hyacinthoides non-scripta*. On the flatter area at the edge of the river are numerous isolated clumps of *Allium ursinum* (Ramsons) and *Allium paradoxum* (Few-flowered Leek) growing often in quite deep shade. The newcomer *A. paradoxum* appears to be almost as common as *A. ursinum* and often grows alongside it. It was not found locally in 1933 by Lee, who said it was then very rare elsewhere. *Melandrium rubrum* has been found in isolated clumps along the wood and *Symphytum tuberosum*, *Ranunculus ficaria* (Lesser Celandine) and *Myrrhis odorata* (Sweet Cicely) are also locally common. *Cardamine amara* grows in a few wet areas near the edge of the wood. *Valeriana pyrenaica* (Pyrenean Valerian) which was frequent in Hopkirk's time has not been found.

### *Wood beside Daldowie Sewage Works*

All the trees in this wood were probably planted within the last

hundred years, yet there are signs from the understorey that this is the site of an older wood. The trees that make up most of the canopy are *Fagus sylvatica* (Beech) and *Acer pseudoplatanus*, with *Tilia x europaea* (Common Lime), *Aesculus hippocastanum* (Horsechestnut), *Ulmus glabra*, *Quercus* sp. (Oak) and *Sorbus aucuparia* (Rowan) being subsidiary. There is also some *Ilex aquifolium* (Holly). The trees appear to be regenerating well. The most common shrubs are *Sambucus nigra* and *Rubus idaeus* (Raspberry), which in places forms a carpet, with some *Crataegus monogyna*. There is a bank of *Rhododendron ponticum* along the south edge of the wood; *Hedera helix* (Ivy) forms a carpet in places and is found on many trees. It is mainly in the herbs that one can detect signs of old woodland. In places *Hyacinthoides non-scripta* forms a carpet. *Anemone nemorosa* (Wood Anemone), *Oxalis acetosella* (Wood-Sorrel), *Stachys sylvatica* (Hedge Woundwort) are all common. There is a large stand of *Convallaria majalis* (Lily-of-the-valley), which is a plant of ancient woodland in the south but doubtfully native in Scotland. There are a number of ferns in the wood including *Dryopteris dilatata* (Broad Buckler-fern) and *D. filix-mas* (Common Male Fern).

### *Kenmuir Wood*

The extent of this wood is much as it has been for two hundred years or more although recent quarrying behind it seems to have destroyed some of the trees at its upper edge. The trees are very mixed. The western half is basically an Elm wood with much *Fraxinus excelsior*, both showing clear signs of coppice management. *Crataegus monogyna* and *Sambucus nigra*, with some *Corylus avellana*, form an understorey over much of the area. *Fagus*, *Acer* and *Quercus* become more abundant in the middle of the wood, and *Salix* spp. line the river bank. Today most of the elms are dead or dying from Dutch elm disease, and as these comprise most of the canopy in the west end of the wood the future composition of the woodland is uncertain. Some of the elms are suckering, unusually for *U. glabra*. With the opening of the canopy *Crataegus monogyna* is doing very well and in places becoming quite large tree size. At the east end of the wood the *Acer* is much the most important tree, possibly having replaced a mixed group of species like those of the west end after major felling operations, which aroused a public outcry in 1890 because of the popularity of the wood and because a right of way was blocked (Glasgow Herald, 1890). *Fraxinus*, *Corylus*, the occasional *Quercus* and *Alnus glutinosa* together with

*Salix* spp., are found near the river. *Viburnum opulus* (Guelder Rose), once common, has not been found. Lee (1900) commented that its flowers were seen more rarely than in Henedy's time. Today it grows only at Clydeside House. A reduction in the abundance of *Melandrium rubrum* and *Stellaria holostea* (Greater Stitchwort) was also noted and attributed to the cutting of the trees, but both species are present in quantity today.

Some of the plants once common or frequent here have not been found because there has probably been a large increase in many rank tall herbs such as *Arrhenatherum eliatum* (Oat-grass), which was noted as common here by Lee in 1895, and *Epilobium hirsutum* (Great Hairy Willowherb), which probably spread after the trees were cut down in 1890, and because some pioneer plants such *Symphytum x uplandicum*, *Petasites hybridum*, *Impatiens glandulifera* and *Reynoutria japonica* have moved in and probably taken their place. Of two interesting records by 'D.D.', *Vicia sylvatica* and *Carex pendula*, only one plant of *C. pendula* has been seen recently. *Sanicula europaea* (Sanicle), which was frequent according to Hopkirk has not been found in or near the wood and only a few spikes of *Campanula latifolia* (Greater Bell-flower) are present at the east edge of the wood.

A number of plants still abundant in the herb layer suggest that the wood is of long lineage, particularly *Hyacinthoides non-scripta* and *Mercurialis perennis* (Dog's Mercury), which are abundant. These have been found in England to move very slowly into new woodland, even that adjoining ancient woodland. The age of the wood is confirmed by the former presence of *Sanicula europaea* and *Anemone nemorosa*, although the detailed relationship between woodland age and herb layer composition has still to be worked out for Western Scotland.

*Lonicera periclymenum* (Honeysuckle) which was once present has not been found in the present survey, nor has *Anemone nemorosa*. Of the woodland grasses we have found *Poa nemoralis*, *Festuca gigantea*, *Bromus ramosus* and *Brachypodium sylvaticum* (found by Henedy), but we have failed to find *Festuca altissima* (found in Kenmuir by Hopkirk) or *Melica uniflora* (found by Henedy).

On the river bank one can still find the tiny *Adoxa moschatellina*, which was first recorded by Henedy. It grows, in places in some profusion, in sandy soil just above the highest water level, and *Saxifraga granulata* can still be found nearby in the same

habitat. *Stellaria nemorum* (Wood Stitchwort), which was not common last century, is frequent near the river bank. *Lamium album* (White Dead-nettle) is common all along the bank in patches. Hennedy described it as a plant of roadsides and riverbanks which was common in the east of Scotland but just beginning to spread into the west where it had been rather scarce. *Cardamine amara*, which according to Hopkirk grew in moist woods in this area, is still common in places, although it is more common in damp open areas behind the open sandy banks. *Crepis paludosa* (Marsh Hawksbeard), which was reported by Hennedy in 1891 as common 'in moist woods' and in particular at Kenmuir Bank, has been refound only at one site there. *Trollius europaeus*, once common, seems to have disappeared. One of its sites was beside the spring called the Marriage Well, near the east end of the wood, and here *Petasites albus* has obtained a foothold. It is also the site for *Carex pendula*. It is of interest that this, which was Hennedy's site and is certainly very wet, is the only place where *Equisetum hyemale* (Dutch Rush) has been found. Hennedy found it not to be a common plant, yet Hopkirk found it growing 'plentifully' on the banks of the Clyde between Carmyle and the ford. At the west end of the wood *Petasites hybridus* and *Impatiens* are invading from the sandy bank and spreading right into the shady parts of the wood.

## ARABLE LAND

There are now no arable fields within the area. They have been replaced entirely by permanent pasture, the weeds of which were present earlier in the flora. Most of the traditional cornfield weeds, including some species indicative of sandy arable ground, probably disappeared due to changes in cropping practice even before the loss of their habitat. They included *Centaurea cyanus* (Cornflower), *Papaver rhoeas* (Field Poppy), *Linum usitatissimum* (Cultivated Flax), *Sinapis arvensis* (Charlock), *Chaenorhinum minus* (Small Toadflax), *Agrostemma githago* (Corn Cockle) and *Scandix pectenvenersis* (Shepherd's Needle) which were 'common in cultivated fields' at Hopkirk's time, but were mostly rare when Hennedy was writing about the area, with only the persistent Charlock as 'very common in cornfields etc.' *Adonis annua* (Pheasant's eye), which occurred occasionally according to Hopkirk, was 'very rare' by Hennedy's time with only one site, 'Cornfield near Tollcross' given. If one can judge from the fact that *Cuscuta* spp. (Dodder), which parasitise flax, had become rare, it would appear that flax had become a less common crop in this area.

## Discussion

A table of species that have appeared or disappeared during the period studied would be a useful guide to the habitats that have been destroyed, impoverished or created. Such a table is difficult to compile, because a complete species list for the Kenmuir area as defined here is available only for the present day. The earlier lists are all incomplete, partly because a few species will have been overlooked in each of the surveys, but more seriously because of the selectivity with which locations within the area are reported in each early survey, as explained above under 'Floristic Change'. Nevertheless certain individual plants have clearly arrived or become extinct: species consistently missing from all the early records but abundant today may be assumed to be genuine arrivals, and species mentioned in the earliest floras but not found by later botanists including ourselves are presumably extinct.

On these criteria Table 2 was constructed. All habitats except, of course, waste ground have lost some species. Relative to the total number of species present, the losses have been most severe from arable land, marshy ground and woodland. The river species, though reduced, are beginning to re-emerge as their environment improves. Industry, roadbuilding and drainage operations have disrupted the natural drainage pattern over parts of the area, but there has probably been little change in the nutrient status of the soils since they are naturally highly basic by West Scottish standards. The rare and interesting woodland and river-bank flora of the area has certainly been eroded, and over-picking by naturalists and the public over 150 years has probably contributed to this. A good deal of it remains, however, and vegetational changes like the loss of the elms by disease, and the spread of *Impatiens*, *Petasites*, *Symphytum x uplandicum* and other invading species on the river banks, have probably altered areas as large as those destroyed by the direct effect of man. New habitats have been created on waste ground by the demise of industry, and these support a flora that would have been strikingly unfamiliar to Hopkirk in 1815.

Table 1 Status of Plants from the Kenmuir District of the Clyde, 1815-1988

Notes to Table 1

- (1) An entry in square brackets means that the species was found by an author (e.g. Lee) within the Clyde Region but that no specific location in the Kenmuir Area was given by him. When the author did give a location in the Kenmuir Area, but the abundance applied to a wider region, only the abundance is bracketed.
- (2) Abbreviations used: D.D. = David Don, P. = Patrick (1831), B.A. = British Association (1876), (1933) = Lee (1933), Mack. = Mackechnie (1958), H. = Herbarium specimen, F.O.G. = Status in Glasgow as determined by Flora of Glasgow Survey, 1986-88.
- (3) Nomenclature follows Clapham, A.R., Tutin, T.G. & Warburg, E.F., 1981, *Excursion Flora of the British Isles*, Ed. 3.

SPECIES	HOPKIRK (1813)	HENNEDY (1865-91)	LEE (1900) and others	TODAY	F.O.G. STATUS
<i>Adoxa moschatellina</i>	[Woods, hedges: frequent]	Banks: Carmyle, Kenmuir: [frequent]	Common: woods	Common: woods at edge of river	Rare, decreasing
<i>Alliaria petiolata</i>	-	Carmyle, Kenmuir; [frequent]	Here and there among butterbars	Very common, probably spreading	Common
<i>Allium paradoxum</i>	-	-	-	As common as <i>A. ursinum</i> , often growing alongside it	Rare, locally abundant
<i>A. vineale</i>	Woods: Daldowie	Banks: Carmyle	Looked for, not found	-	Very rare
<i>Anagallis minima</i>	Bog: Kenmuir	-	-	-	<i>Extinct</i>
<i>Anemone nemorosa</i>	-	Banks: Carmyle, Kenmuir: [frequent: woods]	-	Kenmuir & Daldowie Woods	Uncommon

Table 1 continued

SPECIES	HOPKIRK (1813)	HENNEDY (1865-91)	LEE (1900) and others	TODAY	F.O.G. STATUS
<i>Brachypodium sylvaticum</i>	—	Woods: Carmyle, Kenmuir: [frequent]	—	Kenmuir & Daldowie Woods	Uncommon
<i>Brassica nigra</i>	—	Carmyle: [rare]	—	Locally very common	Uncommon
<i>Campanula latifolia</i>	Banks: Daldowie, Kenmuir: [not infrequent]	Banks: above Carmyle: [frequent]	Woods: both sides of river: very common	Kenmuir Wood, one site only	Uncommon
<i>Carex acuta</i>	[Frequent]	Banks: Carmyle, Kenmuir: [frequent]	One site only	—	Extinct?
<i>C. curta</i>	Bog: Kenmuir: plentifully	[Very common]	[Very common]	—	Very rare
<i>C. elata</i>	Bog: Kenmuir, Daldowie: [occasionally]	—	—	—	Extinct
<i>C. flacca</i>	Bog: nr. Daldowie	[Common]	—	—	Uncommon
<i>C. hirta</i>	[Frequent]	Bank: Kenmuir: [frequent]	Marriage Well	Marriage Well & other sites	Uncommon
<i>C. ovalis</i>	—	—	—	Bog: Kenmuir	Very common
<i>C. panicea</i>	Bogs: Kenmuir, Dalbeth	[Common]	—	—	Uncommon
<i>C. paniculata</i>	Daldowie, Kenmuir: [frequent]	Quoted Hopkirk	—	—	Very rare
<i>C. pendula</i>	Kenmuir (D.D.)	Bank: Kenmuir near Marriage Well	Marriage Well & bank opposite	Possibly one site: Kenmuir Wood	Very rare
<i>C. pulicaris</i>	Marsh: Kenmuir	—	—	—	Very rare
<i>C. remota</i>	Daldowie, Carmyle: [frequent]	Bank: Kenmuir: [frequent]	—	Bog: Kenmuir	Rare

Table 1 continued

SPECIES	HOPKIRK (1813)	HENNEY (1865-91)	LEE (1900) and others	TODAY	F.O.G. STATUS
<i>C. riparia</i>	Banks: Carmyle, Kenmuir: [frequent]	Quoted Hopkirk	—	—	Extinct?
<i>Carum carvi</i>	In the Haugh, Dalbeth	Quoted Hopkirk	Dalbeth	—	Very rare
<i>Chamerion angustifolium</i>	Upriver only	Escape only	Local in 1958 (Mack.)	Frequent	Ubiquitous
<i>Chaenorhinum minus</i>	Tollcross only	Tollcross only	—	—	Uncommon
<i>Chaerophyllum temulentum</i>	[Common]	[Very common]	Kenmuir: abundant before 1890 when trees cut	—	Very rare
<i>Carduus acanthoides</i>	—	—	—	Occasional	Uncommon
<i>Cirsium helenioides</i>	Daldowie	Daldowie	—	—	Very rare
<i>Coeloglossum viride</i>	Wood: Daldowie	Wood: Daldowie	—	—	Extinct
<i>Daucus carota</i>	Bank: Clyde Ironworks	Bank: Clyde Ironworks	—	—	Very Rare
<i>Doronicum pardalianches</i>	Upriver only	Banks: below Carmyle: [rare]	Common	—	Very rare
<i>Echium vulgare</i>	—	—	[Locally abundant in 1958 (Mack.)]	Uncommon	Uncommon
<i>Epipactis helleborine</i>	Dalbeth	[Frequent]	—	—	Common
<i>Equisetum hyemale</i>	Between Carmyle Mill & ford: plentifully	Below Carmyle, Marriage Well	Kenmuir: H. (1967)	One site at Marriage Well	Very rare

Table 1 continued

SPECIES	HOPKIRK (1813)	HENNESSY (1865-91)	LEE (1900) and others	TODAY	F.O.G. STATUS
<i>E. pratense</i>	—	S. bank near Newton	—	—	Extinct
<i>Festuca altissima</i>	Bank: Kenmuir	Bank: Kenmuir	B.A.	Carmyle: as <i>F. calaminta</i> (Percy, 1954)	Extinct
<i>F. arundinacea</i> (or <i>pratensis</i> )	[Occasionally]	[Banks: Clyde: very common]	Recorded	Most sites	Common
<i>Galium odoratum</i>	—	Banks: Kenmuir, Carmyle: common	Uncommon since woods cut	—	Uncommon
<i>G. molluga</i>	Carmyle	Quoted Hopkirk	Probably extinct	—	Rare
<i>G. boreale</i>	Banks: Carmyle, Dalbeth: frequent	Banks: Carmyle, Dalbeth: frequent	Same sites: spreading	—	Extinct
<i>Geranium phaeum</i>	Upriver only	Bank: Kenmuir near Marriage Well	—	Two sites, bank: Cambuslang	Very rare
<i>G. pratense</i>	—	Bank: Kenmuir	Carmyle: one or two places	Kenmuir Wood edge, Cambuslang bank	Uncommon
<i>G. sylvaticum</i>	Banks: Kenmuir: frequent	Woods: Kenmuir: frequent	Woods: Carmyle	Clydesdale House & one other site	Rare
<i>Heracleum mantegazzianum</i>	—	—	—	Banks: locally very common	Uncommon
<i>Hesperis matronalis</i>	—	[Occasional escape]	—	Locally common, perhaps increasing	Common
<i>Hippuris vulgaris</i>	—	—	[Not rec. locally in 1959 (Mack.)]	Locally common	Uncommon

Table 1 continued

SPECIES	HOPKIRK (1813)	HENNEY (1865-91)	LEE (1900) and others	TODAY	F.O.G. STATUS
<i>Hypericum tetrapterum</i>	-	Carmyle, Kenmuir	Banks: common in open areas	One site only	Uncommon
<i>Impatiens glandulifera</i>	-	-	-	Banks: abundant	Common
<i>Lamium album</i>	-	Opposite and above Clyde Ironworks	Spreading	Banks: very common	Uncommon
<i>Linaria vulgaris</i>	-	-	-	Local, bare ground	Very common
<i>Lotus uliginosus</i>	Banks: above Daldowie (D.D.)	-	-	One site only	Very common
<i>Luzula pilosa</i>	-	Bank: Kenmuir: [frequent]	-	Kenmuir bog	Uncommon
<i>Lysimachia nummularia</i>	Banks: Kenmuir: [frequent]	-	Once frequent, not found	-	Very rare
<i>L. vulgaris</i>	-	-	Kenmuir, Carmyle: rare (1933)	Kenmuir	Very rare
<i>Melica uniflora</i>	Upriver only	Kenmuir Bank: [frequent]	-	-	Very rare
<i>Melilotus alba</i>	-	-	Was present, now absent (1933)	Carmyle: (Morton, 1964)	Rare
<i>Myrrhis odorata</i>	-	-	Here & there along the bank	Locally common	Common
<i>Petasites albus</i>	-	One site, Dalbeth	-	Near Marriage Well only	Rare

Table 1 continued

SPECIES	HOPKIRK (1813)	HENNESSY (1865-91)	LEE (1900) and others	TODAY	F.O.G. STATUS
<i>Platanthera bifolia</i>	Kenmuir: [moist meadows: frequent]	Same as Hopkirk	-	-	Extinct
<i>Potamogeton fluitans</i> (probably <i>P.x.sparganifolius</i> )	Dalbeth	-	-	(P.xs) Weir, opposite Carmyle, below Cambuslang Bridge	Very rare
<i>P. gramineus</i>	Below Hamilton Bridge (P.)	[Clyde: frequent]	-	Bogie's Hole Bridge	Very rare
<i>P. lucens</i>	[Clyde: frequent]	[Clyde: common]	-	Below Cambuslang Bridge	Very rare
<i>P. pectinatus</i>	-	[Clyde: frequent]	-	Frequent	Rare
<i>P. perfoliatus</i>	Below Hamilton Bridge (P.)	-	-	Weir, opposite Carmyle	Very rare
<i>P. polygonifolius</i>	-	-	-	Occasional	Very rare
<i>Potentilla sterilis</i>	-	Banks: Carmyle etc. [very common]	-	-	Uncommon
<i>Primula vulgaris</i>	[Common]	[Woods: common]	Rare: Kenmuir district	Looked for, not found	Uncommon
<i>Prunus avium</i>	-	Woods: Kenmuir, Carmyle: [frequent]	Carmyle: S. bank abundant. Kenmuir: some	Kenmuir: local	Uncommon
<i>P. padus</i>	Banks: frequent	Woods above Carmyle: [frequent]	Both sides of river	One site, S. bank	Rare

Table 1 continued

SPECIES	HOPKIRK (1813)	HENNESSY (1865-91)	LEE (1900) and others	TODAY	F.O.G. STATUS
<i>P. spinosa</i>	[Common]	[Common]	S. bank above Carmyle: not common	S. bank below Cambuslang Bridge: not common	Uncommon
<i>Pyrola media</i> (probably <i>P. minor</i> )	Dalbeth	—	—	—	<i>P. minor</i> is very rare
<i>Ranunculus auricomus</i>	Banks: Kenmuir	Banks: Carmyle, Kenmuir: frequent	Extinct	—	Very rare
<i>R. fluitans</i> (prob.) <i>R. penicillatus</i> var. <i>calcareus</i> )	[In Clyde, frequent]	[Frequent: Clyde]	Common	Common	Very rare
<i>Reseda lutea</i>	—	—	New to area in 1958 (Mack.)	Local	Uncommon
<i>R. luteola</i>	Banks: Bogle's Hole: [frequent]	Clyde Ironworks, below Carmyle	Bogle's Hole: rare, bings (Mack.)	Local	Frequent
<i>Reynoutria japonica</i>	—	—	—	Locally common	Ubiquitous
<i>Rumex sanguineus</i> var. <i>viridis</i>	—	Banks: Dalbeth, Carmyle	—	Uncommon	Uncommon
<i>Salix alba</i>	[Banks of Clyde: frequent]	[Banks of Clyde: very common]	—	Occasional	Common
<i>S. alba</i> var. <i>vitellina</i>	[Banks of Clyde: frequent]	[Commonly cultivated]	—	Occasional	Only recorded banks of Clyde
<i>S. fragilis</i>	—	[Banks of Clyde: common]	Characteristic tree of area	Common	Common

Table 1 continued

SPECIES	HOPKIRK (1813)	HENNEDY (1865-91)	LEE (1900) and others	TODAY	F.O.G. STATUS
<i>S. x mollissima</i>	—	—	—	Locally common	Only recorded banks of Clyde
<i>S. pentandra</i>	Marsh near Kenmuir, banks; Dalbeth	Banks: Dalbeth	—	Occasional, planted	Rare
<i>S. purpurea</i>	—	—	Very common	Common	Rare
<i>S. p.</i> var. <i>helix</i> ( <i>poss. S. x rubra</i> )	[Banks of Clyde: frequent]	Banks: Dalbeth	Common	Very common	Very common
<i>S. viminalis</i>	[Marshes: frequent]	Banks: Dalbeth	—	Occasional	Common
<i>Sanicula europaea</i>	Wood; Kenmuir: [frequent]	Bank: Kenmuir: [frequent]	[Woods: common]	—	Uncommon
<i>Saxifraga granulata</i>	Banks: Bogle's Hole, Carmyle: frequent	Banks: Carmyle, Bogle's Hole: frequent	Bank: opposite Carmyle	Bank: Kenmuir & above; occasional	Very rare
<i>Scirpus sylvatica</i>	—	Banks: Kenmuir	—	Kenmuir Wood	Rare
<i>Senecio viscosus</i>	—	—	New to area in 1958 (Mack.)	Locally common	Common
<i>S. fluviatilis</i>	Upriver only	Upriver only	One stand below Cambuslang Bridge	Several stands: extensive below Cambuslang Bridge	Very rare
<i>Stellaria nemorum</i>	—	Woods: Kenmuir, Carmyle	Woods: abundant	Banks, woods: frequent	Uncommon
<i>Symphytum officinale</i>	[Banks of Clyde: not very common]	—	Rare	Rare	Uncommon

Table 1 continued

SPECIES	HOPKIRK (1813)	HENNEDY (1865-91)	LEE (1900) and others	TODAY	F.O.G. STATUS
<i>S. tuberosum</i>	Banks: Daldowie etc.: very common	Banks: Bogle's Hole to Kenmuir: common	Abundant	Not common	Common
<i>S. x uplandicum</i>	—	—	—	Abundant	Common
<i>Thalictrum flavum</i>	Banks: Dalbeth	Banks: Dalbeth [Banks: Carmyle (Balfour, 1844)]	—	—	Extinct
<i>Triglochin palustre</i>	Bog: Dalbeth	—	—	—	Rare
<i>Trollius europaeus</i>	Banks: Daldowie, Kenmuir: occasional	Banks: Daldowie, Kenmuir: frequent	Bank: Marriage Well	—	Extinct
<i>Valeriana pyrenaica</i>	Daldowie Wood (H.)	—	Daldowie	—	Rare: locally abundant
<i>Veronica scutellata</i>	Kenmuir Bog	—	—	—	Very rare
<i>Vicia sylvatica</i>	Kenmuir Wood (D.D.)	—	—	—	Extinct
<i>Vinca minor</i>	Upriver only	Upriver only	Carmyle (1933)	Kenmuir	Rare
<i>Viburnum opulus</i>	Carmyle, Kenmuir	Carmyle, Kenmuir	Common	Two sites only	Uncommon
<i>Zannichellia pallustris</i>	Bogle's Hole Ford	Bogle's Hole Ford	—	—	Very rare

**Table 2. Numbers of species missing from early surveys but found today ('additions') or present in the nineteenth century but not recorded recently ('extinctions'), with total number of species found today in each habitat.**

<i>Habitat</i>	<i>Total No.</i>	<i>'Additions'</i>	<i>'Extinctions'</i>
Woodland	67	3	16
River Banks	127	9	15
River	14	9	6
Marshes	50	3	11
Arable Land	—	—	11
Waste Ground	104	10	—

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## Obituary

### **ALASTAIR A. R. HENDERSON MA, PhD, (1937-1988)**

Alastair Henderson's recent death has saddened all of us who knew him. He was a good and loyal friend and a loving father to his two daughters of whom he was very proud.

Four years ago he presented his fine herbarium to Glasgow Museum. It had its own meticulously prepared catalogue and was already arranged in systematic order. The collection gives an account of his travels and confirms what I already knew of Alastair that he loved the Scottish mountains. He was always a keen hill-walker and had a sharp eye for interesting plants. The plants come from places as widely separated as Sutherland and Somerset, although many specimens were collected from around Aberdeen. He made a special study of the sea cliffs in Kincardineshire, particularly around St Cyrus; and he must have spent many hours walking the hills of Angus and the East Cairngorms. He collected over a period of 35 years, starting when he was only about 10 years old. Alastair's botanical interests began with his father Murray Ross Henderson, who was Director of the Botanical Gardens, Singapore, whose memoirs were published recently by Alastair under the title 'Malayan Journal'. He obviously influenced Alastair's habit of recording carefully whatever he collected.

Alastair joined the Glasgow Natural History Society in 1972, attending more of the outdoor than the indoor activities. While he was very knowledgeable about the Scottish flora, his other great love was the flora of Greece and Crete. Over the years he had made a special study of the flowers associated with the past and the present in these lands and he had planned a major work on this theme; it is sad that he never realised this ambition.

*AGNES WALKER*

## The Bryophytes of Little Cumbrae with Additional Records for Great Cumbrae

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### Little Cumbrae

Little Cumbrae is situated in the Firth of Clyde to the south of Great Cumbrae in the 10-km National Grid Square NS/15 and V.C. 100 (Clyde Isles) and is approximately 3km long and 1½ km wide. Its summit is a little over 400 ft.

The island is composed mainly of basalt with some calciferous sandstone. The variety of habitats includes moorland, heath, bogs, a loch and smaller pools, rock outcrops, wet cliffs and caves, streams, shore rocks and turf. There is a gull colony near the summit and rabbit burrows on the hill slopes but there is little human interference and no farming. The scarcity of trees and walls and the absence of hedges aggravates an already very exposed situation. Bracken, *Pteridium aquilinum*, with an understorey of bluebells, *Endymion non-scriptus*, is dominant over much of the sloping ground shading and sheltering the ground beneath.

Records in the literature specifically for Little Cumbrae are few. Boyd (1907) names one species. Crundwell gives two new V.C. 100 records for the island (Warburg, 1958).

I recorded bryophytes on Little Cumbrae on May 7th 1985, July 24th 1986 and May 11th, 12th and 15th, 1987.

### Check list of taxa

The nomenclature follows Corley and Hill (1981). \* signifies a new vice-county record. † indicates a taxon not yet recorded on Great Cumbrae.

## Hepaticae

- Reboulia hemisphaerica*.† Wet rocks of cave.  
*Conocephalum conicum*. Wet rocks of cave.  
*Metzgeria fruticulosa*.\*† Elders.  
*M. furcata*. Rocks and elders.  
*Riccardia chamedryfolia*. Wet cliffs.  
*Barbilophozia floerkei*. Peaty banks and rock.  
*Lophozia ventricosa* var. *ventricosa*.\*† Amongst rocks above shore.  
*Nardia scalaris*.† Moorland knoll, in shade of rocks.  
*Lophocolea bidentata*. Amongst rocks, mouth of rabbit burrow.  
*L. cuspidata*. Amongst shaded rocks.  
*Chiloscyphus polyanthos*. Wet rocks of cave.  
*C. pallescens*. Bank of stream.  
*Saccogyna viticulosa*. Wet cliff.  
*Diplophyllum albicans*. Moorland, rock.  
*Scapania compacta*. Rocky knoll and cliff.  
*S. undulata*. Wet cliff and bank of stream.  
*S. gracilis*. Rocks above shore.  
*Calypogeia fissa*. Wet rocks of cave.  
*Ptilidium ciliare*.† Heathy knoll, over rocks, under bracken.  
*Frullania tamarisci*. Rocks above shore.  
*F. dilatata*. Elder, rock above shore.

## Musci

- Sphagnum papillosum*. Boggy ground by pool.  
*S. palustre*. Bog, amongst grass on moor.  
*S. squarrosum*. Edge of loch, bog.  
*S. fimbriatum*. Bog.  
*S. capillifolium*. Bog.  
*S. auriculatum* var. *auriculatum*. By bog pool, amongst grass on moor.  
*S. auriculatum* var. *inundatum*.† Boggy area beside loch.  
*S. recurvum* var. *mucronatum*. Bog.  
*Andreaea rupestris* var. *rupestris*.† Rocks on hills.  
*A. rothii* var. *rothii*. Rocks on hills.  
*Polytrichum alpinum* var. *alpinum*. Rocks above shore.  
*P. commune* var. *commune*. Bog, moorland.  
*P. piliferum*. Rocks above shore, cliff, rocky knoll.  
*P. juniperinum*. Amongst rocks.  
*P. alpestre*. Amongst *Sphagnum*.  
*Pogonatum aloides*. Mouth of rabbit burrow.  
*Atrichum undulatum* var. *undulatum*. Mouth of rabbit burrow.  
*Ceratodon purpureus* ssp. *purpureus*. Rocks.  
*Dicranella heteromalla*. Mouth of rabbit burrow, soil under bank.  
*Dicranoweisia cirrata*. Rocks, cliff.  
*Dicranum bonjeanii*. Bank by path near loch.

- D. scoparium*. Moorland, rocks, bog.  
*D. majus*. Under bracken on hillside.  
*Campylopus pyriformis* var. *pyriformis*. Peat by loch.  
*C. paradoxus*. Amongst rocks above shore, cliff, bare peat.  
*C. introflexus*. Bare peat.  
*Leucobryum glaucum*. Under bracken on hillside.  
*Fissidens curnovii*. Amongst *Riccardia chamedryfolia* on wet cliff.  
*F. cristatus*. Rocks and cliff face.  
*F. adianthoides*. Rocks near shore, cave, bank of stream.  
*Barbula convoluta* var. *convoluta*. Path near boat-landing.  
*Trichostomum brachydontium*. Amongst rocks by shore, wet cave.  
*Schistidium maritimum*. Shore rocks.  
*Grimmia pulvinata* var. *pulvinata*. Rocks.  
*G. trichophylla* var. *trichophylla*. Rocks.  
*Racomitrium aciculare*. Rock above *Xanthoria* zone.  
*R. aquaticum*. Inland cliff.  
*R. heterostichum*. Rocks.  
*R. lanuginosum*.† Rocks, boulders above W. shore.  
*Ptychomitrium polyphyllum*. Rock on hillside.  
*Funaria hygrometrica*. Beside path near house.  
*Pohlia nutans*. Turf near shore, moorland, amongst mosses on cliff.  
*Bryum inclinatum*. Amongst turf and rocks on raised beach.  
*B. capillare* var. *capillare*. Rocks.  
*B. pseudotriquetrum*. Wet rocks in cave, amongst turf and rocks on raised beach, bank of stream.  
*B. alpinum*.† Wet cliffs and cave, rocks of raised beach.  
(*B. alpinum* var. *viride*. \* (Crundwell, 1957). Variety not now recognised.)  
*B. bicolor*. Summit rocks.  
*B. argenteum* var. *argenteum*. Path near house, rocks by gull colony.  
*Mnium hornum*. Turf above shore, cave.  
*Plagiomnium affine*. Amongst *Dicranum scoparium* under bracken.  
*Plagiomnium undulatum*. Cave.  
*Plagiomnium rostratum*.† Stone in stream.  
*Aulacomnium palustre* var. *palustre*. Moorland, by bog pool, turf above shore.  
*Philonotis fontana*. Wet cliff, ground by spring.  
*Amphidium mougeotii*.† Rocks near *Xanthoria* zone, wet cliffs.  
*Zygodon conoideus*. Elders.  
*Ulota phyllantha*. Elders, shore rocks.  
*Hedwigia ciliata*.† Boulders of raised beach, rock outcrops, cliff.  
*Hedwigia integrifolia*. \*† Summit rocks (Crundwell, 1957).  
*Fontinalis antipyretica* var. *antipyretica*.† Wet cliff, stone in stream.  
*F. antipyretica* var. *gigantea*. \*† Wet rocks on cave, rock in stream.  
*Climacium dendroides*.† Turf at limit of *Xanthoria* zone.  
*Pterogonium gracile*. Rocks. (Confirms Boyd, 1907).  
*Thamnobryum alopecurum*. Wet rocks of cave.  
*Hookeria lucens*. Wet rock, bank of stream.

- Cratoneuron filicinum* var. *filicinum*. Turf on raised beach.  
*Campylium stellatum*. Turf above shore.  
*Amblystegium serpens* var. *serpens*. Turf of raised beach.  
*Drepanocladus aduncus*.† Dried-up bog pool.  
*D. fluitans* var. *fluitans*. Bog.  
*D. exannulatus* var. *rotae*. Bog pool.  
*Calliargon stramineum*.† Amongst *Sphagna* in bog, border of loch.  
*C. cordifolium*.† Border of loch, beside stream.  
*C. cuspidatum*. Amongst turf of raised beach, by spring, wet cliff.  
*Isoetecium myosuroides* var. *myosuroides*. Rocks.  
*Homalothecium sericeum*. Rocks near shore, elders, wet cliff.  
*Brachythecium albicans*. Rocks above shore, summit rocks.  
*B. rutabulum*. Ground by path, by flush, wet rocks, elders, edge of loch.  
*B. rivulare*. Wet rocks of cave, stone in stream.  
*B. plumosum*. Rock near spring.  
*Pseudoscleropodium purum*. Rock above shore, amongst grass on hillside.  
*Rhynchostegium riparioides*. By spring, wet rocks in cave.  
*Eurhynchium praelongum* var. *praelongum*. Amongst rocks and grass, on elders, willow, cave.  
*E. swartzii* var. *swartzii*. Foot of cliff, wet cave.  
*Plagiothecium succulentum*. Amongst mosses on wet cliff.  
*P. nemorale*. Wet rocks in cave, sheltered crevice in rock.  
*P. undulatum*. With *Sphagna* by bog pool.  
*Isoeterygium elegans*. Mouth of rabbit burrow, under vegetation at foot of dripping cliff.  
*Hypnum cupressiforme* var. *cupressiforme*. Rocks, turf above shore.  
*H. cupressiforme* var. *resupinatum*. Elders, willow, rocks.  
*H. cupressiforme* var. *lacunosum*. Rocks.  
*H. mammillatum*. Rocks, cliff.  
*H. jutlandicum*. Under heather.  
*Rhytidiadelphus squarrosus*. Amongst grass, turf near sea.  
*Pleurozium schreberi*. Heathy knoll, moorland.

## Great Cumbrae

The following list gives taxa additional to Cocking (1985). It includes species recorded by Rhind and Waters (pers. comms.). Recording was carried out in May 1985, July 1986 and May 1987. \* signifies a new vice-county record for V.C.100. The numbers following the taxa refer to 1-km grid squares (Cocking 1985). Nomenclature follows Corley and Hill (1981).

### Hepaticae

- Plagiochila killarniensis*. \* Scree. 55 (Rhind 1987).  
*Nowellia curvifolia*. Rotting log. 76 (also Waters *et al* 1986).

*Porella platyphylla*. \* Rocks. 74.  
*Marchesinia mackaii*. Rocks. 74 (also Waters *et al* 1986).

### Musci

*Sphagnum tenellum*. Amongst *S. compactum* beneath heather. 66.  
*Polytrichum alpinum* var. *alpinum*. Rocks and wall top. 66 (Confirms Balfour 1856).  
*Pseudephemerum nitidum*. \* Bare soil in rough pasture. 76.  
*Fissidens viridulus*. Damp soil at foot of cliff. 74.  
*Barbula vinealis*. Tarmac path, UMBS. 74.  
*Eucladium verticillatum*. Damp foot of cliff. 74.  
*Physcomitrium pyriforme*. \* Bare soil in rough pasture. 76.  
*Pohlia camptotrachela*. Bare soil in rough pasture. 76.  
*Bryum sauteri*. \* Bare soil in rough pasture. 76.  
*Plagiomnium affine*. \* Amongst mosses over rocks, woodland floor. 56, 74.  
*Zygodon viridissimus* var. *stirtonii*. Elders and rocks. 53, 54, 74.  
*Zygodon conoideus*. Elders. 74.  
*Orthotrichum rupestre*. Rocks. 74.  
*Orthotrichum tenellum*. Elders. 74.  
*Neckera complanata*. Rocks. 74 (also Waters *et al* 1986. Confirms Balfour 1856).  
*Anomodon viticulosus*. \* Rocks. 74 (also Waters *et al* 1986).  
*Isoetecium myurum*. Rocks. 74.  
*Rhynchostegiella tenella*. Damp foot of cliff. 74. (Confirms Murray 1901).

### New vice-county records

The above lists contain twelve, valid, new records for V.C. 100. The identification of *Lophozia ventricosa* var. *ventricosa* rests mainly on the nature of the oil-bodies which need to be examined in fresh, well-grown material. It is possible that some of the *L. ventricosa* recorded on Great Cumbrae (Cocking, 1985) is this variety although var. *silvicola* is also quite common in Scotland. *Metzgeria fruticulosa* is recorded on the mainland on both sides of the Firth of Clyde. *Fontinalis antipyretica* var. *gigantea* differs from var. *antipyretica* on the basis of size and shape of leaf. Of the two records made by Crundwell, *Hedwigia integrifolia* is the most interesting. It is a moss with an Atlantic distribution found on exposed rocks. *Bryum alpinum* var. *viride* is no longer distinguished as a separate variety. *Plagiochila killarniensis* has only been recognised as a species distinct from *P. spinulosa* for about a decade and may have been confused with that species in the past. *Porella platyphylla* and *Anomodon viticulosus* favour base-rich habitats. *Pseudephemerum*

*nitidum*, *Physcomitrium pyriforme* and *Bryum sauteri* could easily have been overlooked due to their small size and ephemeral nature. *Plagiomnium affine* is not always easy to distinguish from related species.

### Conclusion

My survey of Little Cumbrae resulted in a total of 116 taxa of which 21 are liverworts and 95 are mosses. The smaller area of Little Cumbrae and the fewer kinds of habitat, particularly the scarcity of trees and walls, are most likely to be responsible for a less diverse bryophyte flora than that found on Great Cumbrae.

There is now a total of 200 taxa recorded for Great Cumbrae of which 46 are liverworts and 154 are mosses. 5 liverworts and 14 mosses recorded on Little Cumbrae have not been recorded for Great Cumbrae. The total for the two islands together is 51 liverworts and 168 mosses making 219 bryophytes in all, further emphasizing the considerable bryophyte diversity of these two small islands.

### Acknowledgments

I wish to thank the following: Mr Peter Kaye, the owner of Little Cumbrae, for kindly allowing me to visit his island to make my records; Professor J. A. Allen of the University Marine Biological Station, Millport, whose help and encouragement made the surveys possible; Dr P. Rhind of the U.M.B.S., Millport, and Dr S. Waters of Royal Holloway and Bedford New College, University of London, for sending me their records; and Dr A. W. Cocking for his continual encouragement.

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## The Natural History of the Muck Islands, North Ebeudes

### 5. Landbirds

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Information on the birds of the Muck Islands is fragmentary and mostly based on visits lasting no more than six days. The earliest published account is that of Harvie-Brown and Buckley (1892) and records up to 1st January 1951 are summarised by Baxter & Rintoul (1953). Evans & Flower (1967) bring together both published and unpublished records including those of local residents, up to the end of 1966. Further information, emphasising recent records and changes in distribution drawn from national surveys, with records of local observers, is given by Reed, Currie and Love (1983).

The present studies were made between 1976 and 1987 starting with summer visits of 1-3 weeks. From 1981 the work was intensified with a visit of at least a week in May every year, except 1982, and another in June or July in each year except 1983. Up to three further visits per year covered every month except October.

The topography and vegetation of the Muck Islands have been described in detail (Dobson & Dobson, 1985) and only such features as affect the distribution of landbirds need be repeated here (Fig. 1).

Most of the land area of Muck and Horse Island, although not rising above 138m, is an upland habitat, consisting of undulating rough grassland of varying quality invaded by low growths of bracken and heather best developed in the W. on Beinn Airein and in Gleann Mhartein. This part is the least affected by man's activities but is also the most exposed. Valleys running in a N.W. to S.E. direction provide some shelter. Rocky outcrops are frequent and inland cliffs a major feature, giving good shelter where facing E. The whole area is grazed.

Fertile glens N.W. of Port Mor and S.E. of Gallanach are occupied by enclosed farm land used for hay, pasture, oats and vegetables which provide good feeding for birds particularly in winter. The two settlements, well sheltered and with an increased number of gardens during the last ten years, support a good

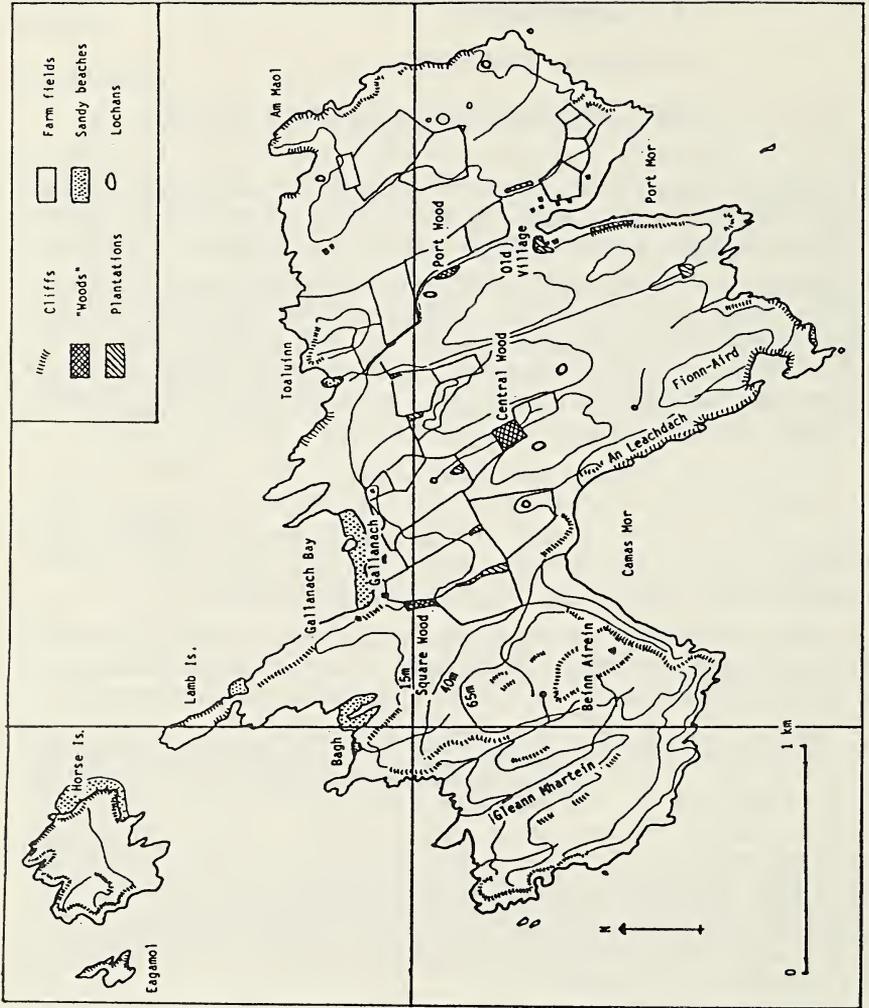


Figure 1 Isle of Muck: General Features

population of birds, although apparently somewhat reduced by domestic cats. This was the only habitat for woodland birds before mixed deciduous and coniferous trees were planted in three small sheltered areas in the 1920s. These trees were over 20m high before this study began, with established shrub and herb layers, and the areas will be referred to as "woods" to distinguish them from the 12 later smaller "plantations" established over the past 20 years. In five of these, consisting mainly of conifers but with some native deciduous and exotic species on their E. sides, the trees are now about 7m high, having grown considerably during the last ten years, and are attracting an increasing number of birds. The trees in the other plantations are small with few birds as yet. The situation of the woods and most plantations beside the farm fields gives optimum conditions for breeding success, combining good feeding with nest sites. It also gives shelter to feeding flocks in winter.

Wet areas, including seven permanent lochans, are numerous but cover a small percentage of the total area, providing space for few birds. Scrub, dunes, machair, saltmarsh and streams are so poorly represented that small use, if any, can be made of them.

The coast-line has been described in detail (Dobson & Dobson, 1986). The long rocky stretches and 3km of sea-cliffs also provide nest sites for land birds. The 26km of coast-line enclosing an area of only 540ha represents a considerable proportion of available breeding space and provides a valuable feeding area in winter.

The off-shore position of the islands and the influence of the Gulf Stream ensure an equable climate. The mild winters and fertile conditions encourage flocks of winter visitors and ensure good survival rates of small birds, while the cool but sunny summers with long days provide good breeding conditions in most years. Frequent storms and cold winds in spring can adversely affect small birds.

## Methods

Observations were made at all seasons while walking all over the main island. In the breeding season the positions of all birds showing territorial behaviour such as male singing, the carrying of nest material and food, alarm calling or the presence of family parties were marked on an Ordnance Survey map, scale 1/10,000 and the number counted. The whole island was covered, but only once during each visit, and Horse Island was visited once in most seasons, thereby giving only approximate estimates of breeding numbers. The woods were visited in calm, fine weather before 11

a.m. and visits repeated if weather permitted. The observations of local people produced valuable extra data.

## Results

The following list of birds is presented in the order given by Thom, 1986. The following special abbreviations are used in addition to conventional ones: ABB – Sharrock, 1976; Anon – Birds of the Isle of Eigg; B&R – Baxter & Rintoul, 1953; E&F – Evans & Flower, 1967; HB&B – Harvie-Brown & Buckley, 1892; RC&L – Reed, Currie & Love, 1983; MB – migrant breeder; RB – resident breeder; (RB) – resident breeder in Eigg; IB – intermittent breeder; (IB) – intermittent breeder in Eigg; WV – winter visitor; SV – summer visitor; PV – passage visitor; V – vagrant; O – not seen during this survey.

### List of Species

Grey Heron *Ardea cinerea* L.

RB Not mentioned by B&R. One pair bred in Central Wood from 1955 until 1965, when 2 pairs bred (E&F). Since 1976 at least 2 and up to 5 pairs bred each year, spreading from Central Wood to Square Wood in 1979 and to Port Wood in 1982. They nest high in pine or spruce trees, eggs hatching in May and young remaining in the nest until July with some later broods fledging in August. Herons feed singly in sheltered bays on the N. and E. coasts throughout the year, 8 being present in January 1985.

White-tailed Eagle *Haliaeetus albicilla* (L.)

V First introduced to Rum in 1975 and now breeding there regularly. Seen only occasionally in Muck.

Hen Harrier *Circus cyaneus* (L.)

V Two reports only: 1962 (E&F) and 1986.

Sparrowhawk *Accipiter nisus* (L.)

V (IB) Single, often young, birds are seen not infrequently in Muck, usually in winter. Pellets found in Central Wood reveal their presence in most years.

Buzzard *Buteo buteo* (L.)

IB (RB) E&F reported a pair in Muck for many years, one bird in 1963 and successful breeding in 1965. RC&L considered breeding regular. Buzzards have been present each year since 1979, usually 2 in winter, roosting in the woods, and a pair in early spring. By summer one or none remained, a dead one being found 3 times in May. In 1981 only, a pair nested on Camas Mor cliffs possibly rearing one young. Buzzard pellets found at roosts consist of fur from small rodents. Rabbits are absent from Muck but carrion is plentiful as a source of food and there is evidence that they also prey on crows.

Golden Eagle *Aquila chrysaetos* (L.)

V (RB) A pair present in the 1950s was not proved to breed (E&F). Three sightings since 1976.

Kestrel *Falco tinnunculus* L.

IB (RB) The most abundant bird of prey in the islands (HB&B) and breeding in Eigg in 1884 and 1933 (8 pairs – B&R). E&F report none in Muck in 1934

but one pair nesting regularly in the 1960s. A pair was present in Muck from 1976 until early 1983 ranging widely over the island in winter and remaining in the W. hills in summer, nesting each year on the cliffs. Up to 3 fledged young were seen in late summer in 3 years. A pair present in winter 1983-84 did not stay and only casuals have occurred since. Kestrel pellets found contained fur and beetles.

Peregrine *Falco peregrinus* Tunstall

V (RB) A not uncommon casual visitor, usually seen singly in summer on the cliffs of Camas Mor or over Beinn Airein. In February 1983 one stayed for several days, feeding on common gulls.

Corncrake *Crex crex* (L.)

IB Numerous in Muck in 1934 (B&R); E&F report 8 pairs reduced to 2 by 1963, but breeding regularly thereafter (RC&L). In 1976 and '78 four birds were calling, after which the species suddenly became much scarcer. One pair bred successfully in 1983 and '85 and a bird was heard calling in 1979, '84 and '86.

Moorhen *Gallinula chloropus* (L.)

IB Moorhen bred twice about 1940 and in 1965 and were otherwise seen twice (E&F). One sighting in 1987.

Oystercatcher *Haematopus ostralegus* L.

?MB & ?WV Abundant in the islands in the 1880s (HB&B) and plentiful in Muck in 1953 (B&R). E&F report few pairs in Muck in 1934, fewer in 1940 but over 50 in 1953. Between 26 and 35 breeding pairs were easily located all round the coast of Muck and Horse Is. by their noisy alarm calls. Nests in May and early June were most common on flatter rocky areas, often alongside the gull colonies, more than  $\frac{2}{3}$  of them occurring on the more sheltered N. and extreme S. coasts. About 16 non-breeding birds frequent Gallanach Bay and Bagh each summer. Breeding sites are vacated by mid-August and numbers are much reduced by September. In Winter 30-45 roost in Gallanach Bay and at Bagh feeding more widely on the shore and on the fields near the farm.

Ringed Plover *Charadrius hiaticula* L.

RB & WV Long known to breed on islands with sandy beaches (HB&B); E&F report 12 pairs in Muck up to 1947, then none for 10 years with 4 pairs again by 1963, with subsequent intermittent breeding (RC&L). Now 2 or 3 pairs are present each year on Lamb Island and the sandy beaches in the N. calling from March. Increased numbers, sometimes including juveniles, are seen on Gallanach Beach from July. In winter 10-12 are usually present.

Golden Plover *Pluvialis apricaria* (L.)

V (RB) E&F state that a very few winter regularly in Muck. Although now wintering in the other Small Isles, only 1 or 2 were seen on the E. hills of Muck occasionally in winter, and once in summer.

Grey Plover *Pluvialis squatarola* (L.)

V One present on Gallanach beach for several days in November 1983.

Lapwing *Vanellus vanellus* (L.)

MB Breeding on most islands (HB&B). E&F report variable numbers with 10-12 pairs in 1934, none after the hard winter of 1947 but later re-establishment. Up to 20 return to Muck in February feeding on the fields and shore. By May, when nesting, up to 3 pairs remain, obvious as they display in their territories. Found at first in upland marshes near Port Mor and sometimes in dune marshes near Gallanach, Lamb Island has been the main site since 1983. Here nests and downy young were found. In late summer small flocks, sometimes including juveniles, are seen on the shore at Gallanach.

Sanderling *Calidris alba* (Pallas)

V Occasional in autumn (E&F). One sighting in 1986.

Purple Sandpiper *Calidris maritima* (Brünnich)

V Described as "occasional in Winter with turnstones" by E&F, 60 were seen on the N. coast in February 1981.

Dunlin *Calidris alpina* (L.)

PV Widespread, mainly in winter according to HB&B, E&F report dunlin seen in spring and autumn every year. One or 2 birds were seen at all seasons and flocks of up to 14 in breeding plumage stayed for a few days in May and July feeding on Gallanach Beach. In November 1980 thirty were seen there.

Snipe *Gallinago gallinago* (L.)

RB & ?WV Common where suitable (HB&B), E&F report very few breeding in Muck with some arriving in winter. About 6 drumming or calling birds were found scattered among the small ponds and permanent wet areas in most seasons, drumming commencing in February. Birds were found similarly scattered often in pairs and sometimes in larger numbers on the coastal marshes at Gallanach in winter. They were scarce in the dry summer of 1984.

Woodcock *Scolopax rusticola* L.

WV(RB) Long known as winter visitors to the islands, particularly numerous in cold weather (HB&B, E&F). One or 2 woodcock were seen during winter visits, but local observers reported larger numbers during frosty spells.

Bar-tailed Godwit *Limosa lapponica* (L.)

V & O Two reports; 1938 and 1966 (E&F).

Whimbrel *Numenius phaeopus* (L.)

V One sighting in 1984.

Curlew *Numenius arquata* (L.)

WV, PV & SV Curlews have been present with increased numbers in autumn and winter (HB&B, E&F). Up to 6 occur on the coast from April to June, increasing in numbers from July. In winter up to 36 feed on the N. coastal grasslands, gathering to roost on the rocks E. of Gallanach Bay.

Redshank *Tringa totanus* (L.)

WV, SV & ?RB Regarded by E&F as a regular winter visitor with up to 20 present, redshank are now less common, with a maximum of 8 in winter and 1-2 present at most seasons. In May 1987 one persistently alarming bird in Lamb Island suggested breeding there.

Common Sandpiper *Actitis hypoleucos* (L.)

MB Described as common in the Inner Hebrides (HB&B, B&R), E&F report several pairs breeding regularly in Muck. Up to 3 probably breeding pairs were found each year in low coastal sites.

Turnstone *Arenaria interpres* (L.)

WV HB&B describe turnstones as "abundant on suitable shores" while 30-50 wintered regularly in Muck from November to April (E&F). A passage visitor in Eigg (Anon.), 10-12 now winter regularly in Muck from September to March frequenting the rocks off Lamb Island and Gallanach Bay and the beach in stormy weather. One seen in August 1987.

Rock Dove *Columba livia* Gmelin

RB & WV Abundant in the 1880s, particularly in Eigg (HB&B) and still common in many islands in the 1930s to '50s (B&R), E&F only report a few pairs breeding regularly in Muck at Am Maol, Fionn-aird and An Leachdach where

2 and 1 pairs were found on the cliffs in 1982 and '86. A few are known to breed in caves. Pairs and small groups (max. 9 birds) feed on the grassland and fields at all seasons while flocks of up to 50 incomers sometimes occur in mid-winter.

Woodpigeon *Columba palumbus* L.

V (RB) HB&B describe woodpigeons as common on wooded islands but they occurred sparsely on most in the 1930s (B&R). E&F report flocks of 30-40 in winter in Muck and a few in summer in 1963, while ABB reports "possible breeding". They are now casual visitors with 2 in 1985 and 1 in '86, both in May.

Collared Dove *Streptopelia decaocto* (Frivaldszky)

SV (?RB) In 1966 four non-breeding pairs were present in Muck (E&F). An increasing summer visitor in Eigg (Anon). ABB report "probable" breeding in the Small Isles. Now up to 4 birds are casual summer visitors to Muck in most years.

Turtle Dove *Streptopelia turtur* (L.)

V & O A rare passage visitor (E&F; Anon).

Cuckoo *Cuculus canorus* L.

?IB (MB) On all wooded islands (HB&B), E&F report fluctuating numbers on all islands. RC&L report intermittent breeding. One was heard calling for short periods in most years in May, but only in 1987 were both male and female known to be present at the same time. Breeding is probably still intermittent.

Long-eared Owl *Asio otus* (L.)

?IB (RB) Long known to breed in Eigg (E&F, ABB, Anon), E&F reported up to 4 breeding pairs in Central Wood, Muck, but ABB found none, although RC&L reported continued breeding. During this survey pellets and feathers have been found in some more mature plantations indicating residence for short periods, mostly in winter. Although owls are easily overlooked, breeding now seems unlikely.

Short-eared Owl *Asio flammeus* (Pontoppidan)

V (RB) Long present in Eigg (HB&B, E&F) and breeding there in 1981 (Anon.), short-eared owls have only been seen 3 times during this survey.

Swift *Apus apus* (L.)

V One sighting of 4 on 4 July 1980.

Skylark *Alauda arvensis* L.

?RB & ?MB Long common in the islands (HB&B), described as summer visitors (B&R). E&F found them numerous on pasture land in Muck where they are still common breeding birds and their constant singing makes them easy to census. Numbers of singing birds fluctuated between 26 and 31, spread fairly evenly over the greater part of Muck and Horse Island but more sparsely in the W. They favour the better quality pasture in the N. and on the shoulders and tops of the hills and avoid the enclosed fields. Birds flock in September and in winter up to 35 feed on the arable fields with increased numbers in March, when they begin to take up territories.

Swallow *Hirundo rustica* L.

MB B&R reported occasional breeding in the islands and E&F found breeding in some years in Muck and migrating birds in spring and autumn. Now up to 3 pairs breed each year in farm buildings and outhouses, the young fledging in July and August with some later broods. Larger numbers are seen in May and September.

Meadow Pipit *Anthus pratensis* (L.)

?RB & ?MB Common on larger and some smaller islands (HB&B) and common in the Inner Hebrides (B&R), E&F describe meadow pipits as common breeding birds in Muck but not in Horse Island. They now breed throughout both islands, except on the enclosed fields, favouring the rougher grassland. The S. area is the most densely populated, most pairs being found on the more sheltered E. sides of hills. Counts were made either in May, when alarming birds drew attention to nest sites, or in July when parents were feeding family parties, and at both times about 40 pairs were found. Numbers were noticeably lower in the hot dry season of 1984 and the very wet season of '86. Some may rear two broods but by August most birds have left the outlying areas, forming flocks more centrally. About 30 remain in winter, numbers increasing from February and some singing in March.

Rock Pipit *Anthus spinoletta* (L.)

RB Occurring on all Scottish coasts and islands (HB&B, B&R), E&F found "a few tens of pairs" in Muck in 1963. The rocky coastline of Muck and Horse Island, with many weedy beaches and inlets, is ideal for rock pipits and they take up territories all round the coast, including the cliffs, in March. The whole coastline could not be censused, so in 1985 sample sections were taken on the S. and E. coasts in March and on the N.W. coast in May where 3-4 pairs per km were found, giving a rough estimate of up to 70 pairs. In winter they congregate in small groups on more sheltered stony beaches and are sometimes seen feeding on the grass.

Pied Wagtail *Motacilla alba yarrellii* Gould

MB Present on all inhabited islands (HB&B) and breeding in Rum, Eigg and Canna (B&R), E&F found several pairs breeding but not wintering in Muck. Their status has remained unchanged, birds arriving in early March and keeping to the low ground around habitations or on raised beaches. About 5-7 pairs raise 2 or 3, but up to 5 young in June or July with some later broods into September. Few young were reared in the drought of 1984 or the cold wet season of '86.

White Wagtail *Motacilla alba alba* L.

PV Long known as a regular passage visitor in Tiree (HB&B, B&R) but not recorded by E&F. One or 2 were seen occasionally on beaches in May and September.

Wren *Troglodytes troglodytes* (L.)

RB Commonest in wooded areas (HB&B), B&R found wrens common in Eigg and Muck, while E&F report a big decrease after the hard winter of 1963. They are still common but rarely found in Horse Island. The undulating terrain with valleys and E. facing cliffs provides sheltered breeding sites between rocks or among heather or ivy throughout the island, c.300m. apart wherever suitable. Breeding birds are present every year in all but the youngest plantations often near their stone boundary walls. About 30 singing birds were located in spring and summer each year and over the period 22 sites were found which were occupied by singing birds in 4 or more years. The same sites were often occupied in winter. No winter was cold enough to cause drastic reduction in numbers.

Dunnock *Prunella modularis* (L.)

RB HB&B found dunnock abundant near settlements, even on the smaller isles, and E&F state that a few breed every year in Muck. They are found mainly in the gardens at Port Mor and Gallanach, with up to three singing birds present in May. Young are seen from July until September but less commonly in more recent years.

Robin *Erithacus rubecula* (L.)

RB & ?MB General, but less abundant than on the mainland in 1880's (HB&B), B&R reported breeding on Rum, Eigg and Canna. Although absent from Muck in 1934 they were breeding in gardens and plantations ("woods") by 1963 (E&F), where up to 10 pairs still breed each year. Since 1984 the maturer plantations have held increasing numbers, with 7 singing birds in 1987, giving a total of up to 17 breeding pairs. In winter about 20, most singing, are concentrated mainly in gardens, only a few remaining in woods and in more open situations in the E.

Whinchat *Saxicola rubetra* (L.)

?IB O (MB) Common in Eigg (HB&B) and known to nest there since 1884 (HB&B), whinchat were seen in Muck in 1934 and '55 but only found breeding in '63 (E&F). Since absent from Muck (RC&L).

Stonechat *Saxicola torquata* (L.)

IB (RB) Sparingly distributed in Eigg (HB&B, E&F), but not mentioned from Muck until reported breeding by ABB. They were considered regular by (RC&L) and now occur in some years, one pair breeding in 1976 and '82 and possibly in 1983 and '87. They sometimes occur in winter.

Wheatear *Oenanthe oenanthe* (L.)

MB Common on all islands of the Inner Hebrides (HB&B, B&R), E&F report a big increase in Muck between 1934 and '63 where breeding birds, resident from April to late August are now common throughout, including Horse Island. Frequent rocky outcrops with nesting crevices beside fertile grazed turf, provide ideal conditions with highest densities in the more sheltered S. and N.W., where some second broods are probably raised. Counts made in July, when young were fledging, revealed about 50 pairs; a high density comparable only to other favoured offshore islands (Condor, 1956).

Blackbird *Turdus merula* L.

RB "Blackbirds are rarer on islands than the mainland, needing more shelter than the song thrush" (HB&B). B&R report breeding in Muck while E&F state that breeding numbers in Muck increased from 1934-63, then equalling song thrushes in numbers, with large numbers passing through in November. Four or 5 breeding pairs were present 1981-85, increasing to 7 pairs in '86 with several young fledging each year. Constant preferred sites are in Central Wood and gardens but the larger plantations are gradually being used as they mature. Nesting begins in March and dependent young are seen up to August. Up to 20 are present in winter, including several young males.

Fieldfare *Turdus pilaris* L.

WV Said to be irregular in winter in smaller, less wooded islands (HB&B). E&F describe fieldfares as regular on autumn passage in October with a few wintering in the Small Isles. Up to 5 were seen in some winters, up to April, during this survey.

Song Thrush *Turdus philomelos* Brehm

RB & ?MB A resident breeder in the isles where sufficient shelter, and breeding in Muck in 1934 (B&R). E&F found a few pairs breeding in gardens, plantations and on heather slopes in Muck. About 6 breeding pairs were present in 1981 and '82 in Central Wood, gardens and the most developed plantations increasing to 8-10 pairs in following years, with more plantations being used as the trees grew. A smaller number is resident near the settlements in winter but by February birds were singing and some pairs were formed. Dependent young were seen from May to September. Few bred in 1987 for no obvious reason.

Redwing *Turdus iliacus* L.

WV Described as autumn migrants by HB&B and as passage and winter visitors to the Inner Hebrides (B&R) and to the Small Isles (E&F). Flocks of up to 30 were seen between November and April, particularly in cold weather.

Sedge Warbler *Acrocephalus schoenobaenus* (L.)

?IB (RB) Found on Eigg by HB&B, but on few islands by B&R. Now breeding in Eigg (Anon). E&F report one pair in Muck in 1955. Two calling birds were heard in May 1986, one remaining in July among shrubs at Port Mor. Breeding was not established.

Whitethroat *Sylvia communis* Latham

IB (RB) Common in Eigg (HB&B) and reported more widely in the islands including Muck by B&R, one pair bred regularly in Muck until 1961 (E&F). They now breed regularly in Eigg (Anon.). One bird was heard singing in Muck in May 1983.

Chiffchaff *Phylloscopus collybita* (Vieillot)

IB (RB) Occasional visitors to the Small Isles (E&F), ABB reported "probable breeding" in Eigg, where a few now breed regularly (Anon). One pair bred in Central Wood in 1981 rearing 3-4 young.

Willow Warbler *Phylloscopus trochilus* (L.)

MB Common on Eigg though rarer on smaller isles (HB&B), breeding on

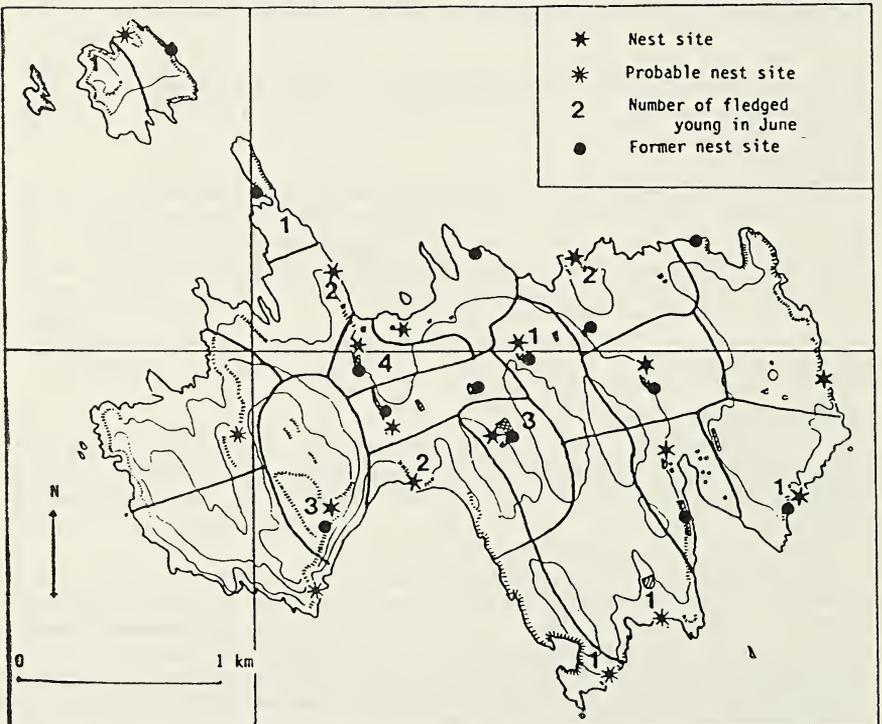


Figure 2 Hooded Crow territories with nest sites etc. in 1986

all other Small Isles (B&R). Breeding was first proved in Muck in 1958/59 (E&F) and was intermittent thereafter (RC&L). In 1981 and '82 eight singing birds were found in the woods and plantations, numbers fluctuating between 11 and 14 since. Numerous young spread into the gardens in July, all birds leaving in August.

Goldcrest *Regulus regulus* (L.)

RB HB&B found goldcrests in Eigg, but not in the smaller isles, and in 1933 they were breeding there (B&R). They increased steadily up to 1963, but there were only spring records in Muck (E&F). They are now regular in Muck at all seasons, first noted breeding in 1978 (Reed, pers.comm.) and confined to Central Wood until '82 where two or three pairs breed each year, sometimes twice. Since 1983 other woods and maturer plantations have been occupied sporadically and there may now be up to 6 pairs.

Spotted Flycatcher *Muscicapa striata* (Pallas)

?IB (IB) Intermittent breeder in Eigg (E&F). Reported by RC&L but only one seen during this survey, in 1987.

Long-tailed Tit *Aegithalos caudatus* (L.)

V (IB) Occasional in Small Isles (HB&B, B&R, E&F) but more recently breeding in Rum and Eigg (ABB). Occasional winter parties seen in Muck.

Coal Tit *Parus ater* L.

V (RB) Not known to B&R in the smaller inner islands, coal tits were first reported breeding in Eigg in 1934 with subsequent increases, although only occasional in Muck (E&F). A family party with 5-6 young was seen in Square Wood in July 1985.

Blue Tit *Parus caeruleus* L.

V (RB) First reported breeding in Eigg in 1933 with subsequent increase but only occasional in Muck (E&F). One sighting in Muck, April 1986.

Treecreeper *Certhia familiaris* L.

V (RB) First reported breeding in Eigg in 1934 and now breeding there regularly (Anon.); seen twice in Muck, 1937 (E&F), 1984.

Jackdaw *Corvus monedula* L.

WV Common in the isles in the 1880s (HB&B), jackdaws first colonised Eigg in 1933 (B&R). E&F report 100 pairs breeding on Kildonan cliffs, with flocks of 30-40 visiting Muck in winter. Still a winter visitor, small numbers were seen on the fields and Gallanach shore from August to April with some flocks of up to 60 in mid-winter. They roost on the cliffs at Toaluinn.

Rook *Corvus frugilegus* L.

WV Breeding in Eigg in 1886 (HB&B), but not after 1909 and thereafter a casual visitor to the Small Isles (E&F), a few young rooks were sometimes seen in Muck from November to March, feeding with crows and jackdaws on the fields. In January 1987 twelve, including two adults, were present.

Carrion Crow *Corvus corone corone* L.

V One resident in summer 1987 but not mixing with the hooded crows.

Hooded Crow *Corvus corone cornix* L.

RB & WV Abundant in the islands (B&R) and breeding freely in Muck with many wintering (E&F), crows, being able to exploit a wide range of food and nest sites, are still numerous. The population consists of 20 breeding pairs and a wandering flock of up to 40 in summer, but larger in autumn and winter. Pairs are seen in their territories (Fig. 2), which cover all three islands, throughout the year. These were determined by watching movements of birds, particularly in the

nesting season when they defend them most actively. Only seven territories contained trees, the preferred nest site, where spruces were most commonly used. Other nests were on cliffs or lower rocky sites, usually by the sea. They are begun in March, and young are in the nest in May. By mid-July about half the pairs had one remaining fledged young, with some larger families. The flock, frequenting the farmland and Camas Mor, also feeds on the N. shores in winter. Over 100 birds, probably the total population, roost in Port Wood in winter, assembling on the arable fields at dusk. In the breeding season only 30-40 roost there. Pellets found in the wood in autumn consisted of turnip, oat husks, wool, insect remains and shore invertebrates, showing the wide range of food taken. Concentrated animal feed is included in winter.

The crow population of Muck, rich in suitable foods, is high, breeding numbers equalling those of Canna which is twice the size (Swann, 1986). Breeding territories average 27 ha. Near the farm and gull colonies, where food is plentiful, they are smaller, while those with more barren conditions approach the 39 ha. found in Morvern (Hewson & Leitch, 1982).

Raven *Corvus corax* L.

RB Always common in the isles (HB&B), E&F report 1-2 pairs from Muck, nesting at varying sites. One resident pair nesting at Am Maol was joined in December 1982 by another which nested on cliffs near Camas Mor, a former nest site, in 1983. Both pairs now breed in most years, rearing up to 3 young, and remain throughout the year.

Starling *Sturnus vulgaris* L.

RB & WV Uncommon in Scotland in the early 1800s, starlings increased rapidly and were abundant in the isles by 1890 (HB&B). Numerous in Muck in 1934 (B&R), E&F estimated about 5 breeding pairs with up to 200 birds in winter. RC&L report 40 pairs. In May breeding pairs, either singly or in small groups, occupy holes in stone walls and rock clefts near the coast but rarely the eaves of houses. Ruined houses near Port Mor provide nest sites for up to 15 pairs, with a total of 20-30 pairs. Some are double brooded, with young birds present from June to September. In winter a small flock of 20-30 frequent the Port Mor and Gallanach areas, often feeding on the shore and roosting nearby. A larger flock of up to 250 feeds on the farm fields and probably roosts in the woods.

House Sparrow *Passer domesticus* (L.)

RB Known to breed in Muck since the 1880s (B&R) and reaching "plague proportions" in 1930s. After control measures they had increased again by 1963 (E&F). About 6 pairs breed in houses and outbuildings at both Port Mor and Gallanach, numbers increasing greatly by autumn, when many move to the corn fields, and gradually decreasing in winter. At the farm they stay in the barns in bad weather and feed on the vegetable fields when these are close to the buildings.

Chaffinch *Fringilla coelebs* L.

RB & WV A common and increasing bird on wooded islands (HB&B), chaffinches were absent from Muck in 1923, with a few pairs in 1933 and increased regular breeding thereafter (E&F). Counts of singing birds and pairs in May gave an estimate of about 20 breeding pairs each year in gardens, woods and plantations, the youngest being occupied by 1987. Adults and young, except a few later breeders, form roving flocks from July. In winter regular flocks frequent Port Mor (c.20) and the farm (c.30). A larger flock of c.100 but up to 200 feeds on the arable fields and shelters in the woods and plantations with more of the latter being used as the trees grow.

Greenfinch *Carduelis chloris* (L.)

?IB (RB) Common on wooded islands (HB&B, B&R), E&F report breeding most years after 1937 in Muck, with birds present in all plantations ("woods") in 1963, and breeding regularly thereafter (RC&L). Several were present in 1976 but since then only one pair was seen in 1980/81 and 1986/87. Breeding was not proved.

Twite *Carduelis flavirostris* (L.)

MB Occurring on all islands and plentiful in Eigg in 1891 (HB&B), twite were breeding regularly in Muck but had decreased by 1963 (E&F), and subsequently (MacEwen, 1985). Up to 8 pairs were found each year widely spread and in the vicinity of inland cliffs, including those of Horse Island in 1982. They are always present on Beinn Airein, where nests were found. Flocks of up to 40, seen once in spring and every year in late summer, collect near the farm, feeding on grass and weed seeds. They may stay into November but are absent in winter.

Redpoll *Carduelis flammea* (L.)

V One singing bird in May 1987.

Snowbunting *Plectrophenax nivalis* (L.)

V Regular in Rum and Eigg in small numbers, but only occasional in Muck (E&F). Three were seen on Gallanach beach during a period of N. winds in November 1983.

Reed Bunting *Emberiza schoeniculus* (L.)

IB (RB) Breeding in Eigg in the 1880s (B&R) but infrequently until 1957 and regularly thereafter (E&F). They first bred in Muck in 1958 with 2-3 pairs in 1963 (E&F). Two pairs bred in Muck in 1978, one pair in '82 and possibly one pair in '76 and '85. One or 2 are sometimes seen in winter.

Corn Bunting *Miliaria calandra* L.

O Abundant in Rum and Canna (HB&B), by 1933 there were none in the Small Isles except in Muck (B&R). Only one record since 1937 (E&F).

## Discussion

Reed et. al. have shown (1983) that the number of breeding landbirds on an island decreases with the distance from the mainland or the nearest larger island and increases with increase in area and the number of habitats present. There may be a critical threshold of area of habitat required before a species can breed regularly. Muck, now with 26 regularly breeding species, illustrates this result when compared with Eigg, with c.50. It is almost equidistant from the mainland, but is six times the area with several more viable habitats represented. The small area of some of these habitats in Muck influences the number of intermittent breeders (12), most of which breed regularly in Eigg. The position of stonechats and whinchats is puzzling as there appears to be plentiful habitat and they are regular in Eigg, Rum and Canna. Possibly ecological factors are at work here, all niches being already occupied making entry difficult. (Lack, 1969)

Change in habitat has a significant effect on the number of breeding species present (Reed et. al. 1983). The greatest such change in Muck has been the gradual planting of the woods and plantations, resulting in the establishment of 6 new species over 60 years (chaffinch, robin, greenfinch, heron, willow warbler and goldcrest in that order). All but the greenfinch are increasing and spreading as the plantations mature. It will be interesting to see whether the other regular woodland breeders in Eigg (blue, great and coal tits, treecreeper and woodpigeon) are able to spread to Muck as the area of larger trees increases. This increase in woodland habitat has also enabled wrens, robins, song thrushes and blackbirds to increase their range and numbers, with further increases probable as the newest plantations mature. As in Rum (Williamson, 1975) willow warblers colonised new plantations early while wrens and chaffinches were the first woodland species to appear, followed by robins, song thrushes and blackbirds within 15 years. These species are encouraged by the large "edge effect" produced by small wooded areas beside fertile fields.

All wooded areas are, however, partially exposed in stormy weather and are almost vacated in winter, with song thrushes and robins congregating in the more sheltered gardens. Their reduced numbers probably indicate some local migration to greater shelter elsewhere.

Changes in habitat due to agricultural changes have had a less dramatic effect, resulting in no new species but being responsible for possible increases in numbers and the maintenance of high populations of several existing ones. As numbers in the past are unknown comparisons are somewhat speculative. The increase in the numbers of freely grazing animals, particularly sheep over the years, acts in favour of skylarks, meadow pipits and wheatears, particularly the last, whose population is comparable only to that of other such favourable offshore islands. Plentiful sheep carrion helps to maintain the high population of crows and ravens but its effect on buzzards is more doubtful as they appear to be short of food. The increase in the number of enclosed fields, mostly improved pasture, provides increased feeding area for bird flocks, particularly in winter. On the debit side corncrakes, as elsewhere, have succumbed to the earlier harvesting of hay and silage, and corn buntings to less well defined agricultural changes.

Farming methods which include free range chickens, hay storage in barns and weedy field edges maintain seed supplies for finches and twite, although a decrease in their numbers is reported

(MacEwen, 1985). The numerous stone walls provide nest sites for pied wagtails and starlings and year round shelter for wrens, while open barns are important to breeding swallows and sparrows.

The small but increasing number of established breeding landbirds is thriving in Muck while the island hosts flocks of winter visitors. Most birds are directly affected by Man's activities and most recent changes have acted in their favour.

## Acknowledgments

I am grateful to Mr and Mrs Lawrence MacEwen and all our friends in Muck for their generous hospitality and for their additional bird records; to my husband, Dr R. M. Dobson for help with the manuscript and much encouragement; and to Dr David Houston and Mr Andrew Currie who read the manuscript and made helpful comments and suggestions.

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## Book Reviews

### **A Study of Blackbirds**

D. W. SNOW

British Museum (Natural History), Cromwell Road, London, SW7 5BD. 196pp., line drawings, Paperback, ISBN 0-565-01021-2, £7.95.

“A Study of Blackbirds” is not a monograph but a collection of observations made over several years in and around the Botanic Gardens at Oxford. That the book is superbly written, highly readable and full of interesting facts will come as no surprise to those that have read other books by David Snow. I was a little disappointed however that this reprinting, 30 years after the first edition, has only been updated by a short appendix and some might feel that, at £7.95 for a rather thin paperback, the book is somewhat overpriced.

JOHN KNOWLER

### **The History of the Birds of Britain**

by DAVID REID-HENRY and COLIN HARRISON

Collins/Witherby, London, 1988, 224pp., colour plates, drawings. Hardback, ISBN 0-00-219794-4, £14.95.

A most interesting book, filling a much needed gap in Ornithology by discussing the origins of the species breeding in Britain, their past and present distribution and recent population trends. In this respect the writer, Dr Harrison, has relied on much of the information gathered over his many years in the British Museum of Natural History.

The artist, David Reid-Henry died in 1977, but the works he produced will live on, since they are among the best by any British artist. The text is enhanced by his pencil drawings and a book covering these alone would be worthwhile in its own right. Very good value for money.

BERNARD ZONFRILLO

## The Water Beetles of Islay

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Islay is the largest island of the South Ebrides (V.C. 102). It has attracted surprisingly little attention from coleopterists despite its varied geology and favourable climate. A survey by ten members of the Balfour-Browne Club in May 1984 generated a large number of records of wetland Coleoptera including some new for the Hebrides (\*\*\*) in the following notes) or for the South Ebrides (\*\*) as well as many not previously recorded from Islay (\*) according to Welch (1983). Most of the records in Welch's list were obtained by a party led by Professor Balfour-Browne (1923) in June 1922. They were based at Port Ellen and worked the Oa but they went no further north than the Machrie River or east than Ardbeg. Consequently they failed to work the main areas of limestone on Islay (Fig. 1); these have been found to support several species rare in western Scotland which are not found elsewhere in the Hebrides.

Rather than provide locality data for every species the records have been summarized by the 10 kilometre squares of the National Grid within 100 km square NR (16). Further visits by G.N.F. and M.D.E. in August 1984 and by G. N. F., M.D.E. and M. Sinclair in April 1987 resulted in modern records of all but two species recorded by Welch (1983). Of the latter, *Dryops auriculatus* (Fourcroy) is not accepted as Scottish; many of the published British records of *Dryops* are worthless being based on undissected material identified using faulty keys. The other species, *Paracymus scutellaris* (Rosenhauer), found by Balfour-Browne near Port Ellen in 1922, eluded capture. A few extra grid square records (marked §) have been provided by C. R. Doughty from his visit in May 1985. Dr R. C. Welch also supplied records from pitfall trapping in 1981.

## List of Species

### HALIPLIDAE

- Brychius elevatus* (Pz.)\*\*\*, 36. In the Allt Ruadh at Eorrabus, a weedy, hard water (pH 8.0) river. There are no previous records for any islands other than the Orkneys and there are very few records for the west of Scotland. This species is, however, found in Ireland and this suggests an Irish route for arrival in the Hebrides.
- Haliphus confinis* Steph., 46. One in Loch Fada.
- H. fulvus* (F.), 26,27,35,36,37,46,47. In a variety of freshwater habitats.
- H. lineatocollis* (Marsh.), 25,26,27,36,45. Common.
- H. obliquus* (F.), 37. Found only in pools in old stream courses on the machair at Traigh Baile Aonghais. This species is rare in the west of mainland Scotland and occurs on only the islands of Coll and Orkneys. Balfour-Browne (1953) first suggested an Irish route of arrival for this species.
- H. ruficollis* (Deg.), 26,37,44,47. Stagnant water.
- H. wehnckeii* Gerh., 26,47. Stream at Gruinart and Loch Staoisha.

### DYTISCIDAE

- Laccophilus minutus* (L.)\*\*\*, 44. One specimen was taken in Loch-nan-Diol, a peaty loch.
- Hygrotus inaequalis* (F.), 15,25,26,27,34,35,36,37,44,45,46. Common.
- Coelambus novemlineatus* (Steph.)\*\*, 46,47. Common in Loch Staoisha and in Loch Fada.
- Hydrotus discretus* Fair., 25,26. Muddy flushes and streams.
- H. erythrocephalus* (L.), 15,25,26,27,34,35,36,37,44,45. Stagnant, permanent water.
- H. gyllenhalii* Schiöd., 15,24,25,26,27,34,35,36,44,45,46. Common in stagnant, acid water but also found in streams in 1984 during the drought.
- H. incognitus* Sharp, 24,25,26,35,36,45. In a salt creek at Bridgend, a stream through dunes at Machire and, more typically, in flushes at Bolsay and Claggain Bay.
- H. longicornis* Sharp\*\*\*, 36,45,46. In a spring-fed area of silty stream at Eorrabus, a spring behind a shingle bar at Claggain Bay, a flush on moorland by Sleivemore, and abundant in flushes surrounding the outflow of Loch a' Bhogaidh at Bolsay. This is an under-recorded species associated with groundwater-fed mires. It is also known from Arran and Jura and is common in flushes in the west of mainland Scotland in the winter.
- H. melanarius* Sturm, 24,26,36. Peat pools on the Oa and near Loch Bharradail. Also from pitfall traps on blanket bog by Loch Gorm and at Feur Lochain in 1981.
- H. memnonius* Nic., 24,26,35,36,44,45,46. In shallow peaty water. All females were of the shining, male-like form.
- H. morio* Aubé, 24,46. Peat pools on the Oa and south of Loch Leathann.
- H. nigrita* (F.), 24,25,26,27,34,36,44,45,46. Temporary pools and flushes.
- H. obscurus* Sturm, 15,24,25,26,27,35,36,44,45,46. Stagnant permanent, peat-stained water.
- H. palustris* (L.), 25,26,27,35,36,37,44,45. Mainly in lakes.
- H. planus* (F.)\*, 26,34,36. Only on the west side of the island, mainly in temporary pools.
- H. pubescens* (Gyll.), 15,24,25,26,27,34,35,36,37,44,45,46,47. The commonest water beetle in Islay, mainly in stagnant water.

- H. striola* (Gyll.)\*\*, 26,36. Only in the north-west corner of the island in pools enriched by wildfowl.
- H. tessellatus* Drap., 15,25,26,27,36,37. Common in merseland pools and in the coastal parts of streams.
- H. tristis* (Payk.), 15,24,25,26,35,36,45,46. Mainly amongst *Sphagnum*.
- H. umbrosus* (Gyll.)\*, 26,37,45. In beds of grasses, rushes and sedges in Loch Còrr, Loch Clach a' Bhuaile, on the Gruinart Flats and at Claggain Bay.
- Stictonectes lepidus* (Ol.), 27,36,37. In the Abhainn Glas, in streams in Gleann Tuath and near Killinallan.
- Potamonectes assimilis* (Payk.)\*\*, 25,34,44. Loch-nan-Diol, Loch Conailbhe and in a loch near Risabus (NR 312428).
- P. depressus depressus* (F.)\*\*, 26,34,47. Loch Còrr, Loch Staoisha and in the loch near Risabus. Islay appears to be the only Scottish island to support the type form of *depressus*, others having *elegans*. The two forms occupied separate habitats as on the mainland.
- P. depressus elegans* (Pz.), 26,35,36. In the Allt Ruadh and in the Rivers Laggan and Sorn.
- P. griseostriatus* (Deg.), 45. Single specimens were found in Loch Uigeadail and in a lochan NNW of it by Dr Mark Young and David Bilton. These sites lie at about 250 metres above sea level. The pH values were 5.5 and 5.8 respectively, with correspondingly low conductivity values of 141 and 133  $\mu\text{S}/\text{cm}$ , all of these values being the lowest recorded from 29 water samples taken in May 1984.
- Stictotarsus duodecimpustulatus* (F.), 25,26. Streams in Gleann Mor and in the sand-dunes at Machire.
- Oreodytes sanmarki* (Sahl.), 15,25,35,36,37,44§,45§. Small streams and rivers.
- O. septentrionalis* (Sahl.), 35,37. At Laggan Bridge, where the River Laggan has clean beds of sand and gravel with beds of weed, and in the Gortantaoaid Burn, with pockets of sand in rocky hollows.
- Platambus maculatus* (L.)\*\*, 36,46. Allt Ruadh, the River Sorn and in the outflow of Loch Fada. The distribution of this species in western Scotland can be used to counter the argument concerning an Irish route of arrival to Islay. As with the haliplids it is rare in the west but, unlike them, it does not occur in Ireland. It is known from Skye (Owen, 1977) and Mull (Owen, 1979). *P. maculatus* is a well known example of a flightless species (Jackson, 1956) not occurring on islands such as Anglesey (Foster, 1971) and Gotland (Nilsson, 1984).
- Agabus affinis* (Payk.), 15,25,26,27,34,35,36,45. Among flooded *Sphagnum* carpets at the edges of lakes and pools.
- A. arcticus* (Payk.), 24,45. In and around Loch Uigeadail in the hills but also found on the coast in an old peat cutting pool (NR 303569) on the track to Laggan Point.
- A. bipustulatus* (L.), 15,24,25,26,27,34,35,36,37,44,45,46. Common.
- A. congener* (Thunb.), 45. In the same localities at *Potamonectes griseostriatus*.
- A. guttatus* (Payk.), 27,45. In Loch Uigeadail, the Claggain River and in a stream in Gleann Tuath.
- A. melanocornis* Zimm.\*\*, 15,24,26,34,35,36,37,45. Temporary pools and in mires ("schwingmoor") at the edges of lochs. Previously recorded as *chalconatus* (Pz.) with which it was once confused.
- A. nebulosus* (Forst.)\*\*, 36,37. In oxbow pools at Traigh Baile Aonghais and in a duck pond on the merse at Carnain.
- A. paludosus* (F.), 15,26,36,45,46. In slow streams and in the outflows of lochs.
- A. sturmii* (Gyll.), 15,25,26,27,35,44,45. Lake edges and backwaters of rivers.
- Ilybius aenescens* Thoms., 26,35,44,45. Loch Airidh Dhaibhaidh, in both of the

Lochs Tallant, Loch-nan-Diòl and in the lochan on the track to Laggan Point, all of these sites providing deep beds of loose *Sphagnum*. It was also taken in a pitfall trap in blanket peat at Feur Lochain.

*I. ater* (Deg.)\*\*\*, 26,35. In the Saligo River and in the northern Loch Tallant (NR 334577).

*I. fuliginosus* (F.), 25,26,35,36,37,44,45. Loch edges and slow water in rivers. *Rhantus bistriatus* auct. Brit. (*suturellus* (Harris)), 15,26,34,35. Mainly in acid pools but also in a shallow crowfoot pool (pH 7.4) at Rubha Luidhneis on the Gruinart Flats.

*Colymbetes fuscus* (L.), 26,34,35,36. Mainly among flooded grasses at the edges of pools and lochs.

*Acilius sulcatus* (L.)\*, 26. In the *Sphagnum* pools of the Feur Lochain.

*Dytiscus marginalis* L.\*, 26,27,35,37. In deeper *Sphagnum*-edged lochans.

*D. semisulcatus* Müll. 26,27,34,35,37,38,44. More frequent as adults than *marginalis* with its easily recognised larvae common in the spring in shallow water.

## GYRINIDAE

*Gyrinus aeratus* Steph., 44. Common in Loch-nan-Diòl.

*G. caspius* Men., 26,35,36,37,44,47. Amongst reeds and sedges in the edges of lochs.

*G. distinctus* Aubé (*colymbus* auct. Brit.)\*\*\*, 26. Common among submerged vegetation in the north edge of Loch Còrr in May 1984. There are very few Scottish records and none previously for any island.

*G. minutus* F., 26,35,44. Acid lochs, often on open water.

*G. substriatus* Steph. (*natator* partim auct. Brit.), 15,25,26,27,34,35,37,44,45,46. Common and found in any habitat with small stretches of open water.

## HYDROPHILIDAE

*Helophorus aequalis* Thoms. (*aquaticus* auct.), 15,25,26,36,45,46. Flushes and grassy pools.

*H. brevipalpis* Bed., 15,24,25,26,27,34,35,36,37,44,45,46,47. Mainly in temporary pools.

*H. flavipes* (F.), 15,24,25,26,27,34,35,36,37,44,45,46,47. In a wide range of habitats, present in all peat bogs and grassy pools, even those of high pH.

*H. grandis* Ill., 25,26. Scattered individuals on the Rhinns but abundant in some grassy pools on Gruinart Flats.

*H. granularis* (L.), 26,35. One was found at Laggan Bridge in 1984 and the species was abundant in pools with flote-grass (*Glyceria fluitans*) on Gruinart Flats in 1987. Most of the pools are the deeper parts of linear depressions once used to ret flax. All of the *granularis* appeared to be of the micropterous form, *ytensis* Sharp.

*H. minutus* F.\*\*\*, 37. In pools and a stream on the machair near Killinallan. The first record for the South EbuDES since the species-group was revised.

*H. obscurus* Muls.\*, 26,35,36. Grassy edges of pools and river with pH values exceeding 7.0.

*Coelostoma orbiculare* (F.)\*, 25,26,35,37,44,45. Among *Sphagnum* and other mosses at the edges of stagnant water, particularly common in "brown moss carpets", mainly of *Scorpidium scorpioides* in old peat cuttings.

*Cercyon ustulatus* (Preys.)\*\*\*, 26,27,35,37,45. Muddy edges of pools and lochs rich in mosses and sedges, sometimes in reedbeds.

- Hydrobius fuscipes* (L.), 15,24,25,26,27,35,36,37,44,45. Common in stagnant water.
- Anacaena globulus* (Payk.), 15,24,25,26,27,34,35,36,37,44,45,46. Common in seepages and at the edges of streams and rivers.
- A. lutescens* (Steph.)\*\*\*, 26,45,46. Loch Còrr, Loch Fada and Claggain Bay. This species was recently split from *limbata* s.s. by van Berge Henegouwen (1987) and appears to be commoner than *limbata* (F.) s.s. in peaty water.
- Laccobius atrocephalus* Reitt.\*, 15,46. One in the Lossit Burn and another in a spring feeding Loch Leathann.
- L. bipunctatus* (F.), 24,25,26,27,35,36,37,44,45,46,47. On mud or wet peat.
- L. minutus* (L.), 35,37,44,45,47. On sand, shingle or bare peat in lochs.
- L. striatulus* (F.)\*\*\*, 26,35,36,37. Among silt and mud at the edges of streams and rivers.
- Enochrus affinis* (Thunb.), 15,25,26,27,35,36,45. In peat pools.
- E. coarctatus* (Gred.)\*\*\*, 25,26,35,44. Common in the quaking edges of some lochs and basin mires.
- E. fuscipennis* (Thoms.), 15,24,25,26,27,35,36,37,44,45. Now recognised as a species distinct from *quadripunctatus* (Herbst) by Hansen (1987), *fuscipennis* is usually confined to pools in peat bogs. On Islay it is found in a stagnant water pond fouled by wildfowl or cattle.
- Chaetarthria seminulum* (Hbst.)\*, 25,26,27,36,37. Among moss and peat or mud, often with *Coelostoma orbiculare* and *Cercyon ustulatus*.

#### HYDRAENIDAE

- Ochthebius bicolon* Germ., 36. One in the Allt Ruadh at Eorrabus.
- O. dilatatus* Steph.\*\*, 26. Abundant in pools on the Gruinart Flats.
- O. subinteger lejolisii* Muls. & Rey, 25. In rock pools on the shore at Port Charlotte.
- O. viridis* Pey.\*\*\*, 36. In pools and a stream with tidal influence on the Bridgend Flats but absent from the Gruinart Flats. This is effectively a new record for Scotland but the species has also been found on Colonsay by Dr Keith Miller and by G.N.F. on South Uist and in Argyll.
- Hydraena brittini* Joy\*\*, 26,36. Single specimens were found in the River Sorn, the Allt Ruadh, the Saligo River and in Loch Còrr.
- H. gracilis* Germ.\*\*, 25,35,44§,45§. In a stream in Gleann Mhor and at Laggan Bridge. Also found by R. Doughty in the Allt na tri-dail, the Abhain Bhogie and in the Ardilistry, Kintour and Machrie Rivers.
- H. rufipes* Curt.\*\*\*, 35. One at Laggan Bridge. The only previous island record is for the Orkneys.
- Limnebius truncatellus* (Thunb.), 15,24,25,26,27,35,36,37,44,45,46. Common, mainly in association with flowing water.

#### DRYOPIDAE

- Dryops ernesti* des Goz., 35. Laggan Bridge and, by R. Doughty, in the Allt na tri-dail.
- D. luridus* (Er.), 15,24,25,26,27,35,36,37,46. On wet mud or silt.

#### ELMIDAE

- Elmis aenea* (Müll.)\*\*, 15,25,26,35,36,45,46. Running Water.
- Esolus parallelepipedus* (Müll.)\*\*\*, 35. River Laggan at Laggan Bridge and, by R. Doughty, further up the Laggan River and in the Allt na tri-dail and the Kilennan River.

*Limnius volckmari* (Pz.)\*\*\*, 15,26,34,35,36,44§,45§. Running water.  
*Oulimnius tuberculatus* (Müll.), 15,24,26,35,36,37,44,45,46,47. The most frequent elmid, being found in gravel in running water and on lake shores.  
*Riolus cupreus* (Müll.)\*\*\*, 35. One at Laggan Bridge in May 1984 and at the next bridge upstream a year later by R. Doughty. The only other island record is an unpublished one for Lismore, an island that shares with Islay an abundance of limestone.

#### CHRYSOMELIDAE – DONACIINAE

*Macrolepa appendiculata* (Pz.)\*\*\*, 26. A male was taken from a mass of *Potamogeton gramineus* in Loch Còrr in May 1984. Its identification was confirmed by dissection by Dr M. E. Cox of the Commonwealth Institute of Entomology.

*Donacia obscura* Gyll.\*\*, 35. One was taken at the northern Loch Tallant in May 1984.

*Plateumaris discolor* (Pz.), 35. One male was taken from the water's surface in the lochan by the track to Laggan Point in April 1987.

#### Analysis of beetle communities

Multivariate analysis was undertaken using 81 site-lists acquired during the survey. The program used was TWINSPAN (Hill, 1979) and it was possible to recognise nine "end-groups" corresponding to the main communities associated with the habitat types summarized below: –

- 1 (12 sites) peat pools
- 2 (2 sites) upland stony lochs
- 3 (19 sites) peat lochs and lochans
- 4 (8 sites) sandy lochs and machair pools
- 5 (14 sites) flushes and peaty streams
- 6 (9 sites) muddy pools, mainly on merseland
- 7 (10 sites) streams
- 8 (4 sites) small rivers
- 9 (3 sites) all in the River Laggan

The location of the main sampling sites is indicated in fig. 1 by use of the numbers for the end-groups. The communities of beetles can be characterized by reference to the commoner members of each group (Table 1).

#### Acknowledgments

It is unfortunately impracticable to enter into joint authorship with the rest of those who participated in the survey in May 1984. They were David Bilton, Ron Carr, Jan Cuppen, Andrew Foster, Derek Lott, and Drs Keith Miller, David Shirt, and Mark Young. Ross

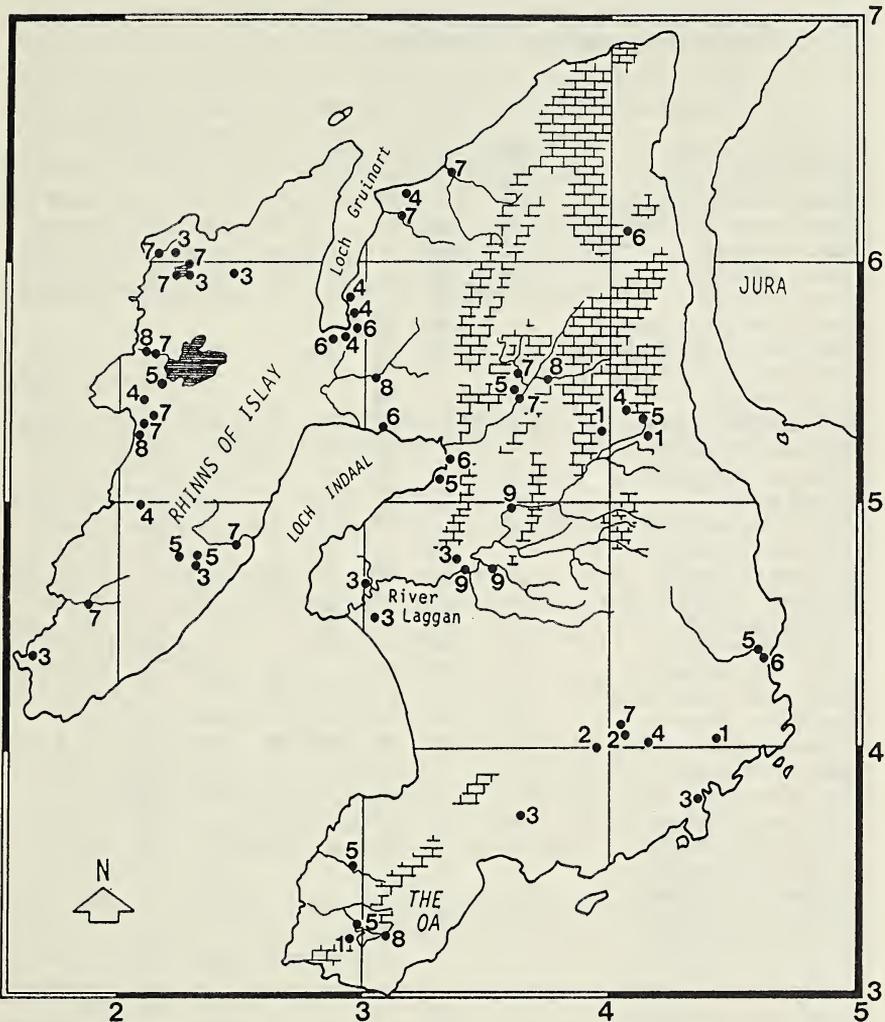


Fig. 1 Sampling sites on Islay numbered according to their classification by TWINSpan: 1—peat pools; 2—upland stony lochs; 3—peat lochs and lochans; 4—sandy lochs and machair pools; 5—flushes and peaty streams; 6—muddy pools mainly on merseland; 7—streams; 8—small rivers; 9—River Laggan. The 10km squares of the National Grid are indicated. The extent of limestone is indicated by “pavement” marking.



Doughty of the Clyde River Purification Board contributed some records from running water and Dr Colin Welch, of the Institute of Terrestrial Ecology, in collaboration with Dr Eric Bignal of the Nature Conservancy Council, supplied records from pitfall trapping. Mrs Margaret Palmer and Angus Laing kindly arranged financial support from N.C.C. and Dr Eric Bignal gave much useful advice in selecting sites for survey. Thanks must also go to Mrs Suzanne Meehan of Gruinart who accommodated Balfour-Browne Club members so well. Most of the other islanders encountered were equally hospitable and helpful in gaining access to sites.

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## Book Reviews

### **British Ferns**

RON FREETHY

The Crowood Press, Ramsbury, Marlborough, SN8 2HE, 1987, 128pp., numerous colour and black and white illustrations. Hardback, ISBN 0-946284-33-4, £10.95.

This book, which deals with Pteridophytes as a whole, was no pleasure to read. Nor were the illustrations a pleasure to view. The inadequacy of the latter can be revealed by studying the habitat painting opposite p.33; it shows our three Filmy Ferns growing in atypical surroundings. We are told on p.51 that Tunbridge Filmy Fern demands shade but the illustration shows the plant at an unshaded streamside. The habits of these ferns are not correctly shown; this is a general criticism of all the illustrations. Tunbridge Filmy Fern is unrecognisable and Wilson's Filmy Fern and Killarney Fern are poorly depicted. The detailed drawings of Tunbridge and Wilson's Filmy Ferns on pages 50 & 51 are unhelpful; the toothed indusium of the former is not clearly drawn.

Many more such points could be made. I cannot recommend this book.

J. H. DICKSON

### **Scotland – The Nature of the Land**

COLIN BAXTER & NATURE CONSERVANCY COUNCIL

Colin Baxter Photography Ltd., 1987, 107pp., many colour photographs. Hardback, ISBN 0-948661-00-3, £12.95.

This book is basically a "Coffee Table" picture book, profusely illustrated throughout and with descriptive text kept to a minimum. The overall visual impact is high and many of the photographs are stunning in their simplicity. Often they consist of bold silhouettes against highly coloured skies or very atmospheric studies at dawn or dusk. This style has gained Mr Baxter considerable acclaim and a growing reputation throughout Scotland. In this instance he has taken National Nature Reserves as a framework on which to hang a collection of his superb landscape pictures.

Prof. T. C. Smout provides an introduction to the book and his theme is the urgent need for conservation. A few lines of text describe the topography of each reserve. Also included are a few close-ups of birds and plants.

The more often people visit and enjoy National Nature Reserves, the more secure is their future. This book should stimulate many people to seek out and experience the peace and tranquility of these sanctuaries.

T. NORMAN TAIT

## Four Species of Scuttle Fly (Diptera: Phoridae) from Scotland New to Britain, including three New to Science

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In order to write volume 2 of the *Handbook* on British Scuttle flies it has been necessary to carry out considerable revision of the giant genus *Megaselia* Rondani (Volume 1 dealt with genera other than *Megaselia*: Disney, 1983a). This has revealed a number of new species, particularly from Northern Britain (Disney, 1983b, 1984a-b, 1985a, 1986a-b, 1987, 1988a-b). Completion of the first draft key to more than 200 species of *Megaselia* from Britain has revealed a further three new species from Scotland, which are described below, and a further species new to Britain is reported.

*Megaselia abernethae* n.sp.

*Male:*

Head: Frons dark and clearly broader than high. Antials about midway between upper supra-antennals and antero-lateral bristles, but a little lower than either. Upper SA's closer together than pre-ocellar bristles and almost a third as long again as the lower pair. Third antennal segment and arista brown. Palps yellowish brown with 6-7 bristles. Labrum brown. Labella with dark patches above and somewhat spinose below.

Thorax: Dark brown. Mesopleuron bare. Scutellum with an anterior pair of small hairs and a posterior pair of bristles. Notopleuron with only two bristles and no cleft.

Abdomen: All tergites dark, with shortish hairs apart from medium sized ones at rear of tergite 6. Venter brownish grey with hairs on segments 3-6. Hypopygium as Fig.1 and largely brown, including pale anal tube. Posterior lobes of hypandrium distinctly abbreviated. Terminal hairs of proctiger distinctly more robust than those on cerci.

*Glasg. Nat.* 21 part 4 (1988)

Legs: All three pairs largely brownish. Hairs below basal half of hind femur only a little longer than longest hairs of antero-ventral row of distal half. Posterodistals of hind tibia differentiated from adjacent hairs but not conspicuous.

Wings: Length 2.12-2.13 mm. Costal index 0.50. Costal ratios 2.49:1.30:1. Costal cilia 0.12-0.13 mm. All veins brown. Vein Sc clearly fades away before reaching R1. Axillary ridge with four bristles. No hair at base of vein 3. Vein 4 originates well beyond fork of vein 3. Membrane greyish. Haltere with brownish to dirty yellow knob and brown stem.

*Female*: not known.

Material examined: ♂ holotype in author's collection (now the property of the University Zoology Museum, Cambridge). Scotland: Loch Garten (Grid ref. 28/9718) Abernethy Forest, Inverness. May 1981, J. A. Owen.

Affinities:

In the keys of Lundbeck (1922) *M. abernethae* runs to couplet 43 page 227. However the free subcosta immediately rules out *M. fusca* (Wood) or *M. angusta* (Wood), as does the abbreviated posterior lobes of the hypandrium. Of species omitted from these keys *M. offuscata* (Schmitz) has strong postero-dorsals on the hind tibia and a longer costal section 1. *M. perfusca* Schmitz has the Sc ending in the R1. The combination of the terminal hairs of the proctiger being stronger than those on the cerci, two notopleural bristles and no notopleural cleft, rules out numerous otherwise similar species.

#### *Megaselia capronata* Schmitz, 1940

A single male of this species was trapped by R. S. Moss (and sent to me by R. S. George), 5/10 July 1982, at Foxbar, Paisley, Renfrew (Grid ref. 26/4863). It is most likely to be confused with *M. subfuscipes* Schmitz or *M. mortenseni* (Lundbeck). The hypopygia of these three species are illustrated in Figs. 2-4. *M. capronata* has previously been recorded only from Portugal; but I have also been sent some specimens from Austria by Christian Kampichler.

#### *Megaselia invernessae* n. sp

*Male*:

Head: Frons dark and clearly broader than high. Antials a little closer to anterolaterals than to upper supra-antennals and slightly lower on frons than either bristles. Upper SA's closer together than pre-ocellar bristles and clearly longer than the lower pair. Third antennal segment and arista brown, former with dense short pile. Palps brownish with 7-8 bristles. Labrum brown. Labella simple with few spines below.

Thorax: Brown, being darker on top. Mesopleuron bare. Scutellum with an anterior pair of minute hairs and a posterior pair of bristles. Notopleuron with three bristles, posterior two being only about three quarters length of anterior bristle.

Abdomen: All tergites dark, with generally shortish hairs, even the longer ones at rear of tergite 6 being only about as long as the longest hairs on the left side of the epandrium (Fig. 5.) Venter somewhat brownish grey with shortish hairs on segments 3-6; Hypopygium as Fig. 5 and largely brown with dusky yellow anal tube.

Legs: All three pairs greyish brown, but anterior pair a little more yellowish. The 6-7 hairs below basal half of hind femur with at least three clearly longer and more robust than those of antero-ventral row in distal half. The postero-dorsals of hind tibia differentiated but not conspicuous.

Wings: Length 2.02 mm. Costal index 0.53-0.54. Costal ratios 3.32: 1.51:1. Costal cilia 0.13-0.14 mm. All veins brown. Vein Sc fades away before reaching R1. Axillary ridge with five bristles. A small hair at base of vein 3. Membrane distinctly brownish grey (apparent to naked eye when viewed against a white background). Haltere with dirty yellow knob and brownish stem.

*Female*: not known.

Material examined: ♂ holotype in author's collection. Scotland: Loch Garten (Grid ref. 28/9718), Abernethy Forest, Inverness. May 1981, J. A. Owen.

Affinities:

In the keys of Lundbeck (1922) *M. invernessae* runs to couplet 52 on page 228. It differs from *M. pulicaria* Fallén by the failure of the Sc to reach the R1 and in having three (not two) notopleural bristles. The combination of brownish legs, dusky wings, weak terminal hairs of the proctiger, longish hairs below the hind femur, simple labella, yellow haltere knob and epandrium hairs subequal with those at rear of tergite 6 will rule out other related species, including *M. sheppardi* (described below).

#### *Megaselia sheppardi* n.sp

*Male*:

Head: Frons brown and broader than high. Antial bristles about half way between antero-laterals and upper supra-antennals and all three at about the same level. Lower SA's clearly shorter and less robust than upper pair which are closer together than pre-ocellars. Third antennal segment brown, frequently pale, with brown arista. Palps yellowish with 6-8 bristles. Labrum brown. Labella simple and with only a few scattered spines below.

Thorax: Brown, but paler on sides. Mesopleuron bare. Scutellum with an anterior pair of small hairs and a posterior pair of bristles. Notopleuron with three bristles.

Abdomen: With brown tergites and somewhat pale greyish venter. Hairing of tergites a little stronger postero-laterally on tergite 2 and only slightly stronger at the rear margin of tergite 6 when compared with tergite 5. Hairs of venter clearly evident on segments 3-6. Hypopygium as Fig. 6, being brownish with a somewhat paler, dirty yellow, anal tube. The bristle near middle of lower left margin is seen to be feathered at high magnifications (x 20 or more).

Legs: Yellowish to dusky yellow, apart from darker apex of hind femur. Hairs below basal half of latter clearly longer than those of antero-ventral row of distal half. Postero-dorsals of hind tibia not conspicuous.

Wings: 1.6-2.1 mm long. Costal index 0.49-0.51. Costal ratios 2.57-2.73:1.30-1.64:1. Costal cilia 0.12-0.15mm. All veins brownish. Vein Sc reaches R1. Axillary ridge with four bristles (rarely three). A small hair at the base of vein 3. Membrane clearly brownish grey (evident to naked eye when viewed against a white background). Haltere with both stem and knob yellowish, in some yellowish to dusky.

*Female*: not known.

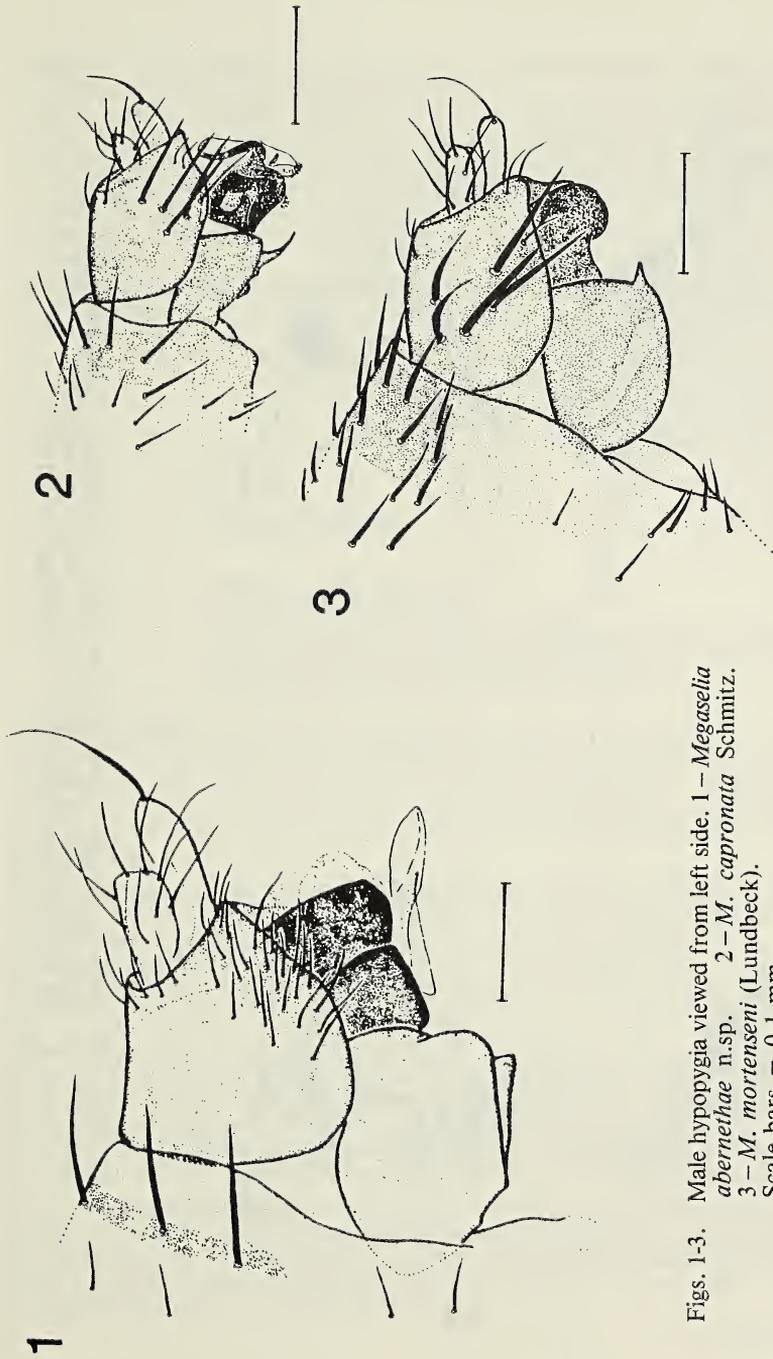
Material examined: ♂ holotype in author's collection England: Stoneleigh, Warwickshire (Grid. ref. 42/3269). 6 May/6 June 1983, D.A. Sheppard. Paratypes: 3 ♂ same data as holotype. 1 ♂ by River Spey, Aviemore, Inverness (Grid ref. 28/893112); 9/13 July 1982, R.H.L. Disney. 2 ♂ Craigellachie NNR, Aviemore, Inverness (Grid ref. 28/891116). 13/16 July 1982, R.H.L. Disney. All in author's collection.

#### Affinities:

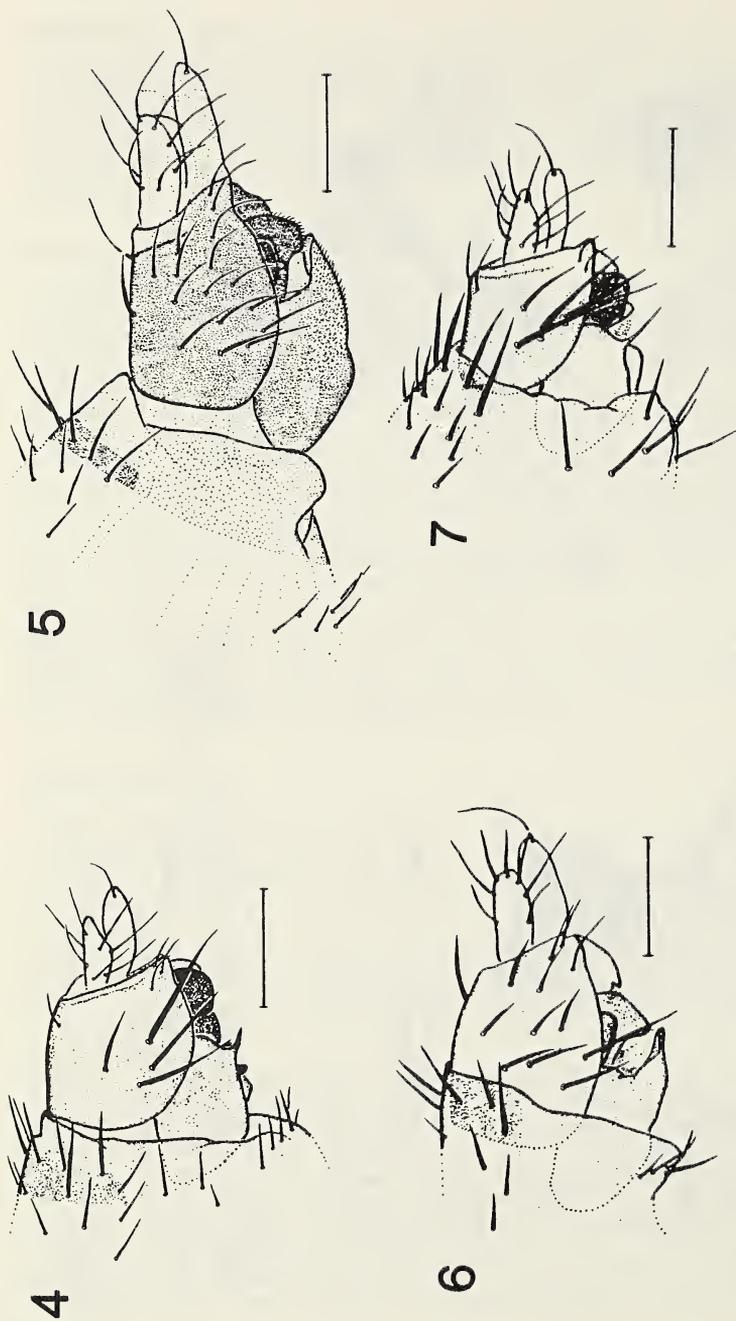
In the keys of Lundbeck (1922) this species runs to couplet 52 on page 228, to *M. pulicaria* (Fallén). It is immediately distinguished from the *M. pulicaria* complex by having 3 (as opposed to 2) notopleural bristles, along with the presence of a bristle, as well as hairs, on the epandrium. If the epandrium is taken to have bristles (although it has only one true bristle) it will run to couplet 48. *M. rubescens* (Wood) has at least seven strong bristles on the left side of the epandrium. In *M. nudiventris* (Wood) (a synonym of *M. discreta* (Wood) – see Disney, 1985b) the hairs below the basal half of the hind femur are clearly shorter than those of the anteroventral row of the distal half. In addition the hypopygia differ (cf. Fig. 6 in this paper and Fig. 2 in Disney, 1983c). The species also somewhat resembles *M. hirticaudata* (Wood) but with a slightly longer costa. However in the latter species the posterior process from the hypandrium is a hairless, finely-tapered structure (Fig. 7). Of the species not covered by Lundbeck's key *M. incongruens* Schmitz could be confused with *M. sheppardi*. However the costal index is less than 0.48 and costal section 1 is more than 3.5 in this species. In addition the third antennal segment tends to be reddish, with a dark apex and the hypopygium differs: in particular it has a short, basally darkened, anal tube. *M. invernessae* also somewhat resembles *M. sheppardi* (see above).

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Figs. 1-3. Male hypopygia viewed from left side. 1 - *Megaselia abernethae* n.sp. 2 - *M. capronata* Schmitz. 3 - *M. mortenseni* (Lundbeck). Scale bars = 0.1 mm.



Figs. 4-7. Male hypopygia viewed from left side. 4 - *Megaselina subfuscpes* Schmitz. 5 - *M. invernessae* n.sp. 6 - *M. sheppardi* n.sp. 7 - *M. hirticaudata* (Wood). Scale bars = 0.1mm.

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## Book Review

### Running with the Fox

DAVID MACDONALD

Unwin Hyman Ltd., 1987, 244pp., many colour photographs, black and white infra-red photographs, line drawings and charts. Hardback, ISBN 0-04-440084-5, £14.95.

Whether, because of the moral dilemma presented by fox-hunting or, because of the possibility of rabies-infected individuals using the Channel Tunnel to enter the country, the fox is very much in the news. Originally a mammal of the countryside, it is now reported increasingly from the suburbs, and indeed from the centre, of towns where its flexibility stands it in good stead in a changing environment.

David Macdonald, who specialises in animal behaviour, is the Ernest Cook Fellow in Wildlife Conservation at Oxford University and his book, based on 15 years research and free from technical jargon, is a pleasure to read. Survey methods are described and details of fox behaviour, life history, body language and population dynamics are recorded, often from direct observation, which normally meant working throughout the night.

Macdonald's dedication is illustrated in a short chapter on diet. He explains that he analysed more than 10,000 fox droppings and that by examining hairs from these he can determine whether victims were mice or voles: by taking cross-sections of hairs he can ascertain the species of vole. Pie charts are produced to indicate fox diets for different standard locations. An interesting aspect is the large percentage of fruit and earthworms consumed.

The text is supplemented generously by colour photographs of the highest quality taken by David and Jeremy Macdonald and particular mention must be made of the delightful line drawings of Priscilla Barrett. The format and excellence of the book is such that I would welcome similar publications on other British Mammals. In conclusion, this is a very good buy.

I. C. McCALLUM

## Book Reviews

### **Man on Earth**

JOHN READER

Collins, London, 1988, 240pp., numerous colour photographs.  
Hardback, ISBN 0-00-219247-0, £17.95.

The inclusion of this book in the Natural History section is justified by its treatment of Mankind in which several of the large variety of human cultures are shown to be the product of adaptation to their environments. These adaptations are shown to enable Man to exploit his available resources without depletion and have therefore persisted, only breaking down when affected by "western culture" and its cash economy. Civilisations are shown to be more ephemeral exhibiting cycles of uncontrolled growth and collapse, arising where adequate food can be produced and apparently raising Man above the confines of his environment only to fall to human ambition and lack of restraint. Modern civilisation has amassed great wealth at the expense of the environment but the author sees hope for the future in Man's ability, by his present knowledge and proved powers of adaptation, to avert unprecedented disaster.

This is a most readable book. The author has travelled in every continent and his first-hand descriptions of human cultures in a wide range of conditions and climates are enthralling. They are much enhanced by his own colour photographs. It is a pity that these are not beside the relevant text, but gathered at the end, and that the maps, a useful addition, are rather sketchy. The price, though not excessive for a book of this quality, may deter some potential readers.

RUTH H. DOBSON

### **Rhum: The Natural History of an Island.**

Edited by T. H. CLUTTON-BROCK and M. E. BALL

Edinburgh University Press, 1988, 159pp., black and white  
photographs, maps. Hardback, ISBN 0-85224-513-0, £19.95.

Rhum has been in the care of the Nature Conservancy Council during the past thirty years, functioning as what is described as an outdoor laboratory. Basically the Council has two choices: to clear the sheep and cattle and observe nature when left to her own devices, or to clear the stock and then attempt by management to restore some of those features destroyed by Man. The latter course was chosen and, at least in the earlier years, pursued with vigour. This book is a popular account, by those closely involved, of what has been found on the island, and of the changes induced by human influence. The seven chapters cover geology, history, plants, invertebrates, birds, deer and domesticated animals. All are well-written and full of interest, if somewhat compressed here and there. Readers wishing to learn more are provided with suggestions for further reading. The book, like the island it describes, is expensive, but one hopes that most people will find them worth the outlay.

IAIN C. CHRISTIE

## Lepidoptera in the West of Scotland, 1987

Compiled by I. C. CHRISTIE

Gartlea, Caldervan, By Alexandria

Weather was moderately favourable throughout the 1987 season and aided the recovery of many insect species from the ravages of the two preceding years. The last week of April was particularly warm, resulting in an early summer, so that by late June growth and developmental processes were perhaps ten days more advanced than they were in 1986. Butterflies did well in their most favoured localities, as did burnets in the west coast colonies, their numbers no doubt augmented by those that re-entered diapause in 1985 and 1986. There was some evidence of an influx of Small Tortoiseshells in early August and two of the highlights of the year were the sightings of single Peacocks in April and August, indicating that the species had survived in Argyll.

In the following list of noteworthy records, specific names and reference numbers are as in Bradley J. D. and Fletcher, D. S., 1979, *A Recorder's Log Book or Label List of British Butterflies and Moths*, Curwen Books, London. The tribulations of more recent catalogues are disregarded.

- 1 *Micropteryx tunbergella* (Fab.), Kilchoan, Loch Melfort, V.C.98, 6/5/87, several, ICC; Creinch, Loch Lomond, V.C.99, 20/5/87, ICC.
- 199 *Psychoides verhuella* Bru., Macgregor's Leap, Glen Lyon, V.C.88, 27/9/87, larvae on Maidenhair Spleenwort, KPB; Portencross, Ayrshire, V.C.75, 2/12/87, many larvae on Hart's-tongue Fern, ICC.
- 317 *Phyllonorycter heegeriella* (Zell.), Rowardennan, Loch Lomond, V.C.86, 11/6/87, ICC.
- 392 *Glyphipterix schoenicolella* Boyd, Ardmeanach, Isle of Mull, V.C.103, 22/6/87; Talisker, Isle of Skye, V.C.104, 10/8/87; Arnisdale, Loch Hourn, V.C.97, 11/8/87, all ICC.
- 413 *Argyresthia sorbiella* (Treit.), Loch Barnluasgan, Bellanoch, Knapdale, V.C.101, 5/7/87, KPB; Oldhall, Paisley, V.C.76, 13/7/87, JM.
- 470 *Orthotaelia sparganella* (Thun.), Gartlea, Loch Lomond, V.C.99, 17/8/87, one female to light, ICC.
- 474 *Acrolepiopsis betulella* (Curt.), Bridge of Awe, Taynult, V.C.98, 23/7/87, larvae in garlic (ramsons) seedheads, KPB.
- 485 *Schreckensteinia festaliella* (Hub.), Loch Barnluasgan, Bellanoch, Knapdale, V.C.101, 5/7/87, KPB; Keills, Tayvallich, V.C.101, 8/6/82, ICC.
- 553 *Coleophora striatipennella* Nyl., Paisley Moss, V.C.76, 16/7/87, JM.

- 606 *Elachista humilis* Zell., Loch Barnluasgan, Bellanoch, Knapdale, V.C.101, 5/7/87, KPB; Cononish, Tyndrum, V.C.88, 3/8/87, ICC.
- 613 *E. subocellea* (Steph.), Shiaba, Ross of Mull, V.C.103, 23/6/87, ICC.
- 625 *Biselachista cinereopunctella* (Haw.), Ardmeanach, Isle of Mull, V.C.103, 22/6/87, ICC.
- 628 *B. eleochariella* Stt., Glen Nant, Taynuilt, V.C.98, 21/7/87, three, KPB.
- 794 *Lita virgella* (Thun.), Johnstone, Renfrewshire, V.C.76, 18/6/87, JM.
- 828 *Caryocolum visciarella* (Stt.), Dunure, Ayrshire, V.C.75, larvae in red campion, emerged late June 1987, JM.
- 845 *Syncopacma sangiella* (Stt.), Point of Knap, Knapdale, V.C.101, 11/9/86, ICC.
- 959 *Cochyliidia rupicola* (Curt.), Taynish, Knapdale, V.C.101, 3/7/87, MRY; Kilchoan, Ardnamurchan, V.C.97, 12/7/87, ICC.
- 992 *Clepsis rurinana* (L.), Achnamara, Knapdale, V.C.101, 4/7/87, MRY.
- 1013 *Olinidia schumacherana* (Fab.), Moulin, Pitlochry, V.C.89, 7/7/87, ICC.
- 1071 *Olethreutes arbutella* (L.), Bohespic, Tummel Bridge, V.C.88, pupae on bearberry, along with *O. mygindiana* (D. & S.), emerged 17/6/87, ICC.
- 1074 *O. palustrana* (L. & Z.), Moine Mhor, Lochgilphead, V.C.98, 4/7/87, Philip Brown per KPB; Trossachs, V.C.87, 30/6/82, ICC.
- 1123 *Ancyliis laetana* (Fab.), Torrinch, Loch Lomond, V.C.99, larvae on aspen, 25/9/86, emerged 5/6/87, ICC; Trossachs, V.C. 87, 23/5/80, several, ICC.
- 1141 *Epinotia nemorivaga* (Tengst.), Shiaba, Ross of Mull, V.C.103, 21/6/87, ICC.
- 1152 *E. maculana* (Fab.), Trossachs, V.C.87, larvae on aspen, emerged 3/9/87, ICC; Shiaba, Ross of Mull, V.C.103, larvae on aspen, emerged 2/9/87, ICC.
- 1189 *Eriopsela quadrana* (Hub.), Kilchoan, Loch Melfort, V.C.98, 4/7/87, several larvae, PW; Fearnoch, Taynuilt, V.C.98, 4/7/87, several larvae, ICC.
- 1238 *Pammene oxsenheimeriana* (L. & Z.), Gartlea, Loch Lomond, V.C.99, 13/6/87, newly emerged female in Sitka Spruce plantation, ICC.
- 1297 *Crambus uliginosellus* Zell., Carsaig, Isle of Mull, V.C.103, 24/6/87, many, ICC.
- 1303 *Agriphila selasella* (Hub.), Bellanoch, Lochgilphead, V.C.98, 4/7/87, RKJ.
- 1348 *Parapoinx stratiotata* (L.), Loch Barnluasgan, Bellanoch, Knapdale, V.C.101, 6/7/87, RKJ.
- 1439 *Eurhodope advenella* (Zinck.), Oldhall, Paisley, V.C.76, 15/8/87, JM.
- 1490 *Oxyptilus parvidactylus* (Haw.), three sites between Carsaig and Malcolm's Point, Isle of Mull, V.C.103, 24/6/87, ICC.
- 1517 *Adaina microdactyla* (Hub.), Ardmeanach, Isle of Mull, V.C.103, 22/6/87; Shiaba, Ross of Mull, V.C.103, 26/6/87; Talisker, Isle of Skye, V.C.104, 10/8/87, larvae; Mingary, Ardnamurchan, V.C.97, 20/7/88, larvae, all ICC.
- 1522 *Leioptilus tephradactyla* (Hub.), Kilchoan, Loch Melfort, V.C.98, 4/7/87, RKJ; Fearnoch, Taynuilt, V.C.98, 4/7/87, ICC; Ardmeanach, Isle of Mull, V.C.103, 22/6/87, ICC: Glen Trosdale, North Jura, V.C.102, 22/7/87, pupal cases, ICC.
- 1597 *Inachis io* (L.), The Peacock, Taynish, Knapdale, V.C.101, 28/4/87, one, David Batty, NCC Warden; Barcaldine, Oban, V.C.98, 19/8/87, one, JCAC; only reported sightings in 1987.
- 1629 *Aphantopus hyperantus* (L.), The Ringlet, large numbers across North Jura from Kinuachdrach to Glen Trosdale, V.C.102, 22/7/87, ICC.

- 1801 *Perizoma taeniatum* (Steph.), Barred Carpet, Glen Nant, Taynuilt, V.C.98, 23/7/87, KPB; Loch Barnluasgan, Bellanoch, Knapdale, V.C.101, 21/7/87 one and 3/8/87 two, ICC and JM.
- 1875 *Asthenia albulata* (Huf.), Small White Wave, Ballachuan, Isle of Seil, V.C.98, 15/6/86, PW. Also recorded from the Isle of Lismore in June 1978.
- 1951 *Aethalura punctulata* (D. & S.), Grey Birch, Flanders Moss, Thornhill, V.C.87, 8 and 18/5/87, several, ICC.
- 1970 *Perconia strigillaria* (Hub.), Grass Wave, Robertson Park, Paisley, V.C.76, 29/6/87, JM.
- 1982 *Hemaris tityus* (L.), Narrow-bordered Bee Hawk, Loch Arkaig, Lochaber, V.C.97, 12/6/87, Miss L. Farrell, NCC, Peterborough.
- 2017 *Clostera pigra* (Huf.), Small Chocolate Tip, Garheugh Port, Luce Bay, V.C.74, 13/8/87, full grown larvae on *Salix repens*, BS; Drymen, Loch Lomond, V.C.86, 1/8/82, larva on *Salix aurita*, KPB.
- 2036 *Setina irrorella* (L.), Dew Moth, Aoineadh Beag, Shiaba, Ross of Mull, V.C.103, 21 to 26/6/87, many, ICC; Mingary, Ardnamurchan, V.C.97, 8/6/88, several, ICC.
- 2083 *Euxoa cursoria* (Huf.), Coast Dart, Sandhead, Luce Bay, V.C.74, 12 to 14/8/87, 22 adults, BS.
- 2093 *Agrotis ripae* (Hub.), Sand Dart, Sandhead, Luce Bay, V.C.74, 14/8/87, larvae local but not uncommon under *Atriplex laciniata*, BS.
- 2099 *Ochropleura praecox* (L.), Portland Moth, Sandhead, Luce Bay, V.C.74, 13 and 14/8/87, three, BS.
- 2177 *Tholera cespitis* (D. & S.), Hedge Rustic, Sandhead, Luce Bay, V.C.74, 13/8/87, BS; Scoor, Ross of Mull, V.C.103, 7/8/88, several, ICC.
- 2192 *Mythimna conigera* (D. & S.), Brown-line Bright-eye, Barcaldine, Oban, V.C.98, 31/7/87, JCAC.
- 2270 *Omphaloscelis lunosa* (Haw.), Lunar Underwing, Barcaldine, Oban, V.C.98, 10 to 19/9/87, three, JCAC.
- 2271 *Xanthia citrago* (L.), Orange Sallow, Barcaldine, Oban, V.C.98, 26/8/87 to 19/9/87, five, JCAC.
- 2342 *Mesoligia literosa* (Haw.), Rosy Minor, Sandhead, Luce Bay, V.C.74, 13/8/87, BS.
- 2412 *Eustrotia uncula* (Cl.), Silver Hook, Carsaig, Isle of Mull, V.C.103, 24/6/87, ICC.

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- KPB – Dr K. P. Bland, 35 Charterhall Road, Edinburgh  
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## Book Reviews

### **Collins Photoguide to Wild Flowers**

OLEG POLUNIN

Collins, London, 1988. 508pp., many colour photographs and line drawings, ISBN 0-00-219709-X, £9.95.

This book describes more than 1750 plants, but excludes all trees, shrubs over 1m high, grasses, sedges and rushes. The descriptions are concise but very informative.

There are over 700 colour photographs arranged in colour order and these are supplemented by many line drawings to show differential diagnostic details. Practically all the colour illustrations are of plants which occur in the British Isles, I consider 86% to be of good or excellent quality.

A drawback of a book such as this, which covers a wide area, is that it is impractical to give local frequencies which can be of great help to a beginner.

The book has been well produced and is recommended as a field guide.

P. MACPHERSON

### **Census Catalogue of the Flora of Ireland**

MARY J. P. SCANNELL & DONAL M. SYNNOTT.

2nd Edition, Stationary Office, Dublin, 1987, 171pp., map. Softback, £4.80.

This new and improved edition of the Irish Census Catalogue, first published in 1972, incorporates the latest information on plant distribution in the forty Irish vice-counties. Nomenclature has been brought up to date, and recent advances in taxonomy are recognised, for example in the more detailed treatment of *Taraxacum* and *Rubus*.

In the fifteen years which have elapsed since the publication of the first edition, 305 taxa have been added to the flora, 174 of which are considered native. There are an additional 25 subspecies and 64 hybrids, together with 42 naturalised and established aliens.

The introductory sections have been considerably altered and revised; the geographical elements in the flora are not repeated, in the light of modern concepts, and a section on conservation has been introduced.

An attractive coloured and more durable flexible cover replaces the rather uninspiring paper cover of the first edition. As before, the common names are given in both Irish and English.

For those interested in the distribution of plants in Ireland this small volume is excellent value.

A. McG. STIRLING

**Additions to the Scottish Tardigrade Fauna, including a Description of *Megastygarcoides setoloso* new species, with a Revised Key for the Identification of Scottish Marine Species.**

**CLIVE I. MORGAN\*** and **MYLES O'REILLY +**

\*Field Studies Council Research Centre, Fort Popton, Angle, Pembroke, Dyfed SA71 5AD

+Forth River Purification Board, Tidal Waters Section, South Queensferry, Edinburgh, EH30 9SQ.

The first records of Scottish marine tardigrades were made by Crisp and Hobart (1954) who observed *Echiniscoides sigismundi* (Schultze) on the alga-covered plates of the barnacles *Balanus balanoides* (L.) and *Chthamalus stellatus* (Poli) from Aberdeen and the Sound of Mull.

Pollock (1971) recorded *Batillipes tubernatus*, a species new to science, co-occurring with *B. mirus* Richters and *Orzeliscus belopus* Du Bois-Reymond Marcus at the Firemore Bay, Loch Ewe study site of McIntyre and Murison (1973). The latter authors further extended the Scottish fauna with additional records for the Loch Ewe site of *Batillipes littoralis* Renaud-Debyser and *B. bullacaudatus* McGinty and Higgins (representing a new European record).

The island of Rockall provided Moore (1977) with a record of *E. sigismundi* which was found in the 'green zone' algae (*Prasiola/Blidingia* mixture, *Bangia*) sampled from pools and the open rock surface.

Morgan and Lampard (1986a) noted marine tardigrades at nine sites around Arran. *Echiniscoides sigismundi* on barnacles had the most extensive distribution (7 sites), *B. tubernatis* was restricted to one site. In a more extensive study of 66 sites within the Clyde Sea Area, these authors described a total of 14 species representing 7 genera, and included a key to tardigrades found in Scottish marine habitats (Morgan and Lampard, 1986b).

The present paper records morphological observations on a further two species of marine tardigrades, one new to science and

the other an addition to the Scottish fauna, which were extracted from sublittoral sand (depth 16m) collected in July 1985 during routine sampling near salmon cages anchored off the south-east shore of Tanera Mor, Summer Isles (O.S. grid reference NB 99-06-). In addition, a revised key to Scottish marine tardigrades is provided.

Class HETEROTARDIGRADA Marcus, 1971 – Cephalic appendages, including lateral cirri A, present. Pharyngeal bulb without distinct placoids but reinforced by bars of smooth, uninterrupted cuticle.

Order ARTHROTARDIGRADA Marcus, 1927 – Median cirrus usually present, rarely absent. Ends of legs +/– digitate, toes always implanted directly into ends of legs, not borne on papillae.

Family HALECHINISCIDAE Ramazzotti, 1962 – Marine spp. Legs with 4 toes each ending with a claw or peg-shaped expansion.

Genus HALECHINISCUS Richters, 1908 – 4 digits of each leg ending with a simple spur-less claw. Single median cirrus present and clavae well-developed.

*Halechiniscus perfectus* Schulz, 1955 (Fig. 1)

**Material studied:** 4 mature adult females on 3 slides deposited with National Museums of Scotland, Chambers Street, Edinburgh EH1 1JF. Ref. No. NMSZ 1988.012.

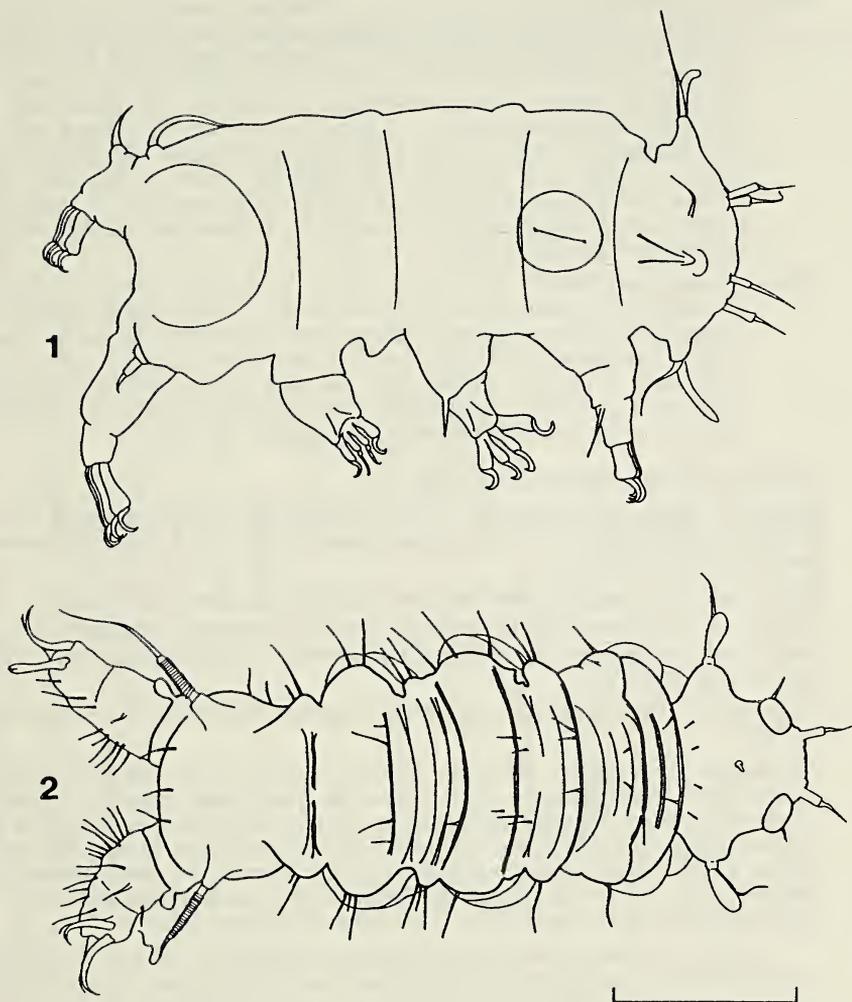
**Diagnosis:** *Halechiniscus* in which normally neither median cirrus nor clavae exceed length of adjacent cirri A. (A secondary characteristic in males may be clavae much longer than cirri A). Laterally with small triangular projections between head and 1st pair of legs and between successive legs which increase in size along body. Each leg with 4 digits bearing a smooth claw and with a small dorsal spine which may be best-developed on leg 3; spine on leg 4 mounted on a papilla (highly diagnostic character).

The following measurements in  $\mu\text{m}$  were taken (where fewer than 4 specimens were measured the no. is given in brackets).

Body length: 150-196; body width at 3rd legs: 60-90; width of head: 64-78; width of neck: 46-52; median cirrus: 10-14; external cirri: 14-28; internal cirri: 14-20; height of cephalic papillae: 2(1); breadth cep. pap.: 6(1); clavae: 14-22; lateral cirri A: 10-34; lateral cirri E: 30-48(3); 1st leg spine: 8-14; 2nd leg spine: 10-16; 3rd leg spine: 10-24(3); 4th leg spine: 8-12; 4th leg papilla: 4-6; claw length: 8.

**Discussion:** These specimens showed considerable individual variation with regard to proportions of body features and the largest (196 $\mu\text{m}$ ) exceeded the maximum published length for the species (181 $\mu\text{m}$ : Ramazzotti & Maucci, 1983). Body width at the 3rd legs varied from  $\frac{1}{3}$  to  $\frac{1}{2}$  body length in fully relaxed specimens. Clavae were usually  $\frac{1}{2}$  to  $\frac{2}{3}$  length of lateral cirri with great variability between left and right sides of a single animal. Shape of clavae was also variable. Leg spines generally increased in length from legs 1-3.

*H. perfectus* has a widespread global distribution in marine sand from littoral and sublittoral coastal locations. This is the first Scottish record of the species, which previously has been found in the North Sea (Helgoland), Mediterranean, Indian Ocean and New Caledonia (Ramazzotti & Maucci, 1983).



Figs. 1-2 1—*Halechiniscus perfectus*, dorso-lateral view.  
2—*Megastygarcides setoloso*, dorsal view. (Scale line 50 $\mu$ m.)

Family STYGARCTIDAE Schulz, 1951 – (Diagnosis emended by McKirdy *et al.*, 1976) Arthrotardigrada with a single median cirrus and 5 pairs of cephalic appendages; anterior clavae either elongate or modified as hemispherical structures. Cuticle organised into unpaired dorsal thickenings or plates. Feet not digitate; adults with either 4 claws on each leg, the central pair with long filamentous extensions, or 3 claws on each leg, the central pair with long filamentous extensions, or 3 claws on each leg, all with a short dorsal accessory spine, or 4 claws on each of the 1st 3 pairs of legs and 2 larger claws on the 4th pair, all with a short dorsal accessory spine; in some, claws attached with dorsal basement membrane. Bulb-shaped papilla at lateral base of each of the 4th legs.

Genus *Megastygartides* McKirdy *et al.*, 1976 – With dorsal plate pattern typical of the family (head plate, 3 body plates, caudal plate) modified by intercalated accessory plates resulting from accordion-like folds of dorsal cuticle. Body more cylindrical than in other stygarctid genera. Each of the 1st 3 pairs of legs with 4 claws, 4th pair with 2 claws; all claws with small dorsal accessory spur and attached to foot with dorsal basement membrane. Anterior clavae modified as ovoid structures.

*Megastygartides setoloso* n. sp. (Fig. 2)

**Diagnosis:** *Megastygartides* with irregularly positioned bristles on lateral margins, along dorsal cuticular folds of body plates, and on 4th legs. 3 bristles on posterior margin of caudal plate.

**Etymology:** The specific name denotes the bristly nature of the animal.

**Holotype:** Adult male collected by M. O'Reilly, July 1985, deposited as a slide in the National Museums of Scotland, Chambers Street, Edinburgh EH1 1JF, Ref. No. NMSZ 1988.011.

**Type locality:** The Anchorage, Tanera Mor, Summer Isles, Scotland. At 16m depth, in sand.

**Description of holotype:** Body an elongate cylinder with well-developed and characteristically ornamented head lacking the deep median anterior indentation of the type species. 4th legs long (44µm), trailing behind animal. Body length from anterior margin of cephalic plate to edge of caudal plate 182µm. Body width greatest (68µm) across 2nd body plate, narrowest (52µm) across caudal plate. Distance from anterior tip to mid-point of 1st legs 62µm, from 1st to 2nd legs and 2nd to 3rd legs 34µm and 30µm respectively, and 3rd and 4th legs 56µm.

Cuticle transparent with faint granulation extending over most of the body. Cuticular plates arranged as in the type species and defined as large areas of smooth cuticle, the pattern confused by the presence of accessory plates and folds between them; these give the animal a wrinkled appearance. The 3 body plates have pronounced lateral lobes with smaller lobes in the accessory plate areas and a well-defined lobe between the 3rd body plate and caudal plate.

4 claws on each of legs 1 to 3, 16µm, 16µm, and 14µm in length respectively, 2 claws on legs 4, 19µm in length. No bristles on legs 2 and 3 but 1st legs with single bristle (10µm) and 4th legs with numerous slender bristles, up to 16µm long, on dorsal and lateral surfaces. 4th legs also have an elongate coxal papilla, 6/5.5µm long and 2.8/3.6µm broad.

Width of head between anterior cephalic lobes 38µm, between posterior cephalic lobes 56µm, with well-defined neck region. Median cirrus present, rising straight

Table 1. Morphometric comparison of (A) *Megastygaretioides setoloso*, (B) *M. orbiculatus* and (C) *M. isounguis*.Figures are maximum measurements in  $\mu\text{m}$ .

Character	A	B	C	Character	A	B	C
Body length	182	258	235	4th leg papilla, ht. x bdth.	6x3.6	6x?	4x4
Width at ant. cephalic lobes	38	-	-	Buccal cone length	6	-	15
Width at post. cephalic lobes	56	78	-	Buccal tube length	1/6	-	70
Width at 1st body plate	64	-	-	Bulb length	19	-	20
Width at 2nd body plate	68	-	-	Bulb breadth	19	-	20
Width at 3rd body plate	64	-	-	1st leg bristle	10	-	-
Width at caudal plate	52	-	-	2nd leg bristle	-	+	-
Ant. tip to midpoint 1st legs	62	-	-	3rd leg bristle	-	+	-
1st to 2nd legs midpoint	34	-	-	4th leg bristle	16	-	-
2nd to 3rd legs midpoint	30	-	60	Claws 1st leg	16	15	16
3rd to 4th legs midpoint	56	-	-	Claws 2nd leg	16	12	16
Median cirrus	6	29	17	Claws 3rd leg	14	12	16
External cirri	12	29	16	Claws 4th leg	19	19	16
Internal cirri	14	29	22	Dorsal bristles	13	-	-
Ant. clavae, ht. x bdth.	4.7x10.3	7x15	?x8	Lateral bristles	22	-	-
Post. clavae, ht. x bdth.	11.9x4	19x7	12x	Caudal bristles	12	-	-
Lateral cirri A	25	36	35	Caudal vesicular vesicles	-	-	+
Lateral cirri E	46	51	70				

upwards and approximately 6µm long. Internal cirri rising from a small swelling, basal portion 5.5µm, tapering flagellum section 7.9/8.7µm. External cirri positioned ventrally, below the anterior clavae, with basal portion 5.5µm and tapering flagellum 5.5/6.3µm. Anterior clavae modified as ovoid structures, broader than tall, 10.3µm longest dimension. Posterior clavae elongate, 11.9/11.1 x 4µm, on a short (1.5µm) basal section. Lateral cirrus A rising from the base of each posterior clava; proximal portion 8.7/7.1µm long, with enlarged base; distal flagellum 16.4/8.7µm long, with a swelling at point of articulation.

The caudal plate carries long cirri E (46/44µm long) each consisting of 3 parts: a broad basal portion, 6/7µm; an annulated or ringed middle portion, 15/15µm; and a tapering flagellum, 25/22µm. 3 slender cirri, 12, 4, and 9µm long, emerge just above the extreme posterior margin of the caudal plate.

Mouth ventral, positioned at the tip of a telescopic cone (6µm long). Buccal tube (46µm long) narrow (c. 2µm internal diameter), leading to an ovoid bulb.

**Discussion:** *M. setoloso* n. sp. differs significantly from the type species, *M. orbiculatus* McKirdy *et al.*, 1976, and the only other recorded species in the genus, *M. isounguis* Renaud-Mornant, 1981, in possessing dorsal, lateral, and caudal bristles and numerous bristles on the 4th legs. Differences in the relative proportions of cephalic appendages and other measurable characteristics of the three species in the genus are provided in Table 1.

The nature and arrangement of anterior and posterior clavae, good critical characters for species differentiation in many other genera of Arthrotardigrada, are similar to those of *M. orbiculatus* except that the anterior clavae are not so broad at the base and the posterior club-shaped clavae are shorter; in *M. isounguis* anterior clavae are even narrower at the base and posterior clavae are large ovoid structures. It is also significant that *M. setoloso* has larger claws on the 4th legs and smaller claws on the 3rd legs than on legs 1 and 2, a pattern different from the other two species. Lateral cirri E are shortest in *M. setoloso*, about 13% longer in *M. orbiculatus* and up to 52% longer in *M. isounguis*.

## KEY TO SCOTTISH MARINE TARDIGRADES

The following key is designed for the artificial separation of tardigrades recorded from Scottish marine habitats. The morphological characters used have been selected to facilitate easy identification and are not intended to describe fully the animals or the range of intraspecific variation that might be encountered in a natural population. A diagrammatic composite tardigrade, illustrating morphological characteristics found in Scottish marine living forms, is provided (Fig. 3) to assist the use of the key.

- |    |  |    |
|----|--|----|
| 1. | With lateral cirrus at position A .....  | 2  |
|    | Without lateral cirrus at position A .....   | 12 |
| 2. | Legs without claws and terminated with digits, either elongate, rounded or oval flattened expansions ..... | 5  |
|    | Legs with or without digits and terminated with claws .....  | 3  |

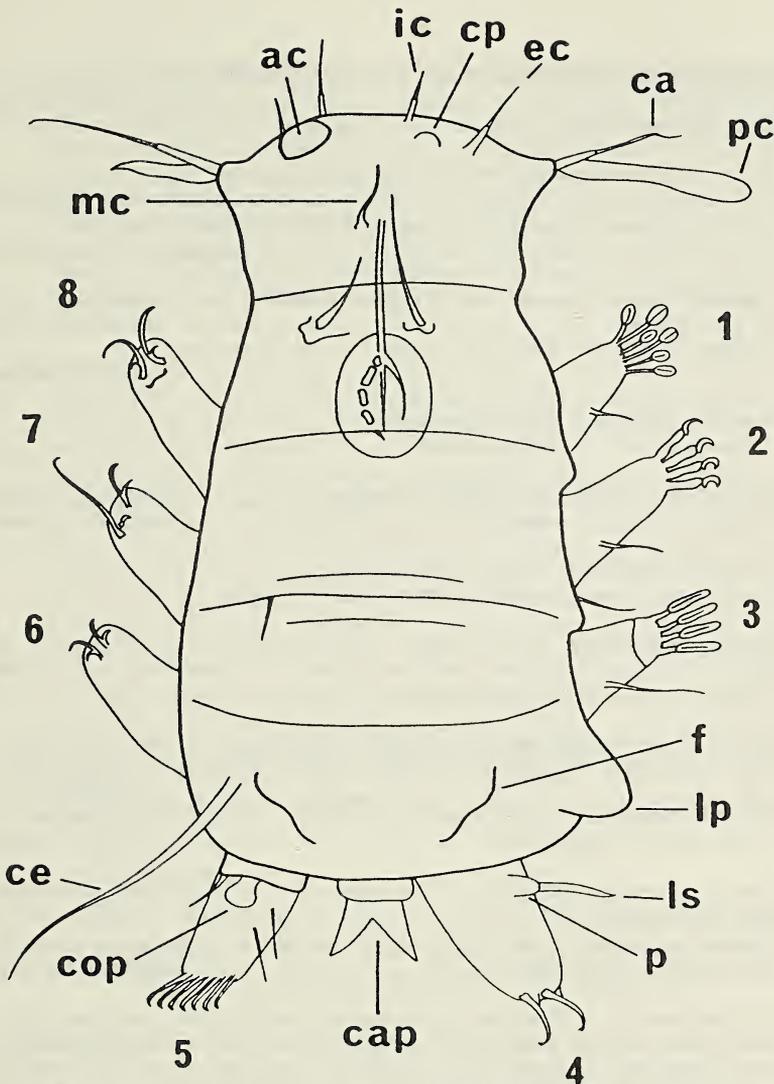


Fig. 3 Diagrammatic composite tardigrade illustrating morphological characteristics found in Scottish marine living forms. Key: ac – anterior clava; ca – cirrus A; cap – caudal appendage; ce – cirrus E; cop – coxal papilla; cp – cephalic papilla; ec – external cirrus; f – facetting; ic – internal cirrus; lp – lateral projection; ls – leg spine; mc – median cirrus; p – papilla; pc – posterior clava; 1 – digitate leg with round/oval expansions; 2 – digitate leg with claws; 3 – digitate leg with elongate flattened expansions; 4 – claws attached to leg with dorsal basement membrane; 5 – claws inserted directly into leg; 6 – *Macrobiotus* doubleclaw; 7 – *Hypsibius* doubleclaw; 8 – *Dactylobiotus* doubleclaw.

3. Legs with four digits each bearing a single smooth claw .....  
 ..... *Halechiniscus perfectus*  
 Legs without digits ..... 4
4. Five to eleven claws inserted directly onto each leg .....  
 ..... *Echiniscoides sigisimundi*  
 First three legs each with four claws, fourth legs with two claws .....  
 ..... *Megastygarcitides setoloso*
5. Digitate legs terminated with elongate, paddle-shaped expansions .....  
 ..... *Orzeliscus belopus*  
 Digitate legs terminated with round or oval expansions ..... 6  
 ..... Genus *Batillipes*
6. Animals without a caudal appendage ..... 7  
 Animals with a caudal appendage ..... 8
7. Caudal end swollen, with slight facetting ..... *Batillipes tubernatis*  
 Caudal end gently rounded ..... *Batillipes acaudatus*
8. Caudal appendage a single spine ..... 9  
 Caudal appendage consists of more than one spine ..... 11
9. Caudal appendage a long spine, placed dorsally, terminating in a  
 membranous sack; the sack may be inflated ..... *Batillipes bullacaudatus*  
 Caudal appendage a simple spine ..... 10
10. Caudal spine slender and short, inserted directly into the extreme caudal  
 end of the body. A single short spine on each of the fourth pair of legs  
 ..... *Batillipes mirus*  
 Caudal spine with a wide base, arising from a distinct basal peduncle  
 at the extreme caudal end ..... *Batillipes pennaki*
11. Caudal appendage consisting of three spines of equal length inserted directly  
 onto the caudal end ..... *Batillipes littoralis*  
 Caudal appendage consisting of a central long spine, surrounded by several  
 small spines at the base ..... *Batillipes phreaticus*
12. Doubleclaws on each leg are approximately similar in size and shape and  
 form mirror images with respect to the median plane of the foot; viewed  
 from above the sequence of claws across the foot is secondary arm, primary  
 arm, primary arm, secondary arm ..... 12  
 Doubleclaws on each leg usually differ in size and shape, and are always  
 asymmetrical (that is they do not form mirror images) with respect to the  
 median plane of the foot; viewed from above the sequence of claws across  
 the foot is secondary arm, primary arm, secondary arm, primary arm 14
13. Doubleclaws consisting of a large curved principal arm, with a small  
 secondary arm inserted at or near the base. The bases of the two  
 doubleclaws on each leg are joined by rods of cuticle. Genus *Dactylobiotus*  
 ..... Animal with a small conical swelling between the third and  
 fourth pair of legs, which may be difficult to see. Pharyngeal bulb with

- two macroplacoids, the first of which may be constricted. Microplacoid absent ..... *Dactylobiotus dispar*  
 The principal and secondary arms of each doubleclaw do not differ dramatically in size from each other. The bases of the two doubleclaws are not united by rods of cuticle. Genus *Macrobotus* .....  
 The two arms of each doubleclaw are united from the base to halfway along their length forming a Y shape with a small, smooth lunule at the base. Cuticle smooth or covered by small, sparse, irregularly scattered dimples. The pharyngeal bulb contains two macroplacoids, the first longer than the second and with a slight median constriction. Microplacoid present ..... *Macrobotus hufelandi*
14. Doubleclaws of each foot dramatically different in size and shape. The principal arm of the external doubleclaw is attached to the secondary arm by a flexible joint. The secondary arm of the doubleclaw is smoothly curved. Genus *Hypsibius* ..... 15  
 Doubleclaws of each leg more or less different from each other. The secondary arm of each doubleclaw arising at right angles to the longitudinal axis of the principal arm. Genus *Isohypsibius* ..... At the base of the smaller doubleclaw on the first three pairs of legs is a small cuticular bar. The pharyngeal bulb contains rows of three macroplacoids with a microplacoid; the first two macroplacoids in a row are rounded granules which touch, the third is a short rod equal in length to the first two ..... *Isohypsibius prosostomus*
15. Cuticle of the body smooth. Pharyngeal bulb with two smooth, rod-shaped macroplacoids of equal length and a microplacoid ... *Hypsibius dujardini*  
 Cuticle of the body densely granulate, with nine transverse bands of pigment. Pharyngeal bulb round containing two round granular macroplacoids. Microplacoid absent ..... *Hypsibius oberhaeuseri*

## Acknowledgments

The authors gratefully acknowledge D. Mills and S. Anderson, formerly of Heriot-Watt University, for assistance with field sampling, and D. Lampard for slide preparation.

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## Book Review

### **Keys to the Adults, Male Hypopygia, Fourth-Instar Larvae and Pupae of the British Mosquitoes (*Culicidae*) with notes on their ecology and medical importance.**

P. S. CRANSTON, C. D. RAMSDALE, K. R. SNOW and G. B. WHITE

F.B.A. Scientific Publication No. 48, 1987, 152pp.,  
1 photo-plate, many line drawings. ISBN 0-900386-460,  
ISSN 0367-1887. Softback £9.00.

This is a much-needed, up-to-date key to the various stages of British mosquitoes, of which, despite their obvious importance, no single account has been published since the classic work of J. F. Marshall in 1938.

As well as the matter listed in the title, this book includes a check-list and gives details of life-cycles and collecting methods. Three species of *Aedes* and one of *Culiseta* are not covered in the section on pupae due to lack of material. The text is accompanied by clear line drawings.

As a non-specialist, I would have welcomed the inclusion of a glossary even though technical terms are very well explained throughout the text. This point aside, this is a nicely-produced, well-written and illustrated text and will be of great use to entomologists and fresh-water biologists.

MARGARET M. T. REILLY

## The Vascular Plants of Great Cumbrae Island and the Adjacent Islets

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Great Cumbrae is situated SE of the island of Bute in the Firth of Clyde and is c. 17.7km in circumference with an area of c. 12 sq.km. Its highest point is 121 m above sea level. The rocks are predominantly Upper Devonian Red Sandstone but there is a small outcrop of Lower Carboniferous calciferous sandstone around Millport Bay and there are many igneous dykes and sills mostly orientated in a NW to SE direction.

A list of vascular plants found on the island between 1985 and 1987 was compiled (Table 1) and records, both in this list and in the text, are referred to 1km grid squares as indicated by letters in the map (Fig. 1). Two small islands in Millport Bay (Eileans in Fig. 1) were also surveyed and plant records from these are indicated in Table 1 by bold type. Table 2 lists all previous records from Gt. Cumbrae of plants *not found in the present survey*. Nomenclature and order of presentation follow Clapham *et al.* 1981, *Excursion Flora of the British Isles*, Ed. 3 as far as possible.

### Botanical History of Great Cumbrae

Plant records from Gt. Cumbrae can be traced back for over 150 years and several published lists have appeared. In this study these records have been summarised.

The first account of the Cumbrae flora was that of Stalker, (1830, see Campbell, 1975), a forester, who listed both flora and fauna of the island. Only common names were used but many of these are no longer applied. He recorded 226 species of vascular

plants, including 19 pteridophytes, and many of his records have since been confirmed. However, if interpretation of the names is correct, the list contains 6 new Scottish records and therefore should be regarded as untrustworthy.

The first list to use Latin names was that of Balfour (1856), who, with a party of students, surveyed both Great and Little Cumbrae. He recorded 447 species of vascular plants, including 27 pteridophytes. The ratio of pteridophytes to spermatophytes was regarded as high, presumably in comparison to that of the mainland, and rocks near the coast and wooded ravines were found to be the best botanical stations. Balfour described these ravines as running up from the shore but they have since been cut back and are now far short of this. Similarities between the flora of the Cumbraes and that of the island of Bute were pointed out but, unfortunately, records from the two Cumbraes were not distinguished so this list is unreliable as a record of the former flora of Gt. Cumbrae. Balfour records which have not been subsequently confirmed are indicated by ? in Table 2.

Keddie (1862) listed flowering plants and ferns of the Cumbraes and, like Balfour, usually did not distinguish between the two islands. His work, however, appears to have been mainly concentrated on Great Cumbrae and the list includes 80% of the species found in the present survey. Unconfirmed Keddie records are indicated by ? in Table 2. "Interesting" plants were said to occur on the rocky shores and amongst the cliffs overlooking the sea and the flora was likened to that of Bute rather than to that of Arran, the latter island supporting a sub-alpine flora and having a greater diversity of shore species.

Keddie's list, by far the most comprehensive for the Cumbraes, comprises 478 species of vascular plants including 28 pteridophytes. He was concerned about the fate of several species and included some which had recently disappeared. Others, which he regarded as on the brink of extinction, were not found in the present survey. For example, *Mertensia maritima*, common on the shores of Arran and Bute, had apparently been swept from the sandy shores of Cumbrae by a storm. Keddie could only find one specimen of *Geranium sanguineum* on Great Cumbrae although the species was still common on the cliffs of Little Cumbrae. *Chamaemelum nobile* had been extirpated from its old habitat and only survived precariously at the east end of Millport where it was in danger of being trodden down. *Coronopus squamatus*, restricted to an exposed road side in west Millport, had disappeared the previous season from

the shore by being overwhelmed by rubbish (this probably refers to the site of the Victorian tip, remnants of which are still traceable in area V). *Eryngium maritimum*, once common in the south of the island, had been extirpated and *Calystegia soldanella*, which grew alongside it was regarded as occupying an ever-receding space. *Geum rivale*, conspicuous by its absence today, was not found even though it was known to abound near Fairlie on the mainland. *Ranunculus sceleratus*, regarded as extinct, has, surprisingly, turned up in the present survey, albeit as a single specimen. Like Balfour, Keddie noted the rich fern flora although several species occurred only sparingly. This was blamed on the then popular habit of fern gathering which affected species such as *Asplenium marinum*, *A. ruta-muraria*, *Ophioglossum vulgatum*, *Hymenophyllum wilsonii* and, above all, *Osmunda regalis* which was carried off, roots and all, in great quantities. *A. ruta-muraria* had been reduced to a few plants, but now, as fern-gathering is no longer fashionable, has recovered and is abundant. This, however, could also be due to its having colonized many new stone buildings and walls which have appeared since Keddie's time. In contrast, *A. marinum*, *H. wilsonii* and *O. regalis* are now extremely rare and only single plants of each have so far been found: *B. lunaria* and *O. vulgatum* seem to be extinct.

Introduced species recorded by Keddie include *Lavatera arborea*, *Angelica archangelica*, *Valeriana pyrenaica*, *Tragopogon porrifolius*, *Iris foetidissima*, *Lysimachia nummularia*, *Lycium barbarum*, *Draba muralis* and *Phalaris arundinacea*. With the exception of *L. nummularia* and *P. arundinacea* which are quite common today, none of the other species could be found in the present survey.

The flora of Great Cumbrae was next dealt with by Henedy whose field guide, *The Clydesdale Flora*, had run into five editions by 1891 and included the first official records of 143 species. The appendices of the 5th edition included first records for *Silene noctiflora*, found by Paterson in 1878, *Parapholis strigosa*, found by Boyd in 1888 and *Silaum silaus*, found by Shearer in 1889. None of these was found in the present survey.

Soon after, Robertson (in King & Boyd, 1897), reported that *Primula vulgaris* was rapidly diminishing from Great Cumbrae due to its being carried off in basket loads by lady visitors. Fortunately the species survived this onslaught and is now quite common.

On 24 August 1895 the first recorded excursion (Anon., 1897)

by a natural history society, *The Natural History Society of Glasgow*, took place and several species growing on marshy ground below old sea cliffs near the Marine Station (area U) were identified. The report (1895) includes first records for 7 species including *Agrimonia procera* and *Oenanthe lachenalii*.

Ewing (in Elliot *et al.*, 1901) added four more species to the Great Cumbrae list including *Thlaspi arvense* and *Isolepis cernua* and Robertson (1908), reporting on two excursions by *The Andersonian Naturalists of Glasgow*, added 17 new species including *Anthyllis vulneraria*, *Scutellaria galericulata*, *Arabidopsis thaliana*, *Moehringia trinervia*, *Geranium lucidum* and *Adoxa moschatellina*.

Sutherland (1926) gives an account of the plant ecology of the Cumbraes and S. Bute. Although no checklist of species is given, there are several additions including *Carum carvi* (areas RSV & U), *Orchis mascula* (areas Q & U), *Epipactis helleborine* near the old quarry (area U – now vanished) and *Blysmus rufus* (Areas Q & U). He also recorded *Coeloglossum viride* on the seaward edge of area E. None of these has been found since.

Grierson (1930) listed 'Clyde Casuals', including the first record of *Cardaria draba* from Millport. Now this species seems to be restricted to a small patch in area S.

*The Flora of the Clyde Area* (Lee, 1933) generally lumps records from the Clyde Islands together but occasionally makes specific reference to Great Cumbrae and adds five new species for the island including *Oenanthe fistulosa*. This species is still present.

Lee (1953) added *Aconitum napellus* and Conacher (1957) added *Picris echioides* to the Great Cumbrae list. Both were new vice-county records.

The first comprehensive list of the flora of Great Cumbrae to detail the distribution of each species was that of Fletcher and Martin (1960). This list, based on the results of two student expeditions and regarded as incomplete, comprises 329 species, including 10 pteridophytes. It adds 27 new species to the island total including *Lepidium latifolium* and *Alopecurus mysuroides*, both of which were regarded by Lee (1933) as rare in the Clyde Area. Neither was found in the present survey.

Fletcher and Martin described the island as supporting a profusion of orchids, particularly in the marshes and on the ground bordering them. The situation is much the same today, although the vast majority are represented by two or three species of the

taxonomically complicated genus *Dactylorhiza*. Altogether 8 species of orchid were found but up to 13 have occurred on the island.

Fletcher and Martin did not include the fern *Polystichum setiferum*, but a single specimen was found growing under a rock in dense, shrubby vegetation below the cliffs alongside the Marine Station (area U) in 1967 and several plants were found in a small wood behind the Marine Station in 1968 (Thompson & McAllister, 1971). Specimens can still be found in the latter area. Jackson (1974) reported finding a large colony in a wood situated on sandstone detritus but gave no locality. The species does, however, occur in several areas (Table 1). Other pteridophytes found by Jackson include *Dryopteris affinis*, *D. aemula* and *Cystopteris fragilis*, all new records for Great Cumbrae. The two latter species have not, however, been found again.

### Comparison of present and earlier surveys

The present list (Table 1) comprises 366 species including 18 pteridophytes. Seventy-one species not listed by Keddie are added, but of these, 52% have been introduced. However, c. 280 species are unaccounted for (Table 2) and include 17 pteridophytes. Some species may, of course, have been overlooked, but many seem to have disappeared so, to assess why, an examination of habitat preferences of absent species was carried out. Habitat preferences of absent species, expressed as percentages of the total number of species not found, are shown below:

Habitat	% Preference	Habitat	% Preference
Aquatic/Wetland	31	Woodland	12
Grass/Pasture	16	Maritime	8
Arable	16	Salt Marsh	4
Heath/Moor	13		

These results, which assume that all old records are accurate, correlate with environmental effects due to changes in agricultural practice including drainage of wetlands (continuing), destruction of heath and moor by burning and extensive grazing, not leaving grassland to pasture, use of chemicals in intensive agriculture which tends to eliminate weeds or opportunistic species from surrounding areas and clearance of woodlands. Sometimes these changes have been reversed: on the Farland Hills (area PU) heather has encroached upon what was arable land in the mid 19th century (Campbell, 1975). This situation is atypical.

Other major changes since the early surveys likely to have affected the vegetation include:

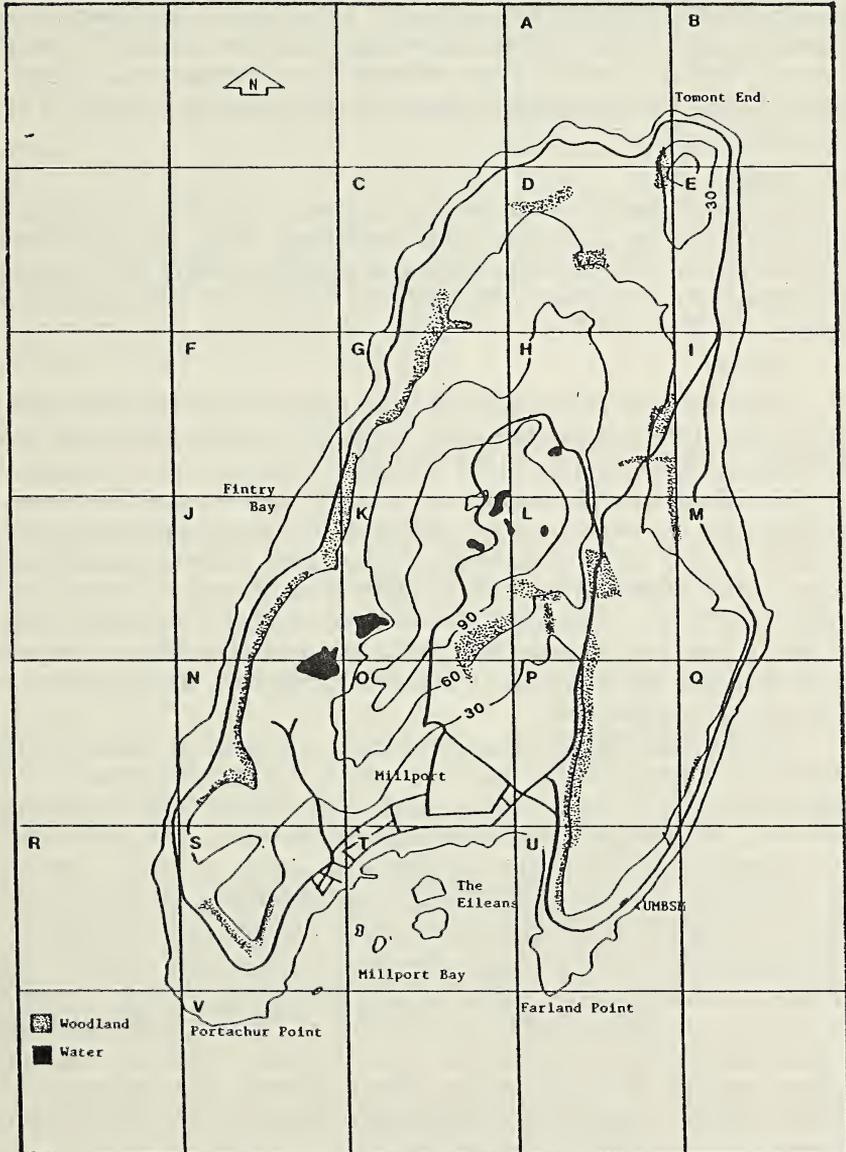
- a. the construction of the road round the island in 1875. This absorbed a substantial amount of the raised beaches much of which would have been marshland.
- b. the laying out of golf courses since 1888. The sole remaining course occupies a large part of area GJKNO which would originally have been moorland, marsh and pasture.
- c. the formation of a reservoir in 1905 above Upper Kirkton Farm (area K) on land formerly largely occupied by a golf course.

The disappearance of maritime and salt-marsh species, including *Zostera marina* (Eel-grass), cannot be attributed to loss of habitat. It could be linked to marine pollution although all the marine/maritime species unaccounted for, except for *Hyoscyamus niger* (Henbane) and *Lepidium latifolium* (Dittander), are found round the shores of Arran (Church, 1986) and *Z. marina* occurs higher up the Clyde than Cumbrae. Sutherland (1926) described *Z. marina* as growing luxuriantly on a sandy ridge in the shallow water of Millport Bay (area STU): its disappearance may be a result of island sewage being deposited there. Furthermore some years ago *Zostera* beds were decimated by disease (Chapman, 1978) and any recovery would have been hindered by pollution. Reasons for the disappearance of other maritime species are unclear and it would be interesting to compare the results of this survey with local mainland shores.

### Present Vegetation of Great Cumbrae

The island encompasses numerous habitats each supporting a different type of vegetation including woodland, heath, moor, marsh, freshwater pools, rocky and sandy shores and salt-marshes. These can often be sub-divided into smaller units or communities each dominated by a distinctive species. Conventionally such communities are named after the dominant species by compounding “-etum” with the stems of their generic names (Tansley 1939). Thus a *Juncus* dominated community is a Juncetum. Where a single species dominates, the trivial name in the genitive case is added, e.g. a *Molinietum caeruleae* is a community dominated by *Molinia caerulea*.

Fig. 1 Map of Great Cumbrae and adjacent Eileans. 1km squares of National Grid are identified by letters. Contour heights are in metres.



The vegetation of the island may be broadly classified as follows:

A. Moor:

This comprises upland vegetation usually above the 60m contour in areas G,H,K,L,P,Q & U (Fig.1). Much of this is typical heather moorland (Callunetum) but there are also large areas covered with bracken and rough pasture. Associated species include *Potentilla erecta*, *Galium saxatile*, *Erica cinerea*, *Juncus squarrosus*, *Scirpus caespitosus*, *Deschampsia flexuosa*, *Anthoxanthum odoratum* and *Nardus stricta*.

B. Heath

Small patches of a Callunetum/Ericetum association are found in a few low-lying areas around the coast (eg. A,B,J,M & Q). These form important refuges for several orchids including *Gymnadenia conopsea*, *Listera ovata*, *Platanthera bifolia*, *P. chlorantha* and species of *Dactylorhiza*.

C. Marsh:

Sutherland (1926) recognized three types of marsh on the island, Juncetum, Irisetum and Eriophoretum. Two further types may now be added, Sphagnetum and Phragmitetum.

(1) Juncetum: This community is often dominated by *Juncus effusus*, (eg. in parts of A,C,E,M,N & P) but elsewhere (eg. parts of C,E,J,N & U) *J. articulatus* is dominant. These species may occupy the same habitat but *J. effusus* is often dominant in wet pasture where it is frequently associated with *Senecio aquaticus*. *J. articulatus* prefers more boggy situations and is often associated with *Ranunculus flammula*, *Cardamine pratensis*, *Lotus uliginosus* and *Achillea ptarmica*.

(2) Irisetum: This community, based on *Iris pseudacorus*, mainly occurs in areas N, S & U, and commonly occupies hollows on wet pasture (eg. S). Commonly associated species include *Filipendula ulmaria*, *Deschampsia cespitosa* and occasionally *Lythrum salicaria*.

(3) Eriophoretum: This community mainly occurs in areas N & U and is based on *Eriophorum angustifolium*. Other common species include *Potentilla palustris* and *Narthecium ossifragum*.

(4) Sphagnetum: This is a moss-dominated community found mainly in area U and in wetter parts of upland areas G,H,K & L. Apart from *Sphagnum* spp. other mosses such as *Polytrichum commune* and *Aulacomnium palustre* are common here. Common vascular plants include *Potentilla erecta*, *Erica cinerea*, *Succisa pratensis*, *Hydrocotyle vulgaris* and *Juncus articulatus*. The insectivorous *Drosera rotundifolia* often occurs too.

(5) Phragmitetum: This community is restricted to area I. The dominant species *Phragmites australis* prefers neutral to alkaline conditions so that this area could be described as fen. This particular community, which is close to the sea, may have formed as part of a transitional community in the succession from salt-marsh to fresh water. Other common species include *Dactylorhiza fuchsii*, *Filipendula ulmaria* and *Angelica sylvestris*.

These wetland communities often grade into one another with many species common to each. In certain less wet parts of areas N & U a Molinietum caeruleae appears which seems transitional to heath. Associated species include *Rhinanthus minor*, *Carum verticillatum*, *Juncus conglomeratus* and a rich variety of orchids. In other wet but not boggy places, especially in coastal fringe areas of C,G,M & N, dense belts of *Oenanthe crocata* occur. Commonly associated species are *Heracleum sphondylium*, *Stachys palustris* and *Filipendula ulmaria*.

#### D. Freshwater:

Major freshwater pools occur in areas G,H,J,K,L & N and include four lochans at the top of the island (area GHKL) and two reservoirs (area JKN). The lochans are described by Sutherland (1926) as supporting a rich freshwater flora. The largest (Minnimoer) is near the summit in area GK. Dominant fully aquatic species include *Potamogeton natans* and *Equisetum fluviatile* whilst *Juncus articulatus*, *J. effusus*, *Ranunculus flammula* and *Hydrocotyle vulgaris* prevail at the margins. *Potamogeton* abounds in all lochans except that SW of Minnimoer (area K) which tends to dry up in summer. The semi-dried basin of this lochan supports numerous aquatic and semi-aquatic species including *Gnaphalium uliginosum* and *Myosotis scorpioides*. The dominant vegetation of the lochans appears similar to that described by Sutherland (1926) except that *Sparganium erectum*, which he noted to be abundant, was not found. The two large reservoirs in area JKN undergo large fluctuations in depth but nevertheless support many aquatic species including *Ranunculus aquatilis*, *Potamogeton natans* and *Eleocharis palustris*. There are also several small areas of standing, shallow water, particularly in areas A & J. Here, aquatic species include *Menyanthes trifoliata* and *Baldellia ranunculoides*.

#### E. Salt-marsh:

Salt-marshes are tracts of land covered by phanerogamic vegetation and subject to periodic flooding by the sea. On Great Cumbrae they occur mainly around West Bay (area S), Kames Bay

(area V), between White Bay and Skate Point (area C) and around Portachur Point (area V) and, like most littoral plant assemblages, are composed of a series of zones or communities dominated by single species. The largest assemblage of these communities occurs between White Bay and Skate Bay in area C. On the seaward edge a Salicornietum can occasionally be found, although *Suaeda maritima* may be co-dominant. Moving inland the Salicornietum quickly gives way to a Glauxetum which often includes *Aster tripolium*, *Triglochin maritima*, *Spergularia media* and a few tufts of *Armeria maritima*. The Glauxetum may often be extensive and may occasionally replace the Salicornietum at the seaward edge where tufts of *Puccinellia maritima* may also occur. Progressing inland the Glauxetum eventually gives way to a Juncetum *gerardii* with *J. gerardi* often forming a thick sward. Other species include *Aster tripolium*, *Sonchus arvensis* and *Potentilla anserina*. Above the spring tide high-water mark occasional patches of *Juncus maritimus* occur but this area tends to be dominated by *Festuca rubra* and *Elymus repens*. The salt-marsh in area S, however, is very different and is mainly composed of Asteretum. Fletcher & Martin (1960) describe the salt-marsh at Portachur Point (area V) in detail.

#### F. Sand dune:

There are no extensive sand dune systems on the island and such as exist occur only in areas F & J around Fintry Bay. A narrow Ammophiletum has formed along the seaward edge. Associated species include *Carex arenaria*, *Hieracium pilosella*, *Euphrasia officinalis* agg., *Centaureum littorale* and *Campanula rotundifolia*. Two other sand-binding grasses, *Leymus arenaria* and *Elymus farctus* also occur occasionally. Further inland Ammophiletum cedes to a Bracken/Bramble dominated community. *Populus alba* also grows here.

#### G. Maritime Rocks:

The Cumbrae shoreline is mainly rocky and usually dominated by either Armerietum or Festucetum. Locally, however, this habitat is probably affected by sheep and possibly rabbit grazing. Heavy grazing tends to encourage the development of Plantaginetum *maritimae* at the expense of *Festuca rubra* (Chapman, 1978). Other commonly associated species include *Silene maritima*, *Plantago coronopus*, *Lotus corniculatus* and *Tripleurospermum maritimum*.

#### H. Woodland

Campbell (1975) reported that very few trees existed on the island prior to the early part of the 19th century when Lord Glasgow had

c. 100 acres of various species planted by his forester, Stalker. Only English names were given e.g. Scotch Fir (?*Pinus sylvestris*), Scotch Oak (?), English Elm (?*Ulmus procera*), Huntingdon Willow (?), Weymouth Pine (?), Bedford Poplar (?), Canadian Poplar (?*Populus x canadensis*), Cytisus (?*Cytisus scoparius*), Laburnum (*Laburnum anagyroides*), Common Willow (?), Larch (*Larix decidua*), Black Spruce (?), White Spruce (?), Common Ash (?*Fraxinus excelsior*), Mountain Ash (*Sorbus aucuparia*), Common Birch (?), Chestnut (?), Oriental Plane Tree (?), and Common Lime Tree (*Tilia x vulgaris*). Further research will be necessary to identify the species to which some of these names refer. English Elm has not been found but other species e.g. Scots Pine, Broom (*Cytisus*), Larch, Ash, Mountain Ash, both Silver and Downy Birch, Laburnum and Horse (but not Sweet) Chestnut still occur. Sutherland (1926) noted there were c. 170 acres of woodland on the island at that time but apparently large areas were cleared during the two World Wars (Campbell, 1975).

Much of the mixed woodland is restricted today to the slopes of the old sea cliffs (areas C,D,G,H,I,J,N,P,Q & U) which are too steep and rocky for agricultural development. Many of these woodlands, especially on the west side of the island may be quite ancient and are much as described by Sutherland (1926). Fletcher & Martin (1960) noted that the ground below the cliffs tends to become drier as the gradient of the slope decreases. Where steep slopes occur (areas C,G,J,N & Q) the woods tend to be dominated by *Quercus robur* in the upper, drier and more precipitous regions and *Alnus glutinosa* in the lower wetter areas, but where more gentle gradients occur (areas D,I,O,P,S & U) *Acer pseudoplatanus* tends to be dominant. The only mixed woodland on relatively flat terrain is the "Standing Stone Plantation" (area L) in which 16 species of tree have been recorded including *Acer campestre*. The main coniferous plantation is found in area KO and consists mainly of two species, *Picea abies* and *P. sitchensis*. This plantation was not mentioned by Fletcher & Martin (1960) and so presumably is of more recent origin. Altogether 24 tree species have been recorded on the island.

At ground level the oak woods are usually dark and damp and abound with bryophytes and ferns. Common vascular plants include *Chrysosplenium oppositifolium*, *Luzula sylvatica* and occasionally *Sanicula europaea*. The Sycamore woods are usually dominated by grasses, with *Holcus lanatus* being particularly common. Other species include *Hyacinthoides non-scripta* and *Silene dioica*.

## Vegetation of the Eileans

The two islets in Millport Bay (Eileans, Fig. 1) are composed mainly of calciferous sandstone with narrow bands of quartzite conglomerate. According to Sutherland (1926), the inner Eilean measures 1.9ha and the outer 2.5ha at low tide. Approximately half of each disappears at ordinary high tide. The outer Eilean was formerly much larger but parts were quarried and used to construct Port Patrick harbour in the early 19th century.

The species present on each Eilean are listed in Table 1 (bold letters). The list also outlines the species regarded by Sutherland (1926) as dominant at that time. Nevertheless, three of these, *Empetrum nigrum* (Crowberry), on both Eileans and *Vaccinium myrtillus* (Bilberry) and *Carex nigra* (Common Sedge) on the outer Eilean, were not found during the present survey. In other respects, however, the dominant vegetation was found to be similar to that found by Sutherland. The inner Eilean is dominated by Gorse/Bramble/Bracken association whereas the outer one mainly supports Callunetum. There is also a small salt-marsh on the outer Eilean.

Coincidentally, 58 species (but of different composition) were recorded on each Eilean, high numbers for such small islands. Sutherland was also impressed by the large numbers present. This species-richness may be related to the fact that the islands provide refuges for many sea-birds which will supply abundant guano and may introduce seeds. According to local people the vegetation of the Eileans occasionally sets on fire and this would tend to maintain diversity by preventing monopolization by dominants. Interestingly, two species recorded on the inner Eilean, *Spergularia rupicola* (Cliff Sea-spurrey) and *Pernettya mucronata* (Prickly Heath) have not been recorded on either Great Cumbrae or Arran (Church, 1986). *P. mucronata* was introduced to this country from Chile and although rare has become naturalized in several places, especially in Ireland.

### Table 1. Vascular Plants of Great Cumbrae and Inner and Outer Eileans, 1985-87

Species are listed according to Clapham, Tutin & Warburg, 1981. Authors of first records are given, abbreviations used are: Exc., 1895 = Anon., 1897; F. & M. = Fletcher & Martin, 1960; Henn. = Henedy, 1891; Jack. = Jackson, 1974; Kedd. = Keddie, 1862; Lee'33 = Lee, 1933; Lee'53 = Lee, 1953; Robtsn. = Robertson, 1908; Stalk. = Stalker, 1830; Suth. = Sutherland, 1926. + denotes a new record for the island. Letters (A, B, C etc.) indicate representative localities on Great Cumbrae (Fig. 1); bold letters indicate species found on outer (O) or inner (I) of small islands (Eileans) in Millport Bay during this survey, (SO, SI) indicate species recorded at these sites by Sutherland 1926.

- Equisetum fluviatile* (Water Horsetail): Stalk. Occasional (H,K,P,S).  
*E. sylvaticum* (Wood Horsetail): Stalk. Occasional (H,I).  
*E. arvense* (Common Horsetail): Stalk. Frequent (H,I,J,K,L,N,P).  
*Osmunda regalis* (Royal Fern): Stalk. Very rare (Q).  
*Pteridium aquilinum* (Bracken): Stalk. Abundant, very widespread (O,I).  
*Hymenophyllum wilsonii* (Wilson's Filmy Fern): Henn. Very rare (S).  
*Asplenium adiantum-nigrum* (Black Spleenwort): Robtsn. Occasional (G,M,O,Q).  
*A. marinum* (Sea Spleenwort): Henn. Rare (U).  
*A. trichomanes* (Maidenhair Spleenwort): Jack. Occasional (L,M,O,Q,T).  
*A. ruta-muraria* (Wall-Rue): Robtsn. Occasional (O,T).  
*Phyllitis scolopendrium* (Hart's-tongue Fern): Stalk. Occasional (L,M,Q,U).  
*Athyrium filix-femina* (Lady-fern): Stalk. Occasional (D).  
*Dryopteris affinis* (Scaly Male Fern): Jack. Occasional (C,U).  
*D. filix-mas* (Male Fern): Stalk. Frequent, widespread (I).  
*D. dilatata* (Broad Buckler-fern): Jack. Frequent, widespread (O,I).  
*Polystichum setiferum* (Soft Shield-fern): Henn. Occasional (N,U).  
*Blechnum spicant* (Hard-fern): F. & M. Occasional (L,M,Q,P).  
*Polypodium vulgare* (Common Polypody): F. & M. Frequent, widespread.  
+ *P. interjectum* (Hexaploid Polypody): (O).  
*Picea abies* (Norway Spruce): Suth. Plantations (K,L,O).  
+ *P. sitchensis* (Sitka Spruce): Plantations (K,O).  
*Larix decidua* (European Larch): F. & M. Plantations (K,L,O).  
*Pinus sylvestris* (Scots Pine): Suth. Frequent (L,P,U).  
*Anemone nemorosa* (Wood Anemone): Kedd. Occasional (C,G,K).  
*Caltha palustris* (Marsh Marigold): Stalk. Frequent (J,N,U).  
*Ranunculus acris* (Meadow Buttercup): F. & M. Frequent, widespread (O,I).  
*R. repens* (Creeping Buttercup): F. & M. Occasional (L).  
*R. flammula* (Lesser Spearwort): Stalk. Frequent (G,H,J,K,N,S,V).  
*R. aceleratus* (Celery-leaved Crowfoot): Kedd. Rare (V).  
*R. aquatilis*: Suth. Occasional (K,N).  
*R. ficaria* (Lesser Celandine): Stalk. Frequent (C,G,H,J,L,P).  
*R. hederaceus* (Ivy-leaved Water-Crowfoot): Kedd. Rare (G).  
+ *Aquilegia vulgaris* (Columbine): Rare (C).  
*Papaver dubium* (Long-headed Poppy): F. & M. Occasional (J,K).  
+ *P. somniferum* (Opium Poppy): Rare (S).  
*Fumaria officinalis* (Common Fumitory): F. & M. Occasional (E,O,V).  
+ *Brassica napus* (Rape): Occasional (V).  
*Raphanus maritimus* (Sea Radish): Henn. Frequent (I,M,N,R;O,I).  
*Cardaria draba* (Hoary Pepperwort): Grierson c.1913. Occasional (S).  
*Capsella bursa-pastoris* (Shepherd's Purse): Stalk. Frequent (M,O,P;I).  
*Cochlearia officinalis* (Scurvy-grass): Robtsn. Abundant (C,J,R,T;O,SO,I,SI).  
*Cardamine pratensis* (Cuckoo Flower): Stalk. Abundant (C,J,M,U).  
*C. amara* (Large Bitter-cress): F.&M. Rare (N).  
+ *C. flexuosa* (Wood Bitter-cress): Occasional (C,G).  
*Nasturtium officinale* (Green Watercress): Stalk. Occasional (H,N,P).  
+ *Hesperis matronalis* (Dame's Violet): Rare (O).  
+ *Cheiranthus cheiri* (Wallflower): Rare (U).  
*Sisymbrium officinale* (Hedge Mustard): Stalk. Occasional (I,J).  
+ *Viola riviniana* (Common Violet): Frequent (G,J,L,P,U).  
*V. palustris* (Marsh Violet): Stalk. Occasional (K,L).  
+ *V. arvensis* (Field Pansy): Rare (V).  
*Polygala vulgaris* (Common Milkwort): Henn. Occasional (C,L,P,Q).

- + *P. serpyllifolia* (Thyme-leaved Milkwort): Occasional (C,J,N).
- Hypericum androsaemum* (Tutsan): Stalk. Occasional (G,U).
- H. perforatum* (Common St John's Wort): Stalk. Occasional (E,N,S).
- H. tetrapterum* (Square-stemmed St John's Wort): Stalk. Occasional (G,N).
- H. pulchrum* (Slender St John's Wort): Suth. Occasional (H,N,Q).
- + *H. calycinum* (Rose of Sharon): Rare (R).
- Silene dioica* (Red Campion): Suth. Frequent (A,C,D,J,M).
- S. maritima* (Sea Campion): Suth. Occasional (U).
- Lychnis flos-cuculi* (Ragged Robin): Stalk. Frequent (A,N,Q,U,V; I).
- Cerastium fontanum* (Common Mouse-ear Chickweed): Henn. Frequent (M,U;O,I).
- Stellaria media* (Chickweed): Robtsn. Frequent, widespread (O,I).
- S. holostea* (Greater Stitchwort): Stalk. Frequent (C,G,L,N,P).
- S. alsine* (Bog Stitchwort): Kedd. (N).
- Sagina procumbens* (Procumbent Pearlwort): F. & M. Frequent, widespread. (O, I).
- Honkenya peploides* (Sea Sandwort): F. & M. Frequent (A,C,S).
- Spergula arvensis* (Spurrey): F. & M. Frequent (C,U).
- Spergularia rupicola* (Cliff Sea-spurrey): (I only).
- S. media* (Greater Sea-spurrey): F. & M. Occasional (A,V).
- Chenopodium album* (Fat Hen): Stalk. Occasional (O,T).
- + *Atriplex littoralis* (Shore Orache): Rare (S).
- A. patula* (Common Orache): Suth. Rare (V; O,I).
- A. glabriuscula* (Babington's Orache): Henn. Frequent (A,C,F,I,M,R; O).
- Suaeda maritima* (Herbaceous Seablite): Suth. Occasional (C,V).
- Salicornia europaea* agg. (Glasswort): Suth. Rare (C).
- Tilia x vulgaris* (Common Lime): Stalk. Occasional (L).
- + *Geranium sylvaticum* (Wood Cranesbill): Rare (E).
- G. dissectum* (Cut-leaved Cranesbill): Robtsn. Occasional (N,O).
- G. molle* (Dove's-foot Cranesbill): F. & M. Occasional (H,S;I).
- G. robertianum* (Herb Robert): Stalk. Frequent (L,M,P,Q;I).
- Oxalis acetosella* (Wood-sorrel): Stalk. Frequent (C,D,G,H,L,P).
- Acer pseudoplatanus* (Sycamore): Suth. Frequent (D,G,H,L,P).
- A. campestre* (Field Maple): Henn. Occasional (L).
- Aesculus hippocastanum* (Horse Chestnut): F. & M. Occasional (D,L,P).
- + *Ilex aquifolium* (Holly): Occasional (H,I,U).
- Laburnum anagyroides* (Laburnum): Stalk. Rare (I,L).
- Ulex europaeus* (Gorse): Stalk. Abundant, widespread (O,SO,I,SI).
- Cytisus scoparius* (Broom): Stalk. Frequent (B,E,K,M,Q;O).
- Trifolium dubium* (Lesser Yellow Trefoil): F. & M. Frequent (K,N,O,S;O).
- T. repens* (White Clover): F. & M. Frequent, widespread (O,I).
- T. pratense* (Red Clover): F. & M. Frequent, widespread.
- Lotus corniculatus* (Birdsfoot-trefoil): Stalk. Frequent, widespread (O,SO,I,SI).
- L. uliginosus* (Large Birdsfoot-trefoil): F. & M. Frequent (M,N,Q,U;O,I).
- Vicia cracca* (Tufted Vetch): Suth. Frequent (A,S,U;O).
- V. sepium* (Bush Vetch): F. & M. Frequent (P,Q,U).
- V. sativa* (Common Vetch): Henn. Rare (G,M,P).
- Lathyrus pratensis* (Meadow Vetchling): Suth. Frequent (A,P,S,U).
- + *L. odoratus* (Sweet Pea): Escape, rare (N).
- + *Spiraea salicifolia* (Willow Spiraea): Rare (U).
- Filipendula ulmaria* (Meadow-sweet): Stalk. Frequent (C,J,N,U).
- Rubus idaeus* (Raspberry): Stalk. Occasional (H,O,U).
- R. fruticosus* agg. (Bramble): Stalk. Abundant, widespread (O,SO,I,SI).

- Potentilla palustris* (Marsh Cinquefoil): Stalk. Frequent (J,K,N,S,U).  
*P. anserina* (Silverweed): Stalk. Abundant (A,C,E,I,K,M;O,I,SI).  
*P. erecta* (Common Tormentil): Suth. Abundant, widespread (O,I).  
*Fragaria vesca* (Wild Strawberry): Suth. Rare (Q).  
*Geum urbanum* (Wood Avens): Suth. Occasional (L,N).  
*Agrimonia eupatoria* (Common Agrimony): Henn. Rare (Q).  
*Alchemilla vulgaris* agg. (Lady's Mantle): Stalk. Occasional (E,L,M).  
*Rosa pimpinellifolia* (Burnet Rose): Henn. Occasional (H,J,N).  
*R. canina* agg. (Dog Rose): Suth. Occasional (C,M,U).  
*Prunus spinosa* (Blackthorn): Suth. Occasional (N,U).  
+ *P. laurocerasus* (Cherry-Laurel): Rare (P).  
*Crataegus monogyna* (Hawthorn): Suth. Frequent, widespread.  
*Sorbus aucuparia* (Rowan): Henn. Frequent, widespread.  
*Sedum anglicum* (English Stonecrop): Exc., 1895. Frequent (G,N,U;O,I,SI).  
*S. acre* (Wall-pepper): Robtsn. Occasional (S,V,U).  
*Umblicus rupestris* (Wall Pennywort): Exc., 1895. Occasional (G,U).  
+ *Saxifraga hypnoides* (Dovedale Moss): Rare (J).  
*Chrysosplenium oppositifolium* (Opposite-leaved Golden Saxifrage): Robtsn. Frequent, (C,G,H,J,O,P).  
*Parnassia palustris* (Grass of Parnassus): Suth. Occasional (E,K,Q,U).  
+ *Ribes nigrum* (Black Currant): Rare (R,U).  
+ *R. uva-crispa* (Gooseberry): Rare (N,U).  
*Drosera rotundifolia* (Sundew): Stalk. Occasional (K,L,U).  
*Lythrum salicaria* (Purple Loosestrife): Suth. Frequent (A,B,C,K,N).  
*L. portula* (Water Purslane): Henn. Occasional (G,K).  
*Epilobium parviflorum* (Lesser Hairy Willow-herb): F. & M. Occasional (N,R).  
+ *E. montanum* (Broad-leaved Willow-herb): Occasional (O,U).  
*E. tetragonum* (Square-stemmed Willow-herb): F. & M. Occasional (E,G,I,N).  
*E. obscurum* (Dull-leaved Willow-herb): F. & M. Occasional (G).  
*E. palustre* (Marsh Willow-herb): Henn. Occasional (J,N).  
*Chamerion angustifolium* (Rose-bay Willow-herb): F. & M. Frequent (K,N,S;O,I).  
*Circaea lutetiana* (Enchanter's Nightshade): F. & M. Occasional (Q,L).  
*Callitriche stagnalis* agg. (Starwort): Occasional (G,K).  
+ *Cornus sanguinea* (Dogwood): Rare (P).  
*Hedera helix* (Ivy): Stalk. Occasional (C,H,U).  
*Hydrocotyle vulgaris* (Pennywort): Stalk. Frequent (G,J,K,Q,U;O,SO).  
*Sanicula europaea* (Sanicle): Stalk. Rare (J,L).  
*Anthriscus sylvestris* (Cow Parsley): Frequent (E,I).  
*Myrrhis odorata* (Sweet Cicely): Henn. Rare (C).  
*Conopodium majus* (Pignut): F. & M. Abundant, widespread.  
*Aegopodium podagraria* (Ground Elder): Stalk. Frequent (K,O).  
*Oenanthe fistulosa* (Tubular Water Dropwort): Lee'33. Rare (S.V.).  
*O. crocata* (Hemlock Water Dropwort): Suth. Abundant (C,E,G,J,M,N,Q,U;O,I,SI).  
*Apium nodiflorum* (Fool's Watercress): Henn. Occasional (N,S,U).  
*Carum verticillatum* (Whorled Caraway): Suth. Frequent (A,C,N).  
*Angelica sylvestris* (Wild Angelica): Stalk. Frequent (A,C,H,J,K,N,U;O,I).  
*Heracleum sphondylium* (Hogweed): Stalk. Frequent, widespread.  
*H. mantegazzianum* (Giant Hogweed): F. & M. Rare (S,T).  
+ *Torilis japonica* (Upright Hedge-parsley): Occasional (N).  
*Ligusticum scoticum* (Lovage): Henn. Occasional (T,U;O).  
*Mercurialis perennis* (Dog's Mercury): Robtsn. Frequent (H,J,N,Q).

- + *Euphorbia helioscopia* (Sun Spurge): Occasional (N,O,V).
- Polygonum aviculare* (Knotgrass): F. & M. Frequent (D,H,K,R;I).
- P. amphibium* (Amphibious Bistort): Suth. Frequent (G,K,N).
- P. persicaria* (Persicaria): Stalk. Frequent (G,L,R,S;I).
- + *Reynoutria japonica* (Japanese Knotweed): Frequent (C,N,U).
- Rumex acetosella* (Sheep's Sorrel): Stalk. Frequent, widespread (I).
- R. acetosa* (Sorrel): F. & M. Frequent, widespread (O,I,SI).
- R. crispus* (Curled Dock): Suth. Frequent, widespread (G,I).
- R. obtusifolius* (Broad-leaved Dock): Stalk. Frequent (I,M,N;I).
- Urtica dioica* (Stinging Nettle): Stalk. Frequent, widespread.
- + *Humulus lupulus* (Hop): Rare (J).
- Ulmus glabra* (Wych Elm): Robtsn. Frequent (D,L,J).
- Myrica gale* (Bog Myrtle): Stalk. Occasional (C).
- Betula pendula* (Silver Birch): Suth. Frequent (J,L,Q).
- + *B. pubescens* (Birch): Occasional (J).
- Alnus glutinosa* (Alder): Stalk. Frequent (D,G,M,L).
- Corylus avellana* (Hazel): Robtsn. Occasional (J,N).
- Fagus sylvatica* (Beech): Suth. Frequent (D,J,L,P).
- Quercus robur* (Pedunculate Oak): F. & M. Frequent (D,J,L,P).
- Populus alba* (White Poplar): Suth. Rare (J).
- ? + *Salix x laurina*: Occasional (G).
- Salix aurita* (Eared Willow): Kedd. Occasional (C,N).
- Salix* spp.: Frequent (O,I).
- Rhododendron ponticum* (Wild Rhododendron): F. & M. Frequent (C,J,U).
- Pernettya mucronata* (Prickly Heath): (I only).
- Calluna vulgaris* (Heather): Suth. Abundant, widespread (O,SO).
- Erica tetralix* (Cross-leaved Heath): Stalk. Frequent (M,Q,U;O).
- E. cinerea* (Bell-heather): Suth. Frequent (M,Q,U: O,SO).
- Vaccinium myrtillus* (Bilberry): Stalk. Frequent (J,N,U).
- Empetrum nigrum* (Crowberry): Exc., 1895. Occasional (A,U).
- Armeria maritima* (Thrift): Stalk. Abundant, in all coastal sectors (O,SO,I,SI).
- Primula vulgaris* (Primrose): King & Boyd, 1893. Abundant (G,H,L,O,Q).
- Lysimachia nemorum* (Yellow Pimpernel): F. & M. Occasional (J).
- L. nummularia* (Creeping Jenny): Exc., 1895. Occasional (J,L,P).
- + *L. vulgaris* (Yellow Loosestrife): Rare (J,U).
- Anagallis tenella* (Bog Pimpernel): Henn. Frequent (N,P,Q,U).
- A. arvensis* (Scarlet Pimpernel): Henn. Occasional (S).
- Glaux maritima* (Sea Milkwort): Stalk. Frequent (A,V,U;O,SO).
- Samolus valerandi* (Brookweed): Exc., 1895. Occasional (A,N,Q).
- Fraxinus excelsior* (Ash): Suth. Frequent (D,L,P,Q).
- Ligustrum vulgare* (Privet): F. & M. Occasional (P,U).
- + *Centaureum littorale* (Centaury): Occasional (Q,R).
- Menyanthes trifoliata* (Bogbean): Stalk. Occasional (D,J,K).
- Symphytum officinale* (Comfrey): F. & M. Occasional (O,U).
- + *Pentaglottis sempervirens* (Alkanet): Rare (O,U).
- Myosotis scorpioides* (Water Forget-me-not): Stalk. Occasional (K,N).
- M. arvensis* (Common Forget-me-not): Suth. Occasional (L,O,U).
- M. discolor* (Yellow-and-blue Forget-me-not): F. & M. Occasional (J,U).
- Calystegia sepium* (Larger Bindweed): F. & M. Frequent (E,O,S).
- + *C. sepium* ssp. *pulchra*: Occasional (N,S).
- Solanum dulcamara* (Woody Nightshade): Stalk. Rare (J).
- Verbascum thapsus* (Mullein): Henn. Occasional (Q,S).

- + *V. nigrum* (Dark Mullein): Rare (E).
- + *Cymbalaria muralis* (Ivy-leaved Toadflax): Occasional (O,P).
- Scrophularia nodosa* (Figwort): Stalk. Occasional (J,L,U).
- Erinus alpinus* (Fairy Foxglove): Lee '33. Occasional (O).
- Digitalis purpurea* (Foxglove): Stalk. Frequent, widespread.
- Veronica beccabunga* (Brooklime): F. & M. Occasional (N,U).
- + *V. catenata*: Rare (R).
- V. scutellata* (Marsh Speedwell): F. & M. Occasional (A,U).
- V. officinalis* (Common Speedwell): Stalk. Frequent (L,P).
- V. chamaedrys* (Germander Speedwell): Stalk. Frequent, widespread.
- V. persica* (Large Field Speedwell): Henn. Frequent (O,S).
- Pedicularis palustris* (Marsh Louse-wort): F. & M. Occasional (C,J,N).
- P. sylvatica* (Lousewort): Suth. Frequent (A,B,J).
- Rhinanthus minor* agg. (Yellow-rattle): Suth. Frequent (J,N,U;O).
- Euphrasia officinalis* agg. (Eyebright): Stalk. Frequent, widespread.
- Odontites verna* agg. (Red Rattle): F. & M. Occasional (H,R,U;O).
- Pinguicula vulgaris* (Common Butterwort): Suth. Occasional (M,N,O).
- Mentha arvensis* (Corn Mint): F. & M. Occasional (K).
- M. aquatica* (Water Mint): F. & M. Frequent (J,N,U).
- + *M. suaveolens* (Round-leaved Mint): Rare (C).
- + *M. x piperita* (*M. aquatica* x *picata*) (Peppermint): Rare (M).
- Lycopus europaeus* (Gipsy-wort): Henn. Occasional (C,M,N).
- Thymus praecox* ssp. *arcticus* (Wild Thyme): Suth. Frequent (A,Q,U).
- Prunella vulgaris* (Self-heal): Stalk. Frequent, widespread.
- Stachys arvensis* (Field Woundwort): Henn. Rare (V).
- S. palustris* (Marsh Woundwort): F. & M. Occasional (J,U).
- S. sylvatica* (Hedge Woundwort): F. & M. Frequent (C,J,M).
- Lamium amplexicaule* (Henbit): Henn. Rare (S).
- L. purpureum* (Red Dead-nettle): F. & M. Occasional (N).
- Galeopsis tetrahit* agg. (Common Hemp-nettle): F. & M. Occasional (C,N,O).
- Glechoma hederacea* (Ground Ivy): Stalk. Occasional (G,U).
- Scutellaria galericulata* (Common Skull-cap): Robtsn. Occasional (C,U).
- Teucrium scorodonia* (Wood Sage): Stalk. Frequent (G,K,M,Q,U).
- Ajuga reptans* (Bugle): F. & M. Occasional (J,N).
- Plantago major* (Rat-tail Plantain): Stalk. Frequent (D,S,T,U).
- P. lanceolata* (Ribwort): Stalk. Frequent (S,T,U;O,I).
- P. maritima* (Sea Plantain): Stalk. Frequent, widespread in coastal sectors (O,I,SI).
- P. coronopus* (Buck's-horn Plantain): Stalk. Occasional (A,C,Q,T,U;O,SO).
- Campanula rotundifolia* (Harebell): Stalk. Frequent (H,K,M,N,P,Q).
- Galium verum* (Lady's Bedstraw): Suth. Frequent (C,G,N,R,S).
- G. saxatile* (Heath Bedstraw): Suth. Abundant (D,H,K,L;O,SO).
- G. palustre* (Lesser Marsh Bedstraw): Suth. Occasional (N,P,U).
- G. aparine* (Goosegrass): F. & M. Frequent (E,I,J;O,I).
- Sambucus nigra* (Elder): Suth. Frequent, widespread (I).
- Lonicera periclymenum* (Honeysuckle): Stalk. Frequent (C,H,L,Q).
- Valeriana officinalis* (Valerian): Stalk. Occasional (J,N,Q).
- + *Centranthus ruber* (Red Valerian): Rare (T).
- Succisa pratensis* (Devil's-bit Scabious): Stalk. Frequent (A,J,S,U).
- Senecio jacobaea* (Ragwort): Suth. Abundant, widespread (O,SI).
- S. aquaticus* (Marsh Ragwort): Suth. Occasional (G,H,N).
- S. vulgaris* (Groundsel): Stalk. Occasional (M,O,R,U).

- Tussilago farfara* (Coltsfoot): Stalk. Frequent (K,N,U).  
*Petasites hybridus* (Butterbur): Stalk. Rare (S).  
*Nepetalum uliginosum* (Marsh Cudweed): Henn. Occasional (B,D,K,N).  
*Solidago virgaurea* (Golden-rod): Stalk. Occasional (C,Q,U).  
*Aster tripolium* (Sea Aster): Robtsn. Frequent (C,S,U,V;**O,SO**).  
 + *A. novi-belgii* (Michaelmas Daisy): Rare (C).  
*Bellis perennis* (Daisy): Stalk. Abundant, widespread.  
*Eupatorium cannabinum* (Hemp Agrimony): Henn. Occasional (M,N).  
*Achillea millefolium* (Yarrow): Stalk. Frequent, widespread.  
*A. ptarmica* (Sneezewort): Stalk. Frequent (D,G,I,N,U).  
*Tripleurospermum maritimum* (Sea Mayweed): Suth. Frequent (S,T,U;**O,I**).  
*Matricaria matricarioides* (Pineapple Weed): F. & M. Frequent (S,T).  
*Leucanthemum vulgare* (Ox-eye Daisy): F. & M. Rare (R).  
*Tanacetum parthenium* (Feverfew): Henn. Occasional (O,T).  
*Arctium minus* agg. (Lesser Burdock): F. & M. Occasional (J,M,N).  
*Cirsium vulgare* (Spear Thistle): Stalk. Frequent, widespread (**O,I,SI**).  
*C. palustre* (Marsh Thistle): Stalk. Frequent, widespread.  
*C. arvense* (Creeping Thistle): Stalk. Frequent, widespread (**O**).  
 + *Centaurea montana* (Perennial Cornflower): Rare (U).  
*C. nigra* agg. (Lesser Knapweed): Stalk. Frequent (I,N,O,U).  
*Lapsana communis* (Nipplewort): F. & M. Occasional (N).  
*Hypochaeris radicata* (Cat's Ear) Frequent: F. & M. (G,M,Q,S;**O,I**).  
*Sonchus arvensis* (Field Milk-thistle): F. & M. Frequent (C,J,N,S;**O,I**).  
*S. oleraceus* (Sow-thistle): F. & M. Occasional (N,O,S).  
*S. asper* (Spiny Sow-thistle): F. & M. Occasional (E,N).  
*Hieracium pilosella* (Mouse-ear Hawkweed): Stalk. Frequent (J,S).  
*Crepis capillaris* (Smooth Hawk's-beard): F. & M. Occasional (L).  
*C. paludosa* (Marsh Hawk's-beard): Henn. Rare (C,L).  
*Taraxacum officinale* agg. (Dandelion): Stalk. Frequent (G,K,S,T,U).  
*Baldellia ranunculoides* (Lesser Water-plantain): Henn. Occasional (C,J,N).  
*Elodea canadensis* (Canadian Pondweed): Suth. Occasional (H,N).  
*Triglochin maritima* (Sea Arrow-grass): Suth. Frequent (A,V,U;**O,SO,SI**).  
*Potamogeton natans* (Broad-leaved Pondweed): Stalk. Frequent (C,G,J,K).  
 + *P. polygonifolius* (Bog Pondweed): Frequent (G,H,K).  
*Narthecium ossifragum* (Bog Asphodel): Suth. Frequent (G,J,Q,U).  
 + *Convallaria majalis* (Lily-of-the-Valley): Rare (L).  
 + *Polygonatum multiflorum* (Solomon's Seal): Rare (L).  
 + *Ornithogalum umbellatum*: Occasional (C,N).  
 + *Hyacinthoides non-scripta* (Bluebell): Frequent (C,H,J,N,U).  
 + *Allium ursinum* (Ramsons): Occasional (N,O,U).  
*Juncus squarrosus* (Heath Rush): Suth. Occasional (J,P,U).  
*J. gerardi* (Mud Rush): Suth. Frequent (C,G,S,U;**O,SO,I,SI**).  
*J. bufonius* agg. (Toad Rush): Suth. Occasional (J,H,N;**I**).  
*J. effusus* (Soft Rush): Suth. Abundant, widespread (**O,SO,I**).  
*J. conglomeratus* (Conglomerate Rush): F. & M. Frequent (C,G,N,U).  
*J. maritimus* (Sea Rush): Henn. Occasional (C,U,V;**I**).  
*J. articulatus* (Jointed Rush): Suth. Abundant (G,K,N,U;**O,SO**).  
*J. bulbosus* (Bulbous Rush): Suth. Occasional (J,N,U).  
*Luzula sylvatica* (Greater Woodrush): F. & M. Frequent (C,G,J,P).  
*L. campestris* (Field Woodrush): F. & M. Frequent (C,G,F,P,U).  
 + *L. multiflora* (Many-headed Woodrush): Occasional (P).  
*Iris pseudacorus* (Yellow Flag): Stalk. Abundant (K,P,S,U;**I**).

- + *Tritonia x crocosmiflora* (Montbretia): Occasional (N,S,U).
- Listera ovata* (Twayblade): F. & M. Occasional (M,Q).
- Gymnadenia conopsea* (Fragrant Orchid): F. & M. Occasional (C,M,Q).
- Platanthera chlorantha* (Great Butterfly Orchid): Henn. Occasional (E,U).
- P. bifolia* (Lesser Butterfly Orchid): F. & M. Occasional (N,U).
- Dactylorhiza fuchsii* (Common Spotted Orchid): F. & M. Frequent (C,G,I,J).
- D. maculata* spp. *ericetorum* (Heath Spotted Orchid): Suth. Frequent (A,C,G).
- D. incarnata* (Marsh Orchid): Suth. Occasional (A,C,N).
- D. majalis* (Western Marsh Orchid): F. & M. Frequent (C,S,Q,U).
- + *Arum maculatum* (Lords-and-Ladies): Henn. Rare (U).
- Sparganium erectum* (Bur-reed): Suth. Rare (N,P).
- Eriophorum angustifolium* (Common Cotton-grass): Stalk. Frequent (K,U).
- Trichophorum cespitosum* (Deer-grass): Stalk. Occasional (G,K,P,U).
- Eleocharis palustris* (Common Spike-rush): F. & M. Occasional (H,K).
- Scirpus maritimus* (Sea Club-rush): Henn. Rare (U).
- Schoenus nigricans* (Bog-rush): Suth. Occasional (J,K,U).
- + *Carex demissa* (Yellow Sedge): Occasional (J,U).
- + *C. sylvatica* (Wood Sedge): Occasional (J,L,P).
- C. panicea* (Carnation-grass): F. & M. Occasional (P,U).
- + *C. flacca* (Glaucous Sedge): Occasional (N,R,S).
- C. nigra* (Common Sedge): Suth. Occasional (K,U).
- + *C. otrubae* (False Fox-sedge): Occasional (J,V).
- C. arenaria* (Sand Sedge): Henn. Occasional (J).
- C. remota* (Remote Sedge): Henn. Rare (L).
- Festuca pratensis* (Meadow Fescue): F. & M. Occasional (N).
- + *F. arundinacea* (Tall Fescue): Occasional (N,S).
- F. rubra* (Red Fescue): Henn. Frequent, widespread (O,I).
- F. ovina* (Sheep's Fescue): Suth. Frequent (K,L,U).
- Lolium perenne* (Rye-grass): F. & M. Frequent (O,P,T;I).
- Poa annua* (Annual Poa): F. & M. Frequent, widespread (I).
- P. pratensis* (Smooth-stalked Meadow-grass): F. & M. Occasional (N,S).
- P. trivialis* (Rough-stalked Meadow-grass): F. & M. Frequent (L,T;I).
- Puccinellia maritima* (Sea Poa): Suth. Occasional (C,M;O,SO,I).
- Dactylis glomerata* (Cock's-foot): F. & M. Frequent, widespread.
- Cynosurus cristatus* (Crested Dog's-tail): F. & M. Frequent (N,S).
- Glyceria fluitans* (Flote-grass): F. & M. Occasional (N,S).
- Bromus hordeaceus* (Lop-grass): F. & M. Occasional (I).
- + *Brachypodium sylvaticum* (Slender False-brome): Occasional (N,U).
- Leymus arenarius* (Lyme-grass): F. & M. Occasional (E,G,M).
- Elymus repens* (Couch-grass): Henn. Frequent, widespread (O,I).
- E. farctus* (Sand Couch-grass): Henn. Occasional (G,M,S).
- Arrhenatherum elatius* (Oat-grass): F. & M. Frequent, widespread (I).
- Deschampsia cespitosa* (Tufted Hair-grass): F. & M. Frequent (J,L,V).
- D. flexuosa* (Wavy Hair-grass): Suth. Frequent (L,N,P,U;O,I).
- Anthoxanthum odoratum* (Sweet Vernal-grass): F. & M. Frequent, widespread.
- Holcus lanatus* (Yorkshire Fog): Suth. Frequent, widespread (O,I).
- H. mollis* (Creeping Soft-grass): F. & M. Occasional (O,S).
- + *Agrostis canina* (Brown Bent-grass): Occasional (U).
- A. capillaris* (Common Bent-grass): Henn. Occasional (J,L;O,I).
- A. stolonifera* (Fiorin): Henn. Frequent (N,P,T).
- Ammophila arenaria* (Marram grass): Henn. Occasional (F,G,J).
- Phleum pratense* (Timothy): F. & M. Occasional (C,E,N).

- Alopecurus geniculatus* (Marsh Foxtail): F. & M. Occasional (K,R).  
 + *Phalaris arundinacea* (Reed-grass): Frequent (N,O,S,U).  
 + *Phragmites australis* (Reed): Occasional (I).  
*Molinia caerulea* (Purple Moor-grass): Suth. Frequent (K,N,U).  
*Nardus stricta* (Mat-grass): Occasional (P).  
 + *Babusa* sp. (Bamboo): Rare (P).

**Table 2. Plants found on Great Cumbrae previously but not during present survey**

Plants records are listed and abbreviations of authors' names are as in Table 1. Balf. = Balfour 1856. ? signifies either a questionable record or a species recorded by Balfour or Keddie but not later confirmed.

- Huperzia selago* (Fir Clubmoss): Stalk., Kedd., Henn.  
*Lycopodium clavatum* (Stag's-horn Moss): Stalk., Kedd., Suth.  
*Lycopodiella inundata* (Marsh Clubmoss): Stalk.  
*Diphasiastrum alpinum* (Alpine Clubmoss): Henn.  
*Selaginella selaginoides* (Lesser Clubmoss): Kedd., Henn.  
*Isoetes lacustris* (Quill-wort): Stalk.  
 ?*Equisetum palustre* (Marsh Horsetail): Kedd.  
*Botrychium lunaria* (Moonwort): Balf., Kedd., Lee'33.  
*Ophioglossum vulgatum* (Adder's Tongue): Stalk., Balf., Kedd., Henn., Lee'33.  
*Oreopteris limbosperma* (Mountain Fern): Stalk., Kedd.  
*Phegopteris connectilis* (Beech Fern): Stalk., Kedd.  
*Cystopteris fragilis* (Brittle Bladder-fern): Jack.  
*Dryopteris aemula* (Hay-scented Fern): Jack.  
 ?*D. carthusiana* (Narrow Buckler-fern): Kedd.  
 ?*Polystichum aculeatum* (Hard Shield-fern): Kedd.  
*Gymnocarpium dryopteris* (Oak Fern): Stalk.  
*G. robertianum* (Limestone Polypody): Stalk.  
*Juniperus communis* (Juniper): Stalk., Kedd., F. & M.  
*Aconitum napellus* (Monkshood): Lee '53.  
*Ranunculus bulbosus* (Bulbous Buttercup): Kedd., F. & M.  
*R. lingua* (Great Spearwort): F. & M.  
*R. omiophyllus* (Lenormand's Water-Crowfoot): Henn., Ewing 1901, F. & M.  
*R. trichophyllus* (Short-leaved Water-Crowfoot): Henn.  
*Berberis vulgaris* (Barberry): Kedd., Henn.  
*Nymphaea alba* (White Water-lily): F. & M.  
*Glaucium flavum* (Yellow Horned-poppy): Kedd., Ewing 1901, Lee'33.  
 ?*Corydalis claviculata* (White Climbing Fumitory): Kedd.  
*Fumaria capreolata* (Ramping Fumitory): Stalk.  
*Brassica rapa* (Turnip): F. & M.  
*B. nigra* (Black Mustard): Stalk.  
*Rhynchosinapis monensis* (Isle of Man Cabbage): Kedd., Henn.  
*Sinapis arvensis* (Charlock): Stalk., Kedd., F. & M.  
*Raphanus raphanistrum* (Wild Radish): Henn., Kedd., F. & M.  
*Cakile maritima* (Sea Rocket): Henn.  
*Lepidium latifolium* (Dittander): F. & M.  
*Coronopus squamatus* (Swine Grass): Kedd., Henn.  
*Thlaspi arvense* (Field Penny-cress): Kedd., Ewing 1901.  
*Draba muralis* (Wall Whitlow Grass): Kedd., Paterson 1878, Lee'33.

- Erophila verna* (Spring Whitlow Grass): Kedd., Henn.  
*C. hirsuta* (Hairy Bitter-cress): Robtsn.  
 ?*Barbarea vulgaris* (Winter Cress): Kedd.  
*Arabis hirsuta* (Hairy Rock-cress): Kedd., Henn.  
*Rorippa islandica* (Marsh Yellow-cress): F. & M.  
*Arabidopsis thaliana* (Thale Cress): Kedd., Robtsn.  
*Viola odorata* (Sweet Violet): Henn.  
*V. canina* (Heath Violet): Robtsn., F. & M.  
*V. lutea* (Mountain Pansy): Henn.  
*V. tricolor* (Wild Pansy): Kedd., Henn.  
*Hypericum maculatum* (Imperforate St. John's Wort): Stalk., Kedd., Henn.  
*H. humifusum* (Trailing St. John's Wort): Stalk., Kedd., F. & M.  
*H. montanum* (Mountain St. John's Wort): Stalk.  
*H. elodes* (Marsh St. John's Wort): Stalk., Lee'33.  
*Silene noctiflora* (Night-flowering Campion): Paterson 1878, Henn.  
*Agrostemma githago* (Corn Cockle): Kedd., Henn., Lee'33.  
 ?*Cerastium glomeratum* (Sticky Mouse-ear Chickweed): Kedd.  
*C. diffusum* (Dark-green Mouse-ear Chickweed): Kedd., Henn.  
 ?*Myosoton aquaticum* (Water Chickweed): Stalk.  
*Stellaria graminea* (Lesser Stitchwort): Stalk., Kedd.  
*Sagina maritima* (Sea Pearlwort): Henn., F. & M.  
 ?*S. subulata* (Awl-leaved Pearlwort): Balf., Kedd.  
*S. nodosa* (Knotted Pearlwort): Kedd., Henn., Exc., 1895.  
*Moehringia trinervia* (Three-nerved Sandwort): Kedd., Robtsn.  
*Arenaria serpyllifolia* (Thyme-leaved Sandwort): Henn.  
*Spergularia rubra* (Sand-spurrey): Kedd., Henn., Robtsn.  
*S. marina* (Lesser Sea-spurrey): Suth.  
 ?*Herniaria glabra* (Smooth Rupture-wort): Stalk.  
 ?*H. hirsuta* (Hairy Rupture-wort): Stalk.  
 ?*Scleranthus annuus* (Knawel): Kedd.  
*Montia fontana* ssp. *fontana* (Blinks): Kedd., Henn.  
*Chenopodium bonus-henricus* (Good King Henry): F. & M.  
*C. vulvaria* (Stinking Goosefoot): Stalk.  
 ?*Atriplex prostrata* (Hastate Orache): Kedd.  
*A. laciniata* (Frosted Orache): Kedd., Lee'33, F. & M.  
*Salsola kali* (Saltwort): Stalk., Kedd., Henn.  
 ?*Malva moschata* (Musk Mallow): Balf.  
*M. sylvestris* (Common Mallow): Kedd., Lee'33, F. & M.  
*Lavatera arborea* (Tree Mallow): Kedd., Henn.  
*Linum catharticum* (Purging Flax): Stalk., Kedd., F. & M.  
*Radiola linoides* (All-seed): Balf., Kedd., Henn.  
*Geranium sanguineum* (Bloody Cranesbill): Balf., Kedd., Henn., Lee'33.  
*G. lucidum* (Shining Cranesbill): Kedd., Henn., Robtsn.  
*Erodium cicutarium* (Common Storks-bill): Kedd., Henn., F. & M.  
 ?*Ononis repens* (Common Restharrow): Kedd.  
*O. spinosa* (Spiny Restharrow): Kedd.  
 ?*Trifolium micranthum* (Slender Trefoil): Kedd.  
 ?*T. campestre* (Hop Trefoil): Kedd.  
*T. arvense* (Hare's-foot): Kedd., Henn.  
*T. aureum*: Henn.  
*Anthyllis vulneraria* (Kidney Vetch): Kedd., Robtsn., F. & M.  
*Vicia hirsuta* (Hairy Tare): Kedd., Henn.



- ?*Salix pentandra* (Bay Willow): Kedd.  
 ?*S. viminalis* (Common Osier): Kedd.  
*S. caprea* (Goat Willow): Henn.  
*S. repens* var. *fusca* (Dwarf Silky Willow): Kedd., Henn.  
*S. x ambigua*: Kedd.  
*Vaccinium oxycoccos* (Cranberry): F. & M.  
 ?*Pyrola minor* (Common Wintergreen): Balf.  
 ?*P. media* (Intermediate Wintergreen): Kedd.  
*Anagallis minima* (Chaffweed): Henn., Lee'33.  
*Centaureum erythraea* (Common Centaury): Kedd., Henn.  
*Gentianella campestris* (Field Gentian): Kedd., Henn., F. & M.  
*Anchusa arvensis* (Bugloss): Stalk., Kedd., Henn.  
 ?*Myosotis secunda* (Creeping Forget-me-not): Kedd.  
*M. laxa* ssp. *caespitosa* (Water Forget-me-not): Kedd., Henn.  
*Mertensia maritima* (Oyster Plant): Balf., Kedd., Henn.  
*Convolvulus arvensis* (Bindweed): F. & M.  
*Calystegia soldanella* (Sea Bindweed): Stalk., Balf., Kedd., Henn., Lee'33.  
*Lycium barbarum* (Duke of Argyll's Tea-plant): Kedd.  
*Hyoscyamus niger* (Henbane): Stalk., Balf.  
*Solanum nigrum* (Black Nightshade): Henn., F. & M.  
*Linaria vulgaris* (Yellow Toadflax): Kedd., F. & M.  
*Veronica anagallis-aquatica* (Water Speedwell): Kedd., Henn., F. & M.  
*V. serpyllifolia* (Thyme-leaved Speedwell): Kedd., Suth.  
 ?*V. arvensis* (Wall Speedwell): Kedd.  
 ?*V. agrestis* (Field Speedwell): Kedd.  
*Melampyrum pratense* (Common Cow-wheat): Kedd., Henn.  
*Pinguicula lusitanica* (Pale Butterwort): Balf., Kedd., Henn., Ewing 1901, Lee'33.  
*Utricularia vulgaris* agg. (Greater Bladderwort): Balf., Kedd., Henn., Lee'33.  
*U. minor* (Lesser Bladderwort): Kedd., Henn., Lee'33, F. & M.  
*Mentha x verticillata* (*M. aquatica x arvensis*) (Whorled Mint): F. & M.  
*Origanum vulgare* (Wild Marjoram): F. & M.  
 ?*Stachys x ambigua* (*M. palustris x sylvatica*): Balf., Kedd.  
*Lamium moluccellifolium* (Intermediate Dead-nettle): Balf., Kedd., Henn., Lee'33.  
*L. album* (White Dead-nettle): F. & M.  
*Littorella uniflora* (Shore-weed): Balf., Henn.  
*Jasione montana* (Sheep's-bit): Balf., Kedd., Henn.  
 ?*Sherardia arvensis* (Field Madder): Kedd.  
 ?*Asperula cynanchica* (Squincywort): Stalk.  
*Galium odoratum* (Sweet Woodruff): Stalk., Kedd.  
*G. cruciata* (Crosswort): F. & M.  
*G. uliginosum* (Fen Bedstraw): Kedd.  
*Sambucus ebulus* (Danewort): Lee'33  
*Adoxa moschatellina* (Moschatel): Kedd., Robtsn.  
*Valerianella locusta* (Lamb's Lettuce): Kedd., Henn.  
 ?*Valeriana pyrenaica* (Pyrenean Valerian): Kedd.  
 ?*Dipsacus fullonum* (Teasel): Balf.  
*Bidens tripartita* (Trifid Bur-marigold): Kedd., Henn.  
 ?*Senecio sylvaticus* (Wood Groundsel): Kedd.  
*S. viscosus* (Stinking Groundsel): F. & M.  
 ?*Doronicum pardalianches* (Leopard's-bane): Kedd.  
 ?*Inula conyza* (Ploughman's Spikenard): Stalk.  
*Filago lutescens* (Red-tipped Cudweed): Kedd., Henn.

- ?*Gnaphalium sylvaticum* (Wood Cudweed): Kedd.  
*Antennaria dioica* (Cat's-foot): Stalk., Kedd.  
*Anthemis arvensis* (Corn Chamomile): Stalk.  
*Chamaemelum nobile* (Chamomile): Kedd., Henn., Lee'33.  
? *Tripleurospermum inodorum* (Scentless Mayweed): Kedd.  
*Chrysanthemum segetum* (Corn Marigold): Kedd., F. & M.  
*Tanacetum vulgare* (Tansy): Kedd., Henn.  
*Artemisia vulgaris* (Mugwort): Kedd., Henn.  
*Arctium lappa* (Great Burdock): Kedd., Henn., Suth.  
*Carduus acanthoides* (Wetted Thistle): Stalk.  
*Cirsium helenioides* (Melancholy Thistle): F. & M.  
*Centaurea cyanus* (Cornflower): Henn.  
? *Leontodon taraxacoides* (Hairy Hawkbit): Kedd.  
*Picris echioides* (Bristly Ox-Tongue): Conacher 1957.  
*Tragopogon porrifolius* (Salsify): Kedd., Henn.  
? *Hieracium vulgatum* (Common Hawkweed): Balf.  
*Hieracium* agg.: 2 species in Henn., 3 species in Kedd.  
*Alisma plantago-aquatica* (Water-Plantain): Stalk., Kedd., F. & M.  
? *Triglochin palustris* (Marsh Arrow-grass): Kedd.  
*Zostera marina* (Eel-grass): Kedd., Ewing 1901, Robtsn., Suth.  
? *Z. angustifolia*: Balf., Kedd.  
*Potamogeton lucens* (Shining Pondweed): Kedd., F. & M.  
*Allium vineale* (Crow Garlic): Kedd., Henn.  
? *Juncus compressus* (Round-fruited Rush): Kedd.  
*J. inflexus* (Hard Rush): Henn., F. & M.  
? *J. acutiflorus* (Sharp-flowered Rush): Kedd.  
? *Luzula pilosa* (Hairy Woodrush): Kedd.  
*Iris foetidissima* (Gladdon): Kedd., Henn.  
*Epipactis helleborine* (Broad Helleborine): Suth.  
*Listera cordata* (Lesser Twayblade): Balf., Kedd., Henn.  
*Coeloglossum viride* (Frog Orchid): Balf., Kedd., Suth.  
*Orchis mascula* (Early Purple Orchid): Suth.  
? *Aceras anthropophorum* (Man Orchid): Stalk.  
*Anacamptis pyramidalis* (Pyramidal Orchid): Stalk.  
*Lemna trisulca* (Ivy Duckweed): F. & M.  
*L. minor* (Duckweed): Stalk., Kedd.  
*Sparganium emersum* (Unbranched Bur-reed): Kedd., F. & M.  
*Eriophorum vaginatum* (Hare's-tail): F. & M.  
*Eleocharis quinqueflora* (Few-flowered Spike-rush): Henn.  
*E. multicaulis* (Many-stemmed Spike-rush): Henn.  
? *E. uniglumis*: Balf., Kedd.  
*Blysmus rufus* (Narrow Blysmus): Suth.  
? *Isoplepis setacea* (Bristle Scirpus): Kedd.  
*I. cernua* (Nodding Scirpus): Ewing 1901, Lee'33.  
*Eleogiton fluitans* (Floating Scirpus): Kedd., Henn., Lee'33.  
*Carex laevigata* (Smooth Sedge): Henn.  
*C. distans* (Distant Sedge): Henn., Lee'33.  
*C. hostiana* (Tawny Sedge): Kedd., Suth., F. & M.  
*C. binervis* (Ribbed Sedge): Kedd., Suth.  
? *C. flava* (Yellow Sedge): Kedd., Henn.  
*C. extensa* (Long-bracted Sedge): Kedd., Henn., Lee'33, F. & M.  
*C. rostrata* (Bottle Sedge): Kedd., Henn., Suth., F. & M.  
*C. vesicaria* (Bladder Sedge): F. & M.

- C. acutiformis* (Lesser Pond-sedge): Kedd., F. & M.  
*C. pendula* (Pendulous Sedge): F. & M.  
*C. hirta* (Hammer Sedge): Kedd., Henn., F. & M.  
*C. pilulifera* (Pill-headed Sedge): Henn.  
*C. caryophyllea* (Spring Sedge): Kedd.  
*C. acuta* (Tufted Sedge): Kedd., Henn.  
*C. paniculata* (Panicked Sedge): Balf., Kedd., Henn., Stirling 1975 (pers. comm.).  
*C. vulpina* (Fox Sedge): Kedd., Henn., F. & M.  
*C. disticha* (Brown Sedge): Lee'33.  
*C. muricata* (Prickly Sedge): Kedd., Henn.  
? *C. echinata* (Star Sedge): Kedd.  
*C. lachenalii*: F. & M.  
? *C. ovalis* (Oval Sedge): Kedd.  
*C. pulicaris* (Flea-sedge): Kedd., Henn., F. & M.  
*C. dioica* (Dioecious Sedge): Henn.  
*Festuca vivipara*: Henn.  
? *Poa nemoralis* (Wood Poa): Kedd.  
*Catabrosa aquatica* (Water whorl-grass): Balf., Kedd., Henn.  
? *Sesleria albicans* (Blue Sesleria): Kedd.  
? *Melica uniflora* (Wood Melick): Balf., Kedd.  
*Bromus sterilis* (Barren Brome): Kedd., Henn.  
? *B. ramosus* (Hairy Brome): Kedd.  
*Elymus caninus* (Bearded Couch-grass): F. & M.  
*Avena strigosa* (Black Oat): Henn.  
*Trisetum flavescens* (Yellow Oat): F. & M.  
? *Aira praecox* (Early Hair-grass): Kedd.  
*A. caryophyllea* (Silvery Hair-grass): Kedd., F. & M.  
*Alopecurus myosuroides* (Black Twitch): F. & M.  
*A. pratensis* (Meadow Foxtail): Kedd., F. & M.  
*Parapholis strigosa* (Sea Hard-grass): Boyd 1888, Ewing 1901.  
*Danthonia decumbens* (Heath grass): Kedd., F. & M.

## Acknowledgments

I would like to thank Dr P. G. Moore of the University Marine Biological Station, Millport for helpful advice regarding the manuscript text. My thanks also to Dr G. Williams of the West of Scotland Agricultural College for his helpful guidance regarding the species lists.

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## Book Review

### Wilderness Britain

ANTHONY BURTON with photographs by JORGE LEWINSKI Andre Deutsch Ltd., 1987, 196 pp., many black and white and colour photographs, map. Paperback, ISBN 0-233-98162-4, £5.95.

In this beautifully designed large book, the reader is taken the length of Britain from Bodmin Moor in Cornwall to Cape Wrath. Anthony Burton describes walks through 12 Wilderness Areas at different times of the year, looking at the physical reality and man's place in each. His special interest is industrial archaeology and he admits that he neither knows nor wants to know the names of the birds or plants which inhabit the areas, which is a disappointment to those of us who enjoy Natural History. His real delight in Wilderness is, however, convincing and he confesses pleasure in seeing that "man's interference in the land can so quickly seem to become part of the natural order again, and can even increase the richness and variety of the natural plant life of the area".

The 12 exciting remote places are shared with those who cannot themselves visit them, and this is Anthony Burton's idea. In his conclusion he pleads that, although popular areas such as Snowdonia, Dovedale and Loch Lomond should be very accessible to the millions, the Wilderness regions should remain, with no roads to them, for future generations to enjoy.

JEAN M. MILLAR

## Short Notes

COMPILED by A. McG. STIRLING

### Botanical

**Stag's-Horn Clubmoss and other moorland flora on a Glasgow City drumlin** N. R. GRIST & P. MACPHERSON

Stag's-Horn Clubmoss (*Lycopodium clavatum*) was recently noticed in association with Heather (*Calluna vulgaris*), Blaeberry (*Vaccinium myrtillus*) and moss species in a patch of rough, periodically mown grass at Ruchill Hospital, Glasgow, V.C.77 (NS586682). The grass covers a raised bank at about 70m above sea-level beside a former nurses' home constructed with wards to accommodate tuberculosis patients as an extension of the original fever hospital at the end of the first world war. The drumlin site of the "Lands of Ruchill" was purchased by Glasgow Corporation in 1892 for the construction of a hospital for infectious diseases and for the adjacent public park. The main hospital was built in 1895-1900.

The patch with the moorland plants occupies about 12m square within a much larger strip of grass. The Clubmoss extends over 130 x 80cm and, being prostrate in habit, survives grass cutting. Nevertheless, the ends are regularly amputated by the mowing and cones will have been unable to develop. The largest branching stem measured 25cm in September 1988, now 22cm (October). The Heather is in 17 patches, the largest 130 x 90cm, flowering in September 1988 despite mowing. The Blaeberry occupies an irregular patch about 2 x 2.5m in size but has not been seen to flower.

There are two other extant sites for *L. clavatum* within the area surveyed for the Flora of Glasgow project (Steven and Dickson 1986, *Pteridologist*, 1, 127-128), one in the vicinity of the old Braehead Power Station near Renfrew at 5m above sea-level, and the other at 50m above sea-level in the Necropolis by Glasgow Cathedral. At the former site the plants were thought to be no more than 5 years old and estimated to be up to 11 at the latter.

As the Ruchill site is on a raised bank above the original ground level the *Lycopodium* cannot be a relic. Despite search no other patches of Clubmoss, Heather or Blaeberry have been observed in the Hospital grounds. The grasses in the local patch are of a different texture and colour from the rest of the strip, but being mown, have not been identified. The mosses present have been determined by

Mr A. McG. Stirling and include *Polytrichum formosum*, *P. juniperinum*, *Campylopus pyriformis*, *Pohlia nutans* and *Hypnum cupressiforme*, all of which are typical of acid, heathy habitats and not of 'man-created' grassland. The total assemblage indicates the likelihood that moorland turf was used for that part of the bank at the time of construction about 1920 or at a subsequent local returfing.

### Additions to "The Vascular Plants of Northern Ardnamurchan"

RUTH H. DOBSON  
and IAN BONNER

The following list is additional to that given by Dobson, R. H., 1983, *Glasg. Nat.*, 20; 313-331. As before, records are attributed to the 10km squares of the National Grid, NM 47 & 57.

- Botrychium lunaria* (Moonwort) Grassland. Uncommon. 57.  
*Ophioglossum vulgatum* (Adder's Tongue) Damp grassland. Uncommon. 57.  
*Osmunda regalis* (Royal Fern) Peat bog. Wet rocks on stream sides. Uncommon. 47.  
*Hymenophyllum wilsonii* (Wilson's Filmy Fern) Shady rocks and rocks under birch. Locally common. 47. 57.  
*Dryopteris aemula* (Hay-scented Buckler Fern) North facing rock outcrops or under birch. Uncommon. 57.  
*Polystichum aculeatum* (Hard Shield-fern) Basic rocks and cliffs. Uncommon. 57.  
*Lotus uliginosus* (Large Birdsfoot-trefoil) Marsh. Rare. 57.  
*Vicia orobus* (Bitter Vetch) Cliffs and rock outcrops. Uncommon. 47.  
*Chamerion angustifolium* (Rose-bay Willow-herb) 57.  
*Callitriche hamulata* Pools near the sea. Uncommon. 57.  
*Salix repens* ssp. *argentea* (Creeping Willow) Moors near the sea. Frequent. 57.  
*Vaccinium vitis-idaea* (Cowberry) Moorland. Rare. 47.  
*Anagallis minima* (Chaffweed) Beside track. 47. (Found by Mr A. A. Slack.)  
*Orobanche alba* (Red Broomrape) Sandy turf. Rare. 57.  
*Utricularia vulgaris* agg. (prob. *U. neglecta*) (Greater Bladderwort) Rocky pool above high water mark. 47.  
*U. minor* (Lesser Bladderwort) Bog pools and streams. Locally common. 47. 57.  
*Littorella uniflora* (Shore-weed) Loch margins. Locally common. 47. 57.  
*Aster tripolium* (Sea Aster) Salt marsh. Appears when grazing reduced. 57.  
*Carlina vulgaris* (Carline Thistle) Coastal grassland. Uncommon. 47.  
*Listera cordata* (Lesser Twayblade) Shady rocks, banks under heather or amongst *Sphagnum*. Widespread where suitable. 47. 57.  
*Coeloglossum viride* (Frog Orchid) Coastal grassland. Rare. 57.  
*Sparganium minimum* (Small Bur-reed) Peaty pools and lochans. Uncommon. 47. 57.  
*Cladium mariscus* (Saw Sedge) Mire. Rare. 47.  
*Carex laevigata* (Smooth Sedge) Wooded stream side. Rare. 57.  
*C. sylvatica* (Wood Sedge) Shady rocks. Uncommon. 47. 57.  
*C. pilulifera* (Pill-headed Sedge) Rough grass. Uncommon. 57.  
*Bromus ramosus* (Hairy Brome) Shady calcareous rocks. Uncommon. 57.  
*Milium effusum* (Wood Millet) Wooded rock ledges. Rare. 57.

### Grass Vetchling and Smooth Tare at East Kilbride

P. MACPHERSON

In June 1988 two adjacent colonies of Grass Vetchling (*Lathyrus nissolia*) were seen at Laigh Mains near East Kilbride (V.C.77). The main colony was on the slope leading to a flat, rocky and marshy area which supported many plants of Smooth Tare (*Vicia tetrasperma*) and moderate numbers of Common Spotted Orchid (*Dactylorhiza fuchsii*), Northern Marsh Orchid (*D. purpurella*) and their hybrid (*D. x venusta*). The smaller colony was 80 yards away, on the grassy bank of a road leading to a factory.

The only other V.C. 77 record traced for *L. nissolia* is its occurrence as a casual near Lanark in 1961. In 1971 it was found, again as a casual, in association with other rare vetches, though not *V. tetrasperma* (Clifford, Clifford and Dickson, 1978 *Glasg. Nat.* 19: 425).

Grierson, 1931 (*Glasg. Nat.* 9, 25) reported that he had seen *V. tetrasperma* as a casual several times on coups but did not give locations. I have three previous records of its occurrence in V.C.77: — Symington, pre-1928; Bothwell Service Area in 1979 and from the NE tip of Lanarkshire in 1985. It did not persist in any of these sites.

At the Laigh Mains site both vetches are in such quantity that their persistence for some years at least would seem likely.

### Hoary Ragwort in the Glasgow Area

A. McG. STIRLING

In mid-September 1988, while botanising on the new cycleway constructed on the line of the disused railway just to the north of Meadowside Granary, Partick (NS549664), I found a small stand of Hoary Ragwort (*Senecio erucifolius*) on grassy waste ground between the cycle track and the fence which separates it from the Clydeside Expressway. The plants, about two dozen flowering stems, were partly in flower and partly in immature fruit. They were readily identifiable from the straight, leafy stems with the flowers clustered above. The hairy achenes were also diagnostic.

Hoary Ragwort was reported from Woodhall, near Airdrie (V.C. 77) in Henedy, 1865 (*The Clydesdale Flora*), the record being repeated in the later editions and also by Lee, 1933 (*Flora of the Clyde Area*). Lee also includes an Ayrshire record from near Kilwinning, attributed to A. Shanks, and plants, apparently from

this locality, were exhibited to the Natural History Society of Glasgow by J. Renwick in 1901. These are the only west of Scotland records of which I am aware. The *Atlas of the British Flora* indicates several east of Scotland records, all regarded as introductions, in which category the plants at Meadowside must also be placed.

As a native species *Senecio erucifolius* is locally distributed north to Cumbria and Northumberland, but thinning out rapidly beyond the English midlands.

**A notable Hazel *Corylus avellana* L.  
in Strathblane**

J. MITCHELL

It is rare that one has the opportunity of examining a fully mature Hazel tree. Yesteryear's country crafts' need for a regular supply of young stems as poles resulted in virtually all Hazel being coppiced on a regular rotation, usually at intervals of seven years. Their economic worth now all but gone, these formerly managed Hazels remain today only as straggling, much branched shrubs.



*Fig. 1 The Strathblane Hazel tree*

In August 1985 an unusually well formed Hazel tree (Fig. 1) was found just outside the southern perimeter of Quinloch Wood,

Strathblane (Stirling, V.C. 86). Assisted by A. J. Moore, the following measurements were taken: height 17' (5.2m); maximum extent of canopy 33' (10m); minimum girth of bole below branch spread 4' 8" (1.4m); maximum girth of bole around the base 9' 9" (3m). At the first visit the tree bore a heavy crop of hazel-nuts, but these disappeared while still green, almost certainly the work of Grey Squirrels. Regrettably, the seeds of destruction are already established, with the fruiting bodies of the wood-rotting Honey-fungus *Armillaria mellea* (Fries) Kummer in evidence at the foot of the tree.

In the latter part of the last century, a few keen members of our society spent a great deal of their available field time recording and photographing notable trees in the Clyde area. It would appear only one specimen Hazel tree came to their attention, an exceptionally tall, single stem example growing just outside the walled garden at Balloch Park (Dunbarton, V.C.99). Measured during a society excursion on 9th July 1892, the tree stood approximately 40' (12.2m) high and at waist height 4' 9" (1.4m) in girth (*The Annals of the Andersonian Naturalist's Society* 1 : 64-65).

### Rediscovery of two grasses rare in Dunbartonshire

A. McG. STIRLING

During the summer of 1987, in the course of field recording in 10km square NS 47 for the BSBI Monitoring Scheme, two discoveries were made of grass species which had not been recorded in the vice-county since the late 19th century.

Water Whorl-grass (*Catabrosa aquatica*) was recorded by Lawrence Watt in 1892 from a ditch in fields at Garscadden, Glasgow, this being the only known record for V.C.99 until it was rediscovered in June 1987 by the writer and Miss A. Rutherford, BSBI recorder. The grass grew in small quantity on the muddy bank of a shallow stream near Dumbuck Hill, Dunbarton (NS419753). *C. aquatica* is rare in the west of Scotland except on the coast where it occurs typically on wet sand, usually where a fresh water stream runs on to the beach (the var. *littoralis*). In this habitat it occurs in a number of places around the Firth of Clyde, particularly in Ayrshire and the Clyde Isles.

Crested Hair-grass (*Koeleria macrantha*). The only previous record of this species is attributed to Lawrence Watt (A. Bennett,

1892 (*Annals Scot. Nat. Hist.*). No indication of locality was given however, and I have traced no specimen in Watt's herbarium.

In spite of searching in likely habitats for this species I had failed completely to find it in the county until, in July 1987, I located a small patch in dry, rather basic turf close to a low outcrop of basalt rock on the south-facing slope of the Kilpatrick Hills above Bowling (NS463737). Much of Lawrence Watt's botanising was done in the area of the Kilpatrick Hills; it is therefore likely that it was here that Watt found *Koeleria* almost one hundred years ago.

### Notable Canal Plants

K. WATSON

In a survey of the Forth and Clyde Canal recently conducted by the Botany Department of Glasgow University over 66 one-kilometre squares were sampled from Bowling in the west to Falkirk in the east, including the Glasgow branch. Many plant species of restricted Scottish distribution occur in some profusion along the canal. Of these the following are particularly noteworthy:

*Sagittaria sagittifolia* (Arrow-head) This plant with its distinctive emergent leaves was recorded from 24 of the 66 squares between NS68-74- and NS90-81-. It occurs sporadically from NE of Kirkintilloch, becoming locally abundant for a 10 km stretch to the south of Kilsyth. A further concentration occurs at Falkirk. Arrow-head was known to be present in the canal between Dullatur and Greenhill in 1889 (Hennedy – *The Clydesdale Flora*) and there is a specimen in the University Botany Department herbarium collected at Castlecary in 1891. Presumably an introduction in Scotland, this species has certainly spread well along the canal, but has rarely been recorded away from this habitat.

*Hydrocharis morsus-ranae* (Frog-bit) A surprising discovery, this species is also an introduction but with no previous Scottish records. It was recorded in 1983 during an earlier canal survey (N. Stewart, pers. comm.). During the present survey it was noted from 8 squares in the Bonnybridge area of Stirlingshire, VC 86, between NS79-78- and NS84-80-, where it was often extremely abundant.

*Alisma lanceolatum* (Narrow-leaved Water Plantain). This plant is a rarity in Scotland generally, but is not uncommon in the western half of the canal (NS45-63- to NS63-73-).

*A. lanceolatum* was known in 1976 from Weed Management Trials conducted in the canal by Paisley College of Technology but there are no earlier published records. It was probably recorded previously as the commoner species *A. plantago-aquatica*. Recent surveys have not revealed *Alisma lanceolatum* away from the canal, but specimens in Herb. GL show it occurred on the banks of the Clyde (R. Clyde, Cambuslang, Percy & Ribbons, 1963).

It would be interesting to hear if any readers have information concerning the origin and spread of these plants.

(There is a specimen of *Alisma lanceolatum* in the herbarium at Kelvingrove Museum, collected from the Forth and Clyde Canal in July 1867 by G. Horn. No precise locality is indicated. The species was certainly well known as a canal plant in the 1960s, being particularly abundant in the timber basin at Temple, and not uncommon westwards to Bowling. It seems to have been unknown to both Henedy and Lee. *Compiler.*)

***Calocera pallido-spathulata* Reid  
in Kinross-shire**

I. McCALLUM

On an excursion to Rumbling Bridge, Kinross-shire, V.C. 85 (NT021188) I recorded the small fungus *Calocera pallido-spathulata* on small coniferous branches on the ground. This species is approximately 5mm in height, spoon-shaped and grows perpendicular to the conifer branches. To date there are only four records for Scotland, of which this is the most northerly.

First found in North-east Yorkshire in 1969, *Calocera pallido-spathulata* was first formally described in 1974 and since has spread rapidly throughout England.

I am indebted to Dr Bruce Ing, Chester College of Education, for determination of the Kinross specimen.

**Extensions to the southern limits  
of Alpine Bearberry in the British Isles**

A. McG. STIRLING

A previous note (Stirling, 1967. *Glasg. Nat.* 18: 523) drew attention to the occurrence of the Alpine Bearberry (*Arctostaphylos alpinus*) in small quantity on Meall a' Bhuiridh, near Glencoe, Argyll (NN255505), this being, at that time, the most southerly British

locality known for this essentially northern species. Now the following two additional records can be reported from the southern fringe of its British distribution.

Mid Perth, V.C.88

F. Buchanan White in his *Flora of Perthshire* (1898) expressed doubt in the following terms regarding the occurrence of *A. alpinus* in the county: ‘. . . . sometimes reputed to be a native of Perthshire, appears not to occur within our limits, though it has been found not many miles from the north-west corner of the county’. The last statement no doubt refers to its occurrence on the hills to the east of Loch Treig and south of Loch Laggan in West Inverness, V.C.97.

In June 1984, following the BSBI Scottish Recorders’ Weekend at Loch Tay, a small party including Dr R. A. Thomas and A. A. Slack, acting on information supplied by Miss M. McCallum Webster, found *A. alpinus* in some quantity at around 750m on Sgiath Bhuidhe (NN458391) between Glen Lyon and Glen Lochay. It was growing in rather longer vegetation than is usual and was neither flowering nor fruiting.

Argyll, V.C.98

On 13 September 1986, Mr John Mitchell and others, searching for *A. alpinus* on the Beinn Chaorach – Stob Choir’ an Albannaich plateau above Glen Etive, found two patches of the Bearberry between 700m and 800m, centred around map reference NN155456. Despite four hours of further searching no additional plants were seen.

If the latitude of the earlier Argyll record is taken as a reference, the two occurrences described in this note represent extensions of the previously known southern limit of *Arctostaphylos alpinus* by some seven and four miles respectively.

## Mammals

**A record of Brandt’s Bat (*Myotis brandtii* (Eversmann)) from Perthshire** S. HEWITT\*

This species has recently been identified by Dr R. E. Stebbings of the Institute of Terrestrial Ecology, Monks Wood, from the skull of an old specimen taken near Rannoch, Perthshire, and now in the collections of Perth Museum and Art Gallery. We believe this

to be the most northerly authenticated record of the species in Britain. The history of the specimen is as follows:

The bat was knocked down with an entomological net by J. Ray Hardy in June 1874 'four miles from Rannoch on the road to Pitlochry' (Evans, 1892. *The Mammalia of the Edinburgh District*. pp 23-24. Edinburgh). Ray Hardy having given two different reports (Harvie-Brown, 1906. *A Fauna of the Tay Basin and Strathmore*. pp 4-5. Edinburgh) there is some doubt as to whether the 'Rannoch' in question refers to Kinloch Rannoch at the east end of the loch or to the western end where the Black Wood was the focus of attention for most visiting entomologists. The former locality would place the bat in an area of south-facing birch woodland, while the latter would be north-facing Scots pine forest.

The carcass went to Manchester where J. Ray Hardy worked and was made up into a study skin. The bat was at first labelled as a Notch-eared Bat (*M. emarginatus* (Geoffroy)) until Mr Oldfield Thomas, of the British Museum, redetermined it as Whiskered Bat (*M. mystacinus* (Kuhl)) in 1891 (determination label in Perth Museum). In 1916 the skin was presented to Perth Museum by Mr W. M. Tattershall, Keeper of Manchester Museum. The skin was then set up as a mount and the skull placed in a display case with it. The mount, having been on display for many years, is now badly faded and much of the wing and tail membrane has been patched with tissue paper at some time.

This record is over 100 years old; now all we have to do is find the colony!

\*(Stephen Hewitt is Assistant Keeper of Natural Sciences at Perth Museum and Art Gallery.)

## Cetaceans in the Clyde Coastal Area

R. SUTCLIFFE

There have been several strandings of cetaceans around the Clyde coast recently. An immature male Bottle-nosed Whale, *Hyperoodon ampullatus* (Forster), became stranded north of Dunure, Ayrshire on 17 September 1986. It was 'rescued' by a Royal Navy helicopter from HMS Gannet and lifted out to sea in a net, but was washed up dead near Lendalfoot two days later. The skull and several vertebrae are now preserved in Glasgow Museum (Reg. No. Z1988-30).

A common Dolphin, *Delphinus delphis* L., was found dead at Pladda, south of Arran on 22 November 1987, and the following month two more were found dead on the beach at Dunure.

A mature female Porpoise, *Phocoena phocoena* (L.) was stranded at Lochranza, Arran on 12 December 1987 and a juvenile female at Machrihanish Bay, Kintyre on 21 February 1988. The latter specimen was recovered intact and taken to Glasgow Museum (Reg. No. DB405) where it was measured and photographed and muscle samples, liver and stomach were removed for analysis.

A juvenile male White-sided Dolphin, *Lagenorhynchus acutus* (Gray) was stranded at Oban on 4th or 5th February 1988. This specimen was also recovered by Glasgow Museum (Reg. No. Z1988-16) and the organs removed for analysis.

The highlight of the strandings was the Sperm Whale, *Physeter catodon* L., washed up close to Bennane Head, Ayrshire on 24 or 25 March 1988. The animal had obviously been dead for some time before being washed ashore and was badly decomposing. It was therefore *very* quickly removed (in six pieces) to the nearby knackers yard at Girvan, so unfortunately no accurate measurements were taken. It was an old male and was estimated to be about 60 feet long. A tissue sample was removed for mercury analysis by Glasgow University and several vertebrae, ribs and parts of the skull have been presented to Glasgow Museum.

This constitutes the first record of this species for the Clyde Sea Area since records began. This year (1988) there have been a large number of strandings of sperm whale around the north and west of Scotland. There have been reports from Shetland (at least 2), Orkney (2), Islay (1), Stornoway (1) and Skye (1) in addition to the Clyde specimen. Normally there are only one or two strandings a year for the whole of the British Isles! The reason for this sudden increase is not clear. It is probable that many strandings, especially of small cetaceans, go unreported and the animals are simply buried on the beaches where they come ashore. Glasgow Museum would welcome any reports of such strandings around the Scottish coast.

## Entomological

### Parasites and predators of Burnet Moths I. C. CHRISTIE

Several instances of parasitisation and predation of Burnet Moths were noticed during 1988.

A few hibernating larvae were taken from a Six-spot Burnet, *Zygaena filipendulae* (L.) colony on the Fife coast at the end of September 1987. These successfully emerged from diapause in April and fed normally during one instar. At the end of this instar larvae of the Braconid *Cotesia zygaenarum* (Marshall) emerged from half the burnets, which died a few days later. Each burnet contained 2 or 3 parasites only.

A small but numerous colony of the Transparent Burnet, *Zygaena purpuralis* (Brun.) was found below Tavool, Ardmeanach, Isle of Mull on 15 June. The site is a short steep slope behind the shore, topped by a low cliff of columnar basalt. The slope faces south and is covered in thyme, the food plant of the burnet larvae. Large numbers of the larvae had climbed up the rock and mummified when of a size consistent with that at the end of the first feeding instar after diapause. Most, but not all, were head up. A sample of twenty was taken and kept warm. Parasites, one per mummy, started emerging after a few days. In all, three were of the Braconid species *Aleiodes bicolor* (Spinola) and fifteen of the Ichneumonid genus *Gelis*. Two mummies remained intact, presumably due to the death of the parasites. *Aleiodes* is a primary parasite of the burnet and *Gelis* is a parasite of *Aleiodes*.

A penultimate instar Heteropteran bug was found sitting on a Six-spot Burnet cocoon near Carsaig, Isle of Mull on 16 June. Its proboscis had pierced the cocoon wall and was sucking the juices of the as yet unupupated larva within. The bug returned to the cocoon over the next three days, by the end of which the larva was reduced to a shrivelled skin. Thereafter it was fed on Emperor and Winter Moth larvae until the adult state was reached. It was then easily identified as the Pentatomid *Picromerus bidens* (L.)

When Paisley Moss, Renfrewshire, was visited on 1 July many Six-spot Burnets were on the wing and many cocoons were obvious on grass stems, broom twigs etc. It was most remarkable that all these cocoons, with one exception, had been torn open by predators and the pupae removed. Not one had emerged normally, and only one still contained a pupa. On a subsequent visit several cocoons

were found low in the vegetation and moths had successfully emerged from all of these. It appeared probable that the culprits were Reed Buntings from the marshy area nearby. A burnet colony in Fife was visited soon after, and it was found that a small proportion of the obvious cocoons had been torn open there, but no such damage was noticed in an Irvine, Ayrshire colony. Reed Buntings appeared to be absent from both these sites.

I should like to thank Dr Mark Shaw of the Royal Museum of Scotland for kindly identifying the Hymenopterous parasites involved.

### **The Reedmace Bug – new to Scotland**      J. E. MORGAN and I. C. CHRISTIE

During a visit to Paisley Moss, Renfrewshire, on 24 October 1987, we noticed that the heads of the Reedmace, *Typha latifolia*, which were affected by the spinnings of the moth, *Limnaecia phragmitella* (Stt.), contained large numbers of a Heteropteran in various stages of development. Specimens were sent to the Royal Museum of Scotland (RMS) where they were identified as *Chilacis typhae* (Perris), the Reedmace Bug, a seed-eating species. The seed heads of the current year's production had small *Limnaecia* larvae and a few bugs in them, whereas those of the previous year still held together by the *Limnaecia* spinnings also had *Limnaecia* larvae and many bugs. It appears that, in a head containing much seed, the first generation of *Limnaecia* leaves sufficient seed uneaten to feed another generation of the bugs, though it is possible that some larvae may take two seasons to mature. This requires further investigation. The spun heads are fluffy and dry within, making ideal winter quarters for the bugs.

In so far as we can determine there is no previous record of *Chilacis typhae* in Scotland, neither in the Scottish Insect Records Index maintained at the RMS, in Masee, 1955 (The County Distribution of the British Hemiptera – Heteroptera. Second edition. *Entomologists' Mon. Mag.* 91: 7-27) nor in Southwood and Leston, 1959 (*Land and Water Bugs of the British Isles*. Frederick Warne. London). Specimens from Paisley Moss have been deposited in the RMS and in Liverpool Museum.

Subsequently Mr Steven Judd of Liverpool Museum collected adult and immature *Chilacis* at Shewalton, near Irvine, on 10 May 1988 and ICC found adults at the South Morton Loch, Tentsmuir,

Fife on 24 August 1988. The bug and the moth were again associated at the latter site. Neither species was found in the *Typha* beds near Lindores in Fife, nor in the beds at the south-east corner of Loch Lomond.

We are indebted to Dr Graham Rotheray of the RMS and to Mr Judd for their assistance in the preparation of this note.

### **An early sighting of the Orange Tip at Balnaguard, Perthshire**

P. BLOUNT

George Thomson in *The Butterflies of Scotland* (1980) records the Orange Tip (*Anthocharis cardamines* (Linnaeus)) as appearing on the wing in the last two weeks of May and, in exceptional years, it has been found as early as the first week of May. It is therefore of note that two males were sighted on 28 April 1987 at Balnaguard SWT Reserve, Perthshire. The male Orange Tip emerges a week or so before the female, and on this occasion enjoyed one of the best spells of weather in what was otherwise a miserable year for butterflies.

It is always a joy to see *A. cardamines* which seems to capture the charm and gaiety associated with the transition from late Spring to early Summer. The insect is single brooded and after completing the pupal stage of between ten and eleven months is on the wing for only about eighteen days.

### **Some Coleoptera new to Islay (V.C. 102) including two species unrecorded from the Inner Hebrides**

M. SINCLAIR

In 1983, Welch (*Proc. Royal Soc. Edinb.*, 83B : 505-529) summarised beetle records from a number of Inner Hebridean islands including Islay. His sources were the published and unpublished records of past and present collectors, specimens in collections and his own collecting. He was able to list 937 species from the Inner Hebrides as a whole, but few of these have been recorded from all the islands included in the survey. Recently the writer was asked to determine and list a collection of about 2500 beetles that had been caught in pitfall traps at Kilchoman, Islay (NR21-63-) in 1980-81. As a result it is now possible to add 15 species not included by Welch in the Islay list. Of these, two species appear not to have been recorded from the Inner Hebrides. Reference has

been made to the species distribution index in the Royal Scottish Museum, Edinburgh, to check for records made since 1983. The species are listed below (\* = new to Inner Hebrides).

Carabidae: *Carabus arvensis* Herbst, *C. clatratus* L., *Pterostichus versicolor* (Sturm), *Agonum marginatum* (L.), \**Amara convexior* Steph.

Staphylinidae: *Megarathrus sinuatocollis* (Bois. & Lac.), \**Philonthus addendus* Sharp, *Quedius boopoides* Munster, *Mycetoporus lepidus* (Grav.), *Zyras collaris* (Payk.), *Aleochara bipustulata* (L.) *A. ruficornis* Grav.

Geotrupidae: *Geotrupes spiniger* (Marsh.).

Cryptophagidae: *Atomaria ruficornis* (Marsh.).

Apionidae: *Apion frumentarium* (Payk.).

I am grateful to Mr Andrew Buckham for supplying the beetles, to Dr Mark Shaw for allowing me to consult the species distribution index in the Royal Scottish Museum, Edinburgh, and to Dr Martin Luff, Prof. John Owen and Mr John Read for help with *Amara*, some Staphylinidae and *Apion* respectively.

### Interesting Beetles from Garscadden Wood R. A. CROWSON

On a rather steep south-facing slope on the northern edge of Glasgow's Drumchapel housing estate is the long narrow strip of Garscadden Wood. The wood is of mixed constitution, with an extensive stand of mature oaks in its western part, an area of old beeches in the centre, some almost treeless areas and an eastern part with younger conifers, sycamores etc. There are also some mature ash and birch and some scattered wild cherry, hazel, hawthorn, etc. Some wet flushes are present and some areas of bracken. From four short collecting visits between 4 June 1986 and 30 April 1988 I can record the occurrence in this wood of a number of less common species of Coleoptera, as follows:

Carabidae: *Amara lunicollis* Schiod.

Staphylinidae: *Gyrophæna strictula* Er., *Bolitochara mulsanti* Sharp

Nitidulidae: *Glischrochilus hortensis* (Fourc.)

Cryptophagidae: *Henoticus serratus* (Gyll.), *Atomaria pusilla* (Payk.), *A. fuscicollis* Man.

Erotylidae: *Triplax aenea* (Schall.), *Dacne bipustulata* (Thunb.)

Sphaerosomatidae: *Sphaerosoma piliferum* (Mull.)

Lathridiidae: *Enicmus testaceus* (Stephens)

Melandryidae: *Hallomenus binotatus* (Qu.)

Chrysomelidae: *Apteropeda orbiculata* (Marsh.)

Curculionidae: *Phyllobius oblongus* (L.), *Acalles ptinoides* (Marsh.), *Coeliodes dryados* (Gmel.), *C. rubicundus* (Herbst), *Rhynchaenus quercus* (L.), *Curculio pyrrhoceras* Marsh.

Scolytidae: *Dryocoetinus villosus* (F.)

Several of these species are particularly associated with oaks, notably the *Phyllobius*, *Coeliodes dryados*, *Rhynchaenus* and *Curculio*. Others are flightless with poor powers of dispersal, e.g. the *Sphaerosoma*, *Apteropeda* and *Acalles*. The *Hallomenus* occurs in the fungus *Polyporus sulphureus*, growing mainly on the oaks. The *Acalles* is notable as a species generally indicative of old, 'primary' woodland sites in Scotland, though it can survive on old *Calluna* (entirely absent in and around Garscadden Wood at present).

The wood is shown on an 1861 Ordnance Survey map of the area, and a similarly shaped wood in about the same position is shown on General Roy's map of 1746. The wood today is subject to the unrestricted activities of the juvenile delinquents of Drumchapel, suffering severe damage from fires and direct attacks on the trees, and, with little or no regeneration, is unlikely to survive for many more centuries.

## Invertebrates

### Some terrestrial flatworm records from the Glasgow area

E. G. HANCOCK

Flatworms or planarians are probably most familiar as the small flattened aquatic worms which glide over the surface of stones in streams or lake margins. They are platyhelminths and there are also some parasitic species such as the well known liver fluke. Within the terrestrial element of the group are only three known British species and a number of established introduced ones.

Four species of these interesting animals have been recorded recently in the Glasgow area, two of which are introduced and two native. One of the alien species was originally noticed in *Glasg. Nat.* 19, 499-501). This is the curious *Artioposthia triangulata* (Dendy) and had been found in two sites in Greater Glasgow in 1978 and 1979. Its interest lies in its normally being established out of doors and so far being known only from the northern parts of the British Isles. A single example of this species was found inside the Kibble Palace in Glasgow Botanic Gardens on 11 March 1988 and another from the banks of the River Kelvin on 10 May 1988. These are apparently the only west of Scotland records of this species in a decade. As it is a native of New Zealand it is probable that it is a cold adapted species and prefers the climate of the north. Kibble Palace is cooler than the other glass houses and it may be significant

that *Bipalium kewense* Moseley, a hot house exotic (see below), was only found in the other (warmer) glass houses visited on that date.

*A. triangulata* eats earthworms voraciously and I have been told that in a garden in Edinburgh, where this animal has been established for some time, it is present in such numbers as to be causing concern for the condition of the soil. In this situation the owner is resorting to collecting the flatworms and feeding them to his poultry but has so far not succeeded in eradicating them. The interest here is clearly that if *A. triangulata* does have a measurable effect on the earthworm population then it could become a pest of major proportions. This possibility is being investigated in Belfast.

The second introduced species, *Bipalium kewense* already mentioned above, is abundant in several of the hot houses at the Botanic Gardens in Glasgow. It has presumably been there for many years although does not seem to have been noticed there before. Barclay (*Glasg. Nat.* 8:171) recorded it from Ruchill Gardens between 1905-1917.

*Microplana* (formerly *Rynchodemus*) *terrestris* (O. F. Müller) is the commonest of the indigenous species but these rather obscure animals are rarely recorded. It has the superficial appearance of a small blackish slug and lives in similar situations so may be under-recorded for this reason. Having become more aware of the appearance of these creatures I found subsequently several specimens in my garden in Chapelton, near Strathaven, Lanarkshire between 24 June and 29 August 1988. In another garden, in Newmilns, Ayrshire, *Microplana scharffi* (von Graff) (formerly *M. brittanicus* (Percival)) has been found very recently, in November 1988, again because of heightened awareness of the existence of these elusive creatures. *M. scharffi* is a rare species and has only been recorded once before in Scotland.

Because of their obscure habits and enigmatic appearance terrestrial planarians are rarely seen. The possible economic interest of the introduced species and the lack of awareness of their native counterparts give a challenge to the naturalist to observe and record whenever possible.

I would like to acknowledge the help of Bill Baird, David Beaumont, Eric Curtis, Dr Hugh Jones, Dr Adrian Rundle, Fred Woodward and Professor Keith Vickerman for providing records or observations on the various species discussed above.

## Book Reviews

### **The IPCC Guide to Irish Peatlands**

ed. CATHERINE O'CONNELL

Irish Peatland Conservation Council, 1988, 102pp., colour plates, photographs, diagrams, line drawings. Paperback, ISBN 0 9512709 0 7, £6.00.

This book was produced to draw attention to the urgent need for the conservation of Irish peatlands, the last of their kind in Europe, in the face of wholesale destruction in the '80s by fuel cutting, drainage and afforestation. It aims to encourage people to explore and appreciate this heritage.

The several short articles by experts cover the value of peatlands as landscape, their formation, flora and fauna, history, archaeology, exploitation and conservation and include lists of preserved sites and conservation bodies.

The clear text in plain language aided by the excellent colour plates and diagrams succeeds in making the book suitable for all readers, while the lists of scientific names in appendices extend its use to the more academic. It is a pity that some of the many drawings which enliven the pages are not more accurate. This book is to be recommended and should well fulfil its aims.

RUTH H. DOBSON

### **Larvae of the British Ephemeroptera: a Key with Ecological Notes**

J. M. ELLIOTT, U. H. HUMPECH & T. T. MACAN

F.B.A. Scientific Publication No. 49, 1988, 145pp., many illustrations. ISBN 0-900386-47-9, ISSN 0367-1887, £10.

Given the fact that it is more meaningful to sample aquatic insects while in their juvenile, aquatic phases a new key to the larvae is of the greatest value to ecologists. To reinforce this the Freshwater Biological Association has published a new key and supplemented it with notes of value in interpreting populations of Mayflies in relation to the habitat. These include comments on the value of these insects as indicators of environmental type and quality. There are also sections on the behaviour, life cycle and feeding habits to the extent that 42 out of 116 pages of text (excluding references, index etc.) are devoted to these most useful summaries of ecological information.

Within the key information on geographical distribution of the individual species is sparse to non-existent except in the case of rarities. This follows a tradition in most F.B.A. keys but is possibly less frustrating than being told the detailed distribution within the English Lake District as used to be the case in their publications. As most modern books or keys do make an attempt to provide distribution maps within each group this becomes all the more noticeable when absent. An up-to-date checklist is provided with notes on recent synonymies. This new key more than replaces the earlier editions and will be essential to freshwater biologists and entomologists alike as well as hopefully stimulating others to take an interest in this group.

E. G. HANCOCK

## Book Reviews

### **The Trees of Britain and Northern Europe**

ALAN MITCHELL, illus. by JOHN WILKINSON

Collins, London, 1988, New Edition, 288pp., over 600 tree illustrations, Softback, ISBN 0-00-219857-6, £6.95.

This is a new format of 'A Field Guide to the Trees of Britain and Northern Europe' by Alan Mitchell, first published in 1974. The earlier book described 800 trees but does not have as many illustrations and is not a book one would use in the field. The colour reproduction, however, is superior to that in the new book.

There are a number of features which would recommend the new book to me. The text is interesting and contains information on the history and provenance of the trees. There is additional information at the end of the book on where one may see notable trees, which includes for example the Cilician fir which can be found at Culcreuch Castle, Fintry. A literal translation of the botanical Latin is something I have always wanted in a botanical book and a number of interesting name derivations are given eg., 'aucuparia' from 'avis' a bird and 'capire' to catch, from the use of the shoots to make birdlime.

The book is compact enough to carry in the field and the laminated covers are light and hard-wearing. The illustrations include, in colour, tree outline, leaves, flowers, fruits and bark. It describes most of the wild and planted trees one would find in Britain together with those of Northern Europe which does not add significantly to its size yet makes it useful for holidays.

Winter silhouettes of the common trees are given at the back of the book and the pictorial guide to leaf shapes at the beginning adds to the usefulness of the key.

One criticism is that while the illustrations in the main are good, the colour reproduction does not show leaf texture very well.

On the whole I would recommend this book as a useful field guide.

AGNES WALKER

### **Wild Flower Poster – A Review**

A key to the common families of Wild Flowers has been made into an attractive poster, devised by Dr Agnes Walker, with art work by Susan Martin. Today with such an increased awareness of the environment, many more people would like to be able to identify native plants but find Wild Flower Books difficult to use. There is a need for a simple pictorial key such as this to show the principles of the arrangement of Wild Flower families in "Natural" order.

The poster was designed initially to be used by adults with no botanical training but is also being used by teachers both at the Primary stage, when pupils are keen to learn about Wild Flowers, and at the Secondary stage when pupils learn about keys.

It is printed on good quality card (65 x 45cm) and published by The Natural History Department of The British Museum, with a recommended retail price of £2. Copies can be obtained from Dr Agnes Walker, Glasgow Museums and Art Galleries, Kelvingrove, Glasgow G3 8AG, or The British Museum (Natural History), Cromwell Road, London SW7 5BD, (including 50p for postage). A special Teachers Pack to go with the poster is being prepared and will be shortly available, price 50p.

JEAN M. MILLAR

## Book Review

### **The Building Stones of Edinburgh**

I. T. BUNYAN, J. A. FAIRHURST, A. MACKIE and  
A. A. McMILLAN

Edinburgh Geological Society, 1987. 196pp.  
Paperback, ISBN 0-904440-044, £5.25.

The authors of this interesting book have painstakingly researched the uses of sandstone in Edinburgh. They describe and tell the history of all known sandstone quarries in the city and have also identified the many varieties of sandstone used in Edinburgh buildings. A large number of places where these can be seen are listed in one of the five extensive appendices, which also list additional information about the quarries, properties of the different sandstones and geological terms.

The title of the book is slightly misleading, as it looks only at sandstones, but the authors do indicate the possibility of publishing a second volume, dealing with the rocks other than sandstones used in the city. If this is produced to the same standard I very much look forward to seeing it.

R. SUTCLIFFE

## Advertisement

**Lee, J. R. 1933, *The Flora of the Clyde Area*.**

Professionally bound copies of the original printing of this Flora can now be provided to order, price £7.50 to members of the *Glasgow Natural History Society* and to the book trade, £10.00 to others (p. & p. 50p extra). This is still the only work of its type on the area and is in diminishing supply.

Obtainable from *The Librarian* at the address given on the inside of the back cover.

## Acknowledgments

The Council and Publishing Committee of The Glasgow Natural History Society wish to express their gratitude to those members of the Society whose anonymous donations have contributed much to the costs of production of this issue of *The Glasgow Naturalist*.

They are also grateful to the Royal Society for a grant of £213 to cover the cost of the paper 'Skye Fungi – Additions' by Dr. Roy Watling which was published in Vol. 21/3.

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## Proceedings 1987

The chairman, place\* and number present, lecturer's name, title of lecture and note of any exhibits are given for each meeting.

\*GMK: Glasgow Museum and Art Gallery, Kelvingrove

UGBD: University of Glasgow, Botany Department

- 13 JANUARY.** Meeting cancelled due to adverse weather.
- 10 FEBRUARY.** Dr P. Macpherson, UGBD, 53. 57th A.G.M. Reports on activities during 1986 were read, elections were held (see page 000), and appointments made by Council were announced. The Report of Council stated that there were 308 members (259 Ordinary members, 25 Family members, 5 Junior members, 12 School members and 7 Honorary members). 33 excursions were organised during 1986 (16 Botanical, 4 Geological, 2 Ornithological, 1 Photographic, 7 Zoological, 2 General and 1 Joint Ornithological/Zoological).  
The film 'Acid Rain' was shown.  
Exhibits: Photographs of Green-winged Orchids and Early Purple Orchids taken at Bennane Head (Mr B. Zonfrillo). Blue Sowthistle, (Mr J. R. S. Lyth). Posters of Papua New Guinea (Dr J. H. Dickson).
- 10 MARCH.** Dr J. H. Dickson, UGBD, 43. Members' Photographic Night.  
Exhibits: Glasgow Urban Wildlife Group and the Garden Festival 1988 (Mrs J. Millar). 2 Flowering Plants from the Canaries (Dr J. H. Dickson). Fossils from Lugton Quarry (Mr R. Sutcliffe).
- 14 APRIL.** Dr P. Macpherson, UGBD, 41.  
Dr Hugh Lang: Botanizing in Greenland.  
Exhibits: Plant from the Canaries (Mr J. R. S. Lyth). Male Chaffinch (Prof. N. R. Grist).
- 12 MAY.** Mr R. Sutcliffe, UGBD, 37.  
Steve J. Edwards: Working for Wildlife in Pollok.  
Exhibits: Fossil bivalve in chert (Miss M. M. H. Lyth).
- 9 JUNE.** Chatelherault Country Park, Hamilton. 72.  
Natural History Social Evening.

- 11 SEPTEMBER.** GMK, 36.  
Annual Exhibition Meeting and Cheese and Wine.  
Exhibits: Fungi from the Milngavie area (Mr R. Hunter). Plant specimens from the Flora of Glasgow (Dr J. H. Dickson and Mr K. Watson). Plants being grown for the Glasgow Garden Festival (Mrs J. Millar). Slides of Summer Excursions (Photographic Section). Forth and Clyde Local Plan, Geological specimens from Craigmaddie Muir, Concrete cores from the Kelvin Hall, Orange Tip butterflies in the Glasgow area (Mr R. Sutcliffe). Fossils from the Petershill Limestone (Mr A. H. Gunning). Geological specimens and photographs from the Dolomites (Mrs J. F. Stevenson). Agates from the Isle of Arran (Miss M. M. H. Lyth). Plants and twigs prepared for library display, a member of the Loasacea family from Lochranza, Arran (new to Britain) (Mr J. R. S. Lyth). Orchids from Drumbrock Meadows (Mrs C. Dickson). Toadflaxes and hybrids (Dr P. Macpherson). Essig's Lupin Aphid, *Tipula invenusta* from Ben Lawers (new to Britain), Foliated example of Purple Toadflax (Mr E. G. Hancock). Freshwater bivalves (Mr F. R. Woodward). Examples from the William B. L. Manley collection of Lepidoptera, BRISC Survey (oak galls) 1987 (Natural History Dept).
- 13 OCTOBER.** Dr J. H. Dickson, UGBD 35.  
Dave Dick: Protecting Rare Birds.  
Exhibits: Bog Arum (Mr I. C. Christie). Spider cocoon being parasitised by parasitic hymenoptera (Mr J. E. Morgan). Pansy for identification (Mr J. R. S. Lyth).
- 10 NOVEMBER.** Dr J. H. Dickson, UGBD 48.  
John Mitchell: The Botanical Legacy of Cornstone Quarries and Bog Hay Meadows.  
Exhibits: New Society Display boards (Mrs A. V. Sutcliffe). Sea Bean found on Blackpool beach (Dr J. H. Dickson).
- 24 NOVEMBER.** Mr R. Sutcliffe, UGBD, 31.  
Dr Mike Jarvis: Soils, Plants and Conservation.  
Richard Sutcliffe: Geology excursions 1987.  
Exhibits: Geological specimens and slides from various localities (7 members)
- 8 DECEMBER.** Dr J. H. Dickson, Dean Park Hotel, Renfrew 80.  
Annual Dinner.  
T. Norman Tait and Dr J. H. Dickson: 1987 Expedition to Papua New Guinea (Audio-visual presentation).

# The Glasgow Naturalist

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\*Part 1 contains (18pp) *The Flora of Easter Dunbartonshire* by J. R. Lee.

†Part 2 contains (18pp) *Additions to the flora of the Clyde Area* by J. R. Lee.

§Part 6 (82pp) is a list of the less common Scottish Basidiomycetes by D. A. Reid and P. K. C. Austwick.

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Orders for any of the above and for copies of the current and future issues, or for reprints or photocopies should be addressed to *The Librarian*:—

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# *The Glasgow Naturalist*

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## **The Glasgow Natural History Society (formerly The Andersonian Naturalists of Glasgow)**

The object of the Society is the encouragement of the study of natural history in all its branches, by meetings for reading and discussing papers and exhibiting specimens, and by excursions for field work. The Glasgow Natural History Society meets at least once a month except during July and August, in the University of Glasgow, the University of Strathclyde or the Glasgow Art Gallery and Museum.

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C/O NATURAL HISTORY DEPARTMENT,  
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### **The Glasgow Naturalist**

Published by the Glasgow Natural History Society  
ISSN 0373-241X

February 1990  
Price £5.00

Edited by R. M. Dobson with the assistance of J. H. Dickson, R. H. Dobson, A. McG. Stirling and I. C. Wilkie.

Contributions are invited, especially when they bear on the natural history of Scotland. A note of information for contributors is available from *The Editor*.

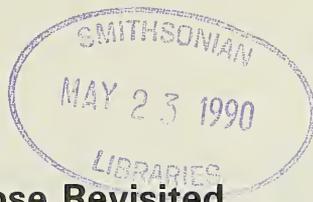
Smaller items are also welcome from members and others. These may cover, for example, new stations for a species, rediscoveries of old records, additions to records in the *Atlas of the British Flora*, unusual dates of flowering, unusual colour forms, ringed birds recovered, weather notes, occurrences known to be rare, interesting localities not usually visited by naturalists. (The nomenclature of vascular plants should be as in Clapham, A.R., Tutin, T. G. & Warburg, E. F. 1981. *Excursion Flora of the British Isles*, Ed. 3. Cambridge.

All communications on editorial matters should be sent to:

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ZOOLOGY DEPARTMENT,  
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A limited number of advertisements can be accepted and enquiries should be sent to *The Editor*.

Back numbers available are listed on the inside back cover.



## Lanarkshire's Nose Revisited

PETER MACPHERSON

Ben Alder, 15 Lubnaig Road, Glasgow G43 2RY.

In a previous paper, the results were reported of intensive botanising in a small area to the west of Glasgow where, for the National Recording Scheme, Lanarkshire (V.C.77) projects into Renfrewshire (V.C.76), a region which we called the tip of Lanarkshire's nose (Macpherson and Teasdale, 1986). The area involved comprises 39% of the 1km square 26/51-67. The survey had been conducted in the period July 1983 to September 1985 and proved remarkably rewarding in that a total of 266 species was recorded.

Since that time interest in the site has been maintained with an average of five visits per year during the period 1986-88. In general there has been little habitat change. Part of a stream has been filled in and another part diverted, one of the old railway lines has become very overgrown and two new factories have been erected. However, there is now a project to create a £150m leisure and retail complex on a 250-acre site on the south bank of the Clyde between Glasgow and Renfrew, centred on the site of the old Braehead Power Station. If approved, part of the "nose site" would be substantially altered. It was decided, therefore, to assess what recording changes had occurred since the previous report.

### Plants previously present but not seen in the 1986-88 period

A full list is given in Table 1. A number of species simply did not reappear, namely those listed from the open ground, grassy, roadside, old railway, bushy/hedge habitats and three of the grasses.

Reclamation of a stream as it ran through open woodland resulted in the loss of *Listera ovata* (Common Twayblade) and *Viola*

Table 1  
**HABITATS**      **1983-85**      **NOT RECORDED AFTER 1985**      **LOST**  
**No.**      **1986-8**

Open Ground	51	<i>Echium vulgare</i> ; (Viper's Bugloss)	<i>Malva moschata</i> ; (Musk Mallow)	<i>Sonchus arvensis</i> (Corn Sowthistle)	3
Grassy	35	<i>Senecio sylvaticus</i> ; (Heath Groundsel)	<i>Trifolium aureum</i> ; (Large Hop Trefoil)	<i>Vicia tetrasperma</i> (Smooth Tare)	3
Roadside	32	<i>Lepidium heterophyllum</i> ; (Smith's Pepperwort)	<i>Silene alba</i> ; (White Campion)	<i>Trifolium medium</i> (Zigzag Clover)	3
Old Railway	20	<i>Epilobium hybrids</i> x 2; (Willow-herbs)	<i>Vicia sativa</i> (Common Vetch)		2
Wood	12	<i>Listera ovata</i> (Common Twayblade)			1
Bush/Hedge	7	<i>Convolvulus arvensis</i> (Field Bindweed)			1
Water-side	6	<i>Stellaria palustris</i> ; (Marsh Stitchwort)	<i>Viola palustris</i> (Marsh Violet)		2
Heath	5				0
Water	3				0
Garden Weed	1	<i>Solanum nigrum</i> (Black Nightshade)			1
Grasses	29	<i>Avena fatua</i> ; (Wild Oat)	<i>Hordeum vulgare</i> ; (6-rowed Barley)	<i>Vulpia myuros</i> (Rat's-tail Fescue)	3
Trees	20				0
Rushes	5				0
Ferns	4				0
Sedges	3				0
Wood-rushes	2				0
Alien/Exotic	31	<i>Aucuba japonica</i> ; (Spotted Laurel)	<i>Centaurea montana</i> ; (Perennial Cornflower)	<i>Cheiranthus x allionii</i> (Siberian Wallflower)	6
		<i>Papaver somniferum</i> ; (Opium Poppy)	<i>Rubus laciniatus</i> ; (Parsley-ldv Bramble)	<i>Sedum spurium</i> (Caucasian Stonecrop)	6
Totals	266				25

**Table 2**  
**HABITATS**

	<b>ADDITIONS 1986-88</b>	<b>Gained 1986-8</b>	<b>TOTAL</b>
		<b>No.</b>	<b>1983-8</b>
Open Ground	<i>Barbarea vulgaris</i> ; (Winter-cress)	3	51
Grassy	<i>Alchemilla glabra</i> (Highland Lady's-mantle)	1	33
Roadside	<i>Taraxacum latissimum</i> (Dandelion sp.)	1	30
Old Railway		0	18
Wood	<i>Hyacinthoides non-scripta</i> ; (Bluebell)	2	13
Bush/Hedge		0	6
Water-side	<i>Cirsium palustre</i> (Marsh Thistle)	1	5
Heath		0	5
Water		0	3
Garden Weed		0	0
Grasses	<i>Festuca diffusa</i> ; (Fescue sp.)	3	29
Trees	<i>Acer platanoides</i> ; (Norway Maple)	3	23
Rushes	<i>Juncus inflexus</i> (Hard Rush)	1	6
Ferns		0	4
Sedges	<i>Carex demissa</i> ; (Cm. Yellow-Sedge)	2	5
Wood-rushes		0	2
Alien/Exotic	<i>Allium paradoxum</i> ; (Few-flwd. Leek)		
	<i>Hyacinthoides hispanica</i> x <i>non-scripta</i> ; (Bluebell hybrid)		
	<i>F. nigrescens</i> ; (Chewings Fescue)		
	<i>Prunus cerasifera</i> ; (Cherry Plum)		
	<i>Glyceria fluitans</i> (Floating Sweet-grass)		
	<i>Salix myrsinifolia</i> (Dark-lvd. Willow)		
	<i>Chenomelis</i> x <i>superba</i> (Quince)		
	<i>Muscari armeniacum</i> (Grape Hyacinth)		
Totals		23	264
		6	1
		37	289

*palustris* (Marsh Violet). Filling in of another part obliterated *Stellaria palustris* (Marsh Stitchwort). *Solanum nigrum* (Black Nightshade) was eradicated by weeding! As might be expected, there were no losses in the groups "Trees to Wood-rushes".

Of the alien/exotic species, *Aucuba japonica* (Spotted Laurel), *Rubus laciniatus* (Parsley-lyd Bramble) and *Sedum spurium* (Caucasian Stonecrop) were lost due to new developments but there was no change of habitat to account for the loss of the other three.

### Additional plants recorded in the 1986-88 period

These are listed in Table 2. The three additions from "Open Ground" balanced those lost from that habitat. *Taraxacum latissimum* was identified from a roadside, the first time that this Dandelion species had been recorded in V.C. 77. *Hyacinthoides non-scripta* (Bluebell) and *Veronica hederifolia* (Ivy-lyd Speedwell) from wood habitats were in small quantity and cannot have been present for any length of time. The latter, in particular, was found at a site looked at frequently during the earlier survey. Alteration to one of the streams produced a damp area and this has yielded *Cirsium palustre* (Marsh Thistle) and *Carex demissa* (Common Yellow Sedge). However, a minute tributary of a stream had not been searched before and this yielded the Floating Sweet-grass, *Glyceria fluitans*. Two other grasses were seen for the first time, *Festuca diffusa* and *Festuca nigrescens*. The record for *F. diffusa* was the third for Lanarkshire. We had had it identified from a grassy bank in the neighbouring King George V Dock in 1985 and from waste ground at Shieldhall earlier in 1986. *F. nigrescens* (*F. rubra* ssp. *commutata*) has not been recorded from the wild previously in the vice-county.

From their size two of the trees added to the list must have been present for many years, the *Acer platanoides* (Norway Maple) being passed over for *A. pseudoplatanus* and the *Salix myrsinifolia* (previously *nigricans* — Dark-leaved Willow) for one of the more common species. The *Prunus cerasifera* (Cherry Plum) grows at the bottom of a wooded hollow and by the end of 1988 was only five feet tall. There is now one clump of *Juncus inflexus*. *Carex pendula* grows on the open heath and it would be surprising if it had been previously overlooked, at least at a flowering state.

In the Alien/Exotic group the six losses were balanced by six

gains. The leaves of *Allium paradoxum* (Few-flowered Leek) had been seen during the earlier survey but not identified correctly. At a visit in the spring of 1987 a good quantity was seen in flower in part of the woodland. There is a tiny colony of *Convallaria majalis* (Lily-of-the-Valley) at the edge of another part of woodland. A few plants of the hybrid Bluebell have now been seen. *Lysimachia nummularia* (Creeping Jenny) is now present on the bed of one of the old railway lines. *Chenopodium x superba* (Quince) and *Muscari armeniacum* (Grape Hyacinth) are at the side of tracks and presumably came with material to be dumped. Neither has been recorded previously for V.C. 77.

### Discussion

As was commented on in the previous paper, there is no end point in botanical recording. Out of a total of 266 plants seen at the tip of the Nose of Lanarkshire during 1983-85, 25 were not again recorded in the following three years. However, during this latter period a further 23 plants were seen. From this tiny area of only 39 hectares (96 acres) a total of 289 different species occurred at least some time during the six years 1983-88.

### Reference

MACPHERSON, P. and TEASDALE, E., 1986. Plant recording at the tip of Lanarkshire's nose. *Glasg. Nat.* 21: 201-214.

## Book Reviews

### **Collins New Generation Guide to the Fungi of Britain and Europe**

STEFAN BUCZACKI, illustrated by JOHN WILKINSON  
Collins, London, 1989, 320 pp., numerous colour illustrations.  
Softback, ISBN 0-00-219448-1, £8.95.

This book contains over 1300 colour paintings of fungi with extensive notes on identification and information on their habitat. An additional section deals with how fungi live, feed, reproduce and spread and with their role in the ecosystem.

The coverage is much more comprehensive than the previous Collins' guide and indeed than any other popular book. It also contains more information on each fungus and general family characteristics are given which is something that has never been consistently done in any popular book before. It is however rather cramped. The type-face is small and the lay-out poor. For example the family characteristics are often separated from the illustration of members of the family. Because so many fungi are illustrated however I think it is a useful field guide for those of us who have a poor memory for names, but I would have preferred the section on natural history to be detachable as one does not want to carry around in the field all this additional information.

The drawings though small are accurate, though I would still recommend Roger Phillip's book for beginners as here several examples of each fungus are shown which helps beginners (and others!) by showing the range of types and of key characters. Phillip's book has the disadvantage however of being too large to take out on the field.

For those who wish to take field identification seriously I would strongly recommend this book which is good value at £8.95.

AGNES WALKER

### **Rare Birds in Britain and Ireland**

J. N. DYMOND, P. A. FRASER and S. J. M. GANTLETT  
T. & A. D. Poyser, Calton, 1989, 366 pp., many line drawings  
and maps. Hardback, ISBN 085661 053 4, £19.00.

This book by three rare bird specialists, combines and updates information in all preceding publications. Including the analysis of 45,000 records from 1958-'85, it gives full information on the normal range and the occurrence in Britain and Ireland of more than 300 species. Each, except the rarest, which have all records documented, is illustrated by histograms and distribution maps, which give a clear picture of when, where and in what numbers it has been recorded, followed by discussion of the results shown. The book is thus of interest, not only to rarity hunters, but to all interested in the changing patterns of occurrence and its wider implications which some of the results reveal. The line drawings of each species add greatly to the presentation of this excellent and comprehensive volume.

RUTH H. DOBSON

**Dace (*Leuciscus leuciscus*(L.)) and  
Chub (*Leuciscus cephalus* (L.)): New  
Introductions to the Loch Lomond  
Catchment**

**COLIN E. ADAMS, DAVID W. BROWN &  
ROGER TIPPETT**

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Glasgow G63 OAW.

Recent evidence suggests that the structure of the diverse fish community of Loch Lomond is undergoing dramatic change.

In 1983 the Ruffe (*Gymnocephalus cernua* (L.)) was first reported from Loch Lomond (Maitland et al., 1983). This species was unknown in Scotland prior to 1982. In the years following its introduction the Ruffe population increased dramatically. Of the total number of fish caught on the trash screens of the Ross Priory pumping station, Ruffe made up 8% (17 individuals) in 1982; by 1985 this had increased to 76% (2021 individuals). Ruffe may now be one of the most abundant fish in Loch Lomond (Maitland, 1987).

In addition to Ruffe, Gudgeon (*Gobio gobio* (L.)), which were introduced to a small loch in the Loch Lomond catchment, found their way into the River Endrick (the main southerly tributary of Loch Lomond), where they are now breeding and well established (Maitland et al., 1983; Maitland, 1987).

This paper confirms the presence of two further fish species, Dace (*Leuciscus leuciscus* (L.)) and Chub (*L. cephalus* (L.)) not previously recorded from Loch Lomond and outwith their reported range within the British Isles.

## Methods and Results

In response to reports of Dace and Chub in the River Endrick by anglers, the authors obtained specimens of these species at two sites in the lower reaches of the River Endrick. Species identification follows the criteria of Maitland (1972) throughout.

Dace *Leuciscus leuciscus* (Fig. 1): 6 juvenile Dace were obtained by electric fishing in shallows over an area of c. 100 sq. m. (Site 1: N.G.R. NS 472 873) on 26th Oct. 1987. These fish had a fork-length of 45-52 mm. Although direct age estimation was not attempted on these small fish, fork-lengths are consistent with their being less than one year old (Mann, 1974; Wheeler, 1969).

To establish if older age groups were present in the River Endrick, a neighbouring site (Site 2: N.G.R. NS 474 876) was fished with rod and line on 15th May 1988. Fifteen Dace were caught in all. Two were caught from a shoal of several hundred which were basking in slow-flowing, shallow (c. 30 cm) water over a sandy substrate. Observations suggested that this shoal was principally composed of fish of the genus *Leuciscus*, probably Dace. The remainder were obtained from deeper water (c. 2m) over a silt substrate overhung by bank-side vegetation. Fork-length of all fish ranged from 150-230mm. Four fish were retained for age determination using scales (Mann, 1974) and otoliths, in addition to length and weight measurements. These data are shown in Table 1.

**Table 1** The fork-length, weight (blotted dry) and age (estimated from scales and otoliths) of 4 Dace caught on rod and line from the River Endrick on 15th May 1988.

Fork-length mm	Weight g	Age yrs
228	154	5
230	151	5
170	52	4
170	58	4

Chub *Leuciscus cephalus* (Fig. 2): two specimens of this species (fork-lengths 225 and 170mm) were collected by rod-and-line fishing at site 2 on 15th May 1988. They were caught in slow-flowing water around 2m deep close to the bank under overhanging vegetation. The larger fish was determined to be 5 years old by scale analysis (Cragg-Hine and Jones, 1969).

## Discussion

It seems likely that an established, breeding population of Dace exists in the River Endrick. This is suggested by the presence of both large numbers of juvenile fish and fish of over 4 years old. Mann

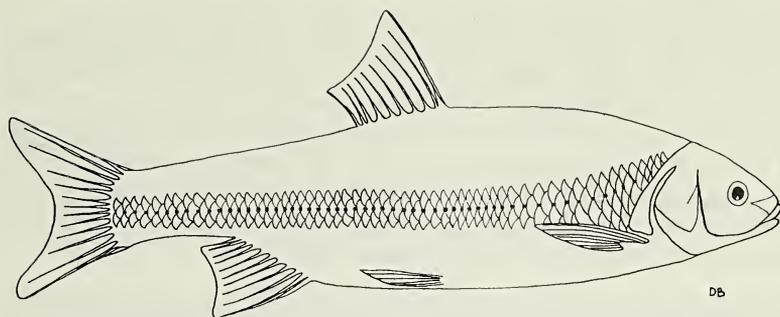


Figure 1 Dace *Leuciscus leuciscus* (L.)

3 cm

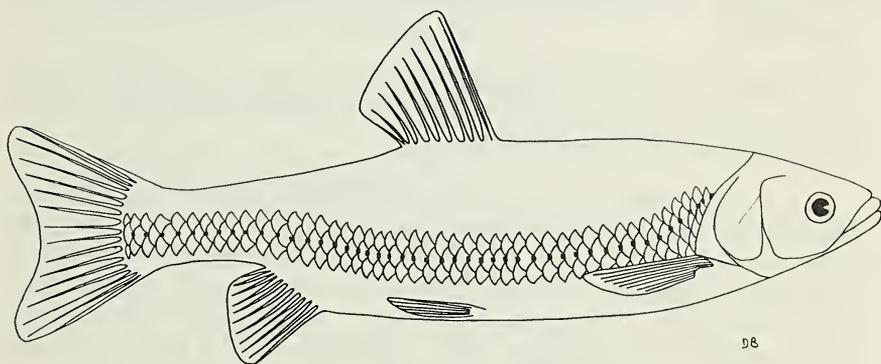


Figure 2 Chub *Leuciscus cephalus* (L.)

3 cm

(1974) has shown that the majority of Dace become sexually mature within 4 years.

This record extends the reported range of this species in Britain northwards. The only other reported population in Scotland is in the River Tweed (Maitland, 1977). In the west its previously reported range extends as far north as Cumbria (Maitland, 1972). Conditions in the River Endrick do not appear to be limiting growth of this species. For example the fork-lengths of Dace collected at this site were consistently longer than the mean for Dace of the same age obtained from rivers in Dorset (Mann, 1974).

Although there is less information on the abundance of Chub, it seems very likely that this species is also well established in the River Endrick. Sexual maturity commonly occurs at 3-4 years of age in male Chub, therefore the 5 years old male fish recorded here would be of breeding age. However, it is known that spawning is unlikely to occur in waters at less than 15°C (Wheeler, 1969). In the River Endrick, water temperature only consistently exceeds 15°C for a short period in the summer (usually in July and August) (unpublished data & Maitland, 1966), and low temperatures for much of the year may hinder successful breeding of this species there. Further data are required to assess fully the breeding status of this population.

Until now Chub have been recorded only as far north as south Dumfriesshire, where populations are known from the River Annan and Castle Loch, Lochmaben.

Confirmation of the presence of Dace and Chub brings the total number of recently introduced fish species which have become established in the Loch Lomond catchment to four. Welcomme (1986) has highlighted 5 potential ways in which such populations may adversely affect existing fish populations: I) disease introduction; II) predation; III) competition; IV) environmental changes; V) gene pool changes.

Both Dace and Chub are known to compete for food with young Salmon and Trout and Chub are known to eat parr when available (Wheeler, 1969). Although there is no information available on the effects of exotic fish populations on the community in Loch Lomond, there is cause for concern for the future of the excellent Salmon and Trout fishery and for the future of the rare population of Powan (*Coregonus lavaretus* (L.)) in Loch Lomond.

## Acknowledgments

We would like to thank Mr Stuart Little for his assistance in obtaining specimens.

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## Book Reviews

### **Red Deer in the Highlands**

T. H. CLUTTON-BROCK and S. D. ALBON

BSP Professional Books, Oxford, London, Edinburgh, Boston, Melbourne, 1989, 260 pp., many drawings, black and white photographs, tables, graphs. Hardback, ISBN 0 632 02244 2, £24.50.

This is a fine work of scholarship intended for serious students of animal behaviour, population ecology and wild life biology and for those concerned with ungulate management. It presents an up-to-date synthesis of the ecology of the Red Deer in the Highlands and deals concisely with populations, social behaviour, reproduction, growth, survival, feeding and habitat use, density, effects of weather, deer in commercial forests and deer research and management. Appendices deal with statistical matters concerning population estimates and variations. The text is clearly written with a minimum of technical jargon and copious references follow each chapter arranged in the order of mention in the text. This is a minor fault: an alphabetical arrangement of all references at the end of the book would have avoided repetition and made their use easier.

RONALD M. DOBSON

### **Butterflies and Day-Flying Moths of Britain and Europe**

MICHAEL CHINERY

Collins, London, 1989, 315 pp and index, numerous colour illustrations and maps. Paperback ISBN 0-00-219787-1, £8.95.

This volume is the latest in Collins' New Generation Guide series and can be regarded as the successor to the publisher's *Field Guide to the Butterflies of Britain and Europe*. The text covering butterflies is more condensed than in the older book, but the format is more convenient, in that for each species the text, distribution map and illustrations are on the same or opposite page. The beautifully reproduced paintings are by expert artists and include likenesses of the earlier stages in most cases. These are useful, though accurate identification of many larvae and pupae is notoriously difficult in practice. In the moth section the burnets, clearwings, tigers and other large species are satisfactorily covered. It would be difficult to do justice to the "micros", which receive relatively scant treatment. The book cannot be recommended for these.

Over a third of the pages are devoted to the natural history of Lepidoptera, and this section is ably written and illustrated. Many interesting aspects are covered in plain, lucid English, so that the book would be well worth its price simply as an introduction to the subject. Excellent for holiday reading.

IAIN C. CHRISTIE

## First Record of the Spoon-worm *Thalassema thalassemum* (Pallas), Echiura, in Scottish Waters

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Most of the sea-bottom of the Firth of Clyde consists of soft sediments, mainly silty clays (Deegan *et al.*, 1973). Amongst the exceptions to this is the "hard ground" in the Fairlie Channel between the southern end of Great Cumbrae and the Ayrshire mainland where slag and cinders dumped from coal-burning steamers over many decades have fused with stones and shells to form rock-like aggregations usually referred to as "clinker". Despite its artificial origin, this substrate has been colonised by a highly diverse fauna of both sessile and free-living animals, including many crevice- and hole-dwelling forms which take advantage of the irregular cavities in the clinker. Consequently it is often sampled to provide material for the study of sublittoral benthic communities by classes at the University Marine Biological Station, Millport (UMBSM).

While examining clinker collected by beam-trawl from 20 fathoms on 10th June 1988, I discovered a single specimen of the spoon-worm *Thalassema thalassemum* (Pallas, 1766) (formerly *T. neptuni* Gaertner). Spoon-worms (phylum Echiura) are thought to be closely related to segmented annelid worms. They have an unsegmented sac-like body with a single pair of chitinous hooks near the mouth and, most characteristically, a gutter-shaped proboscis which can be protruded for feeding purposes or retracted back into the body (when partly everted it can have a spoon-like appearance) (Fig 1a). The body of this specimen (Fig. 1b) was 27mm

long, pink with a bluish tinge except for the posterior one third which was a clean white; the proboscis was creamy white. The living animal exuded continuously a clear, viscous mucus.

This is the second species of echiuran known to occur in the Firth of Clyde. *Maxmuelleria lankesteri* (Herdman) has also been found (Stephen, 1934; C. Edwards, unpublished records in UMBSM; R. J. A. Atkinson, pers. comm.) but is quite distinct with an apple green body and light green proboscis (Stephen & Edmonds, 1972). Also, like most echiurans *M. lankesteri* excavates burrows in soft sediments, whereas *T. thalasseum* is a typical crevice-dweller

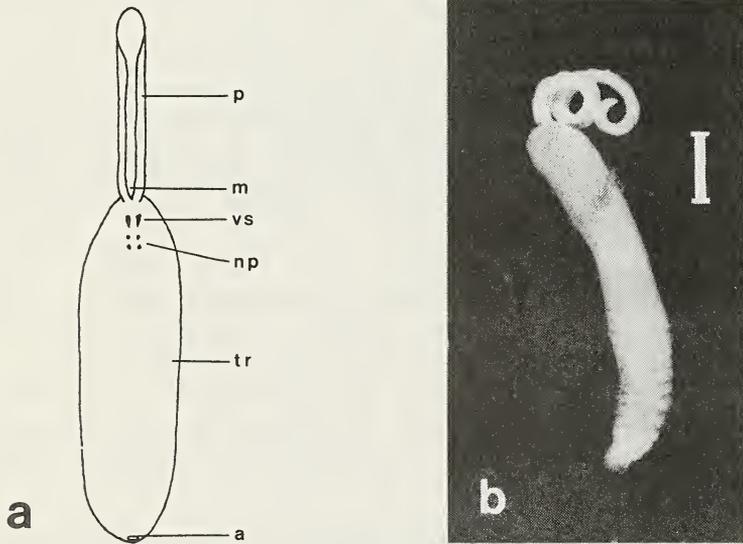


Fig. 1a Generalised diagram of the external features of an echiuran (belonging, like *T. thalasseum*, to the family Echiuridae). *a*, anus; *m*, mouth; *np*, nephridiopores (openings through which eggs or spermatozoa pass to exterior); *p*, proboscis; *tr*, trunk; *vs*, ventral setae (chitinised hooks).

Fig. 1b *T. thalasseum* from the Firth of Clyde, photographed after preservation in neutral buffered formalin. Note the protruded proboscis (arrow). Bar = 5mm.

(Cuénot, 1922). The individual under discussion came to light only when a piece of clinker was broken apart and it was accompanied by other crevice-dwellers such as terebellid worms, the brittlestar *Ophiopholis aculeata* (L.), and the scale-worm *Lepidonotus squamatus* (L.).

*T. thalasseum* occurs on the coasts of Japan, Louisiana, the Mediterranean, Sierra Leone, and France (Mathew, 1976). In the British Isles it was previously known only from the south and west coasts of Ireland (Stephen, 1960), Strangford Lough (Northern Ireland) (Williams, 1954), Devon and Cornwall (Forbes, 1841, and later records), Pembrokeshire (Crothers, 1966), and the Isle of Man (Bruce *et al.*, 1963). This find therefore extends the northern limit of the species in British waters. Its presence in the clinker of the Firth of Clyde is a further indication of the faunal richness of this habitat and should encourage further investigation of it.

The specimen is retained in the author's collection at Glasgow College of Technology.

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## Book Review

### **Adults of the British Aquatic Hemiptera Heteroptera: a Key with Ecological Notes**

A. A. SAVAGE

Freshwater Biological Association, Ambleside, Scientific Publication No 50, 1989, New Edition 173 pp., 81 figures. Softback, ISBN 0 900386 48 7, ISSN 0367-1887, £10.00.

This new edition is a revised and augmented version of T. T. Macan's earlier publication, which has been in use for about a quarter of a century. An opportunity has been taken to make numerous detailed changes in the text and to re-arrange the illustrations and increase their number.

The introductory part includes a description of the general structure of the insects along with an explanation of the morphological terms used in the keys. There follows an account of the classification of the aquatic Heteroptera with an accompanying check list; useful instructions on the preservation and examination of specimens complete this section of the book. The keys to the families and species are well constructed and are provided with appropriate illustrations of a very high quality. Included is a new species of special interest to Scottish naturalists, while another species is established as a member of the indigenous fauna of Britain. An informative section on the ecology of aquatic bugs occupies about a quarter of the entire volume and is a most welcome addition because of the considerable increase in our knowledge of this aspect of the biology of the group. It includes information on life cycles, geographical and ecological distribution, eco-physiology and behaviour, feeding and diet, predation, parasitism, flight polymorphism, ovogenesis, migration and community studies. A list of 175 references and an index conclude the work.

Dr. Savage and the Freshwater Biological Association are to be congratulated on producing such a useful book which it is hoped will encourage more naturalists to take an interest in this fascinating group of bugs.

A. R. HILL

## Records of the Whiskered Bat, *Myotis mystacinus* (Kuhl), from Scotland.

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<sup>2</sup>Department of Zoology, University of Edinburgh, West Mains Road, Edinburgh.

The Whiskered bat, *Myotis mystacinus* (Kuhl), is distributed across the Palaearctic from Ireland to Japan, north to about 65° latitude in mainland Europe (Corbet, 1978). Brandt's bat, *Myotis brandti* (Eversmann), was demonstrated to be specifically distinct from the Whiskered bat by Gauckler and Kraus (1970). According to Corbet (1978) this species is also widely distributed in Europe from Britain to the Urals. Consequently any records of Whiskered bats previous to 1970 cannot be allocated with certainty to either species unless a specimen is still available for examination.

The Whiskered bat has a wide distribution in England and Wales but prior to 1960 there were only two accepted records of Whiskered or Brandt's bat for Scotland (Arnold, 1984). A third, post-1960, record which is shown on the Biological Records Centre map is an error (H. Arnold, pers. comm.). The two old records and another spurious one were discussed by Barrett-Hamilton (1910). Both of these old records, from four miles east of Rannoch in Perthshire and from one mile east of Dunbar in East Lothian, are represented by extant museum specimens.

The Perthshire specimen, a male skin and skull, was captured by J. Ray Hardy in June 1874 (Evans, 1892) and was therefore considered to be the first record of this species for Scotland. It was formerly in the collection of Owen's College, Manchester, but is now

in that of Perth Museum and Art Gallery. This specimen has now been identified as a Brandt's bat (M. Taylor, pers. comm.).

The Dunbar specimen is a whole adult male, preserved in spirit, in the collection of the Department of Natural History of the National Museums of Scotland, formerly the Royal Scottish Museum (reg. no. NMSZ 1988.031). According to William Evans (1893), it was taken on 20th March 1893 "on the links about a mile east of Dunbar" and given to George Pow, who passed it on to Evans. He then gave it to Eagle Clarke of the RSM and together they identified it as a Whiskered bat, the second Scottish record. Examination of this specimen by the authors and by Henry Arnold of the Institute of Terrestrial Ecology has shown it to be a Daubenton's bat, *Myotis daubentoni* (Kuhl).

Neither of the old records in fact being of Whiskered bats, the first substantiated record of this species in Scotland is a dead juvenile which was found below a small roost of about 20 Pipistrelles, *Pipistrellus pipistrellus* (Schreber), in the Borders during the summer of 1987. (A. Panter, pers. comm.). No other Whiskered bats were present in the roost. A second dead individual, a female, was collected in July 1988 near Annan in Dumfriesshire. This specimen is now in the Stebbings collection housed in the National Museums of Scotland (reg. no. NMSZ 1988.049.001).

On 20th June 1988 a male Whiskered bat was found roosting on a rafter at the apex of the roof of an old country house near Gorebridge in Midlothian. This building is also frequented by Long-eared bats, *Plecotus auritus* (Linnaeus). No other Whiskered bats could be found roosting despite a thorough search of the roofspace, however many parts of the roof are inaccessible from inside the building. At dusk of the same evening and on subsequent nights bats were seen leaving from and flying close to the eaves near to where the Whiskered bat was found but capture of any for positive identification was not possible due to the excessive height of the house.

The appearance and flight pattern of these bats were consistent with that of Whiskered bats and certainly precluded their being either the Long-eared bats, which could also be recognised leaving the eaves of the building, or Pipistrelles which have been noted flying in the area. Further evidence that these bats were Whiskered bats and not Long-eared bats or Pipistrelles was provided by listening to the

echolocation signals emitted by them in flight using a Skye Instruments "bat detector". The optimum response was heard when the detector was set at 55 KHz, whereas Pipistrelles gave an optimum response at 40 KHz using this instrument. At the range at which the detector was being used, the weak echolocation signals from Long-eared bats are not audible.

In the summer of 1987 over 50 bats which were not Long-eared bats had been seen to fly out of this building. At the time it was thought that these were probably Pipistrelles, however it is now tempting to suggest that this is the first building in Scotland which is thought to be used by a colony of Whiskered bats.

On the limited amount of evidence presently available, it would seem that the Whiskered bat occurs rarely only in the southern part of Scotland. Even with the current high level of interest in bats in South and Central Scotland, very few of these bats have been found. In summer this species often forms nursery roosts in buildings (Stebbing and Griffith, 1986). If it were more common here it would probably have been found more frequently as several hundred roosts in Scottish houses have been examined in recent years. The same conclusion may well apply to Brandt's bat which has similar roosting habits.

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## Book Reviews

### **Birds in Ireland**

by CLIVE D. HUTCHISON

T. & A. D. Poyser Ltd., Calton, 1989, 215 pp., numerous drawings, graphs and maps. Hardback, ISBN 0 85661 0526, £19.00.

*Birds in Ireland* is a summary of all species recorded from that island, giving information on status and distribution. Accounts of species range from a full page or more to just a few lines for rare occurrences. There are distribution maps for some, but not all species. This is virtually a companion book to *Birds In Scotland* and in some ways is an improvement on that volume *viz.* maps and data presentation. For its thoroughness and usefulness this book represents excellent value for money and is a must for ornithologists visiting Ireland.

B. ZONFRILLO

### **The Value of Birds**

A. W. DIAMOND and F. L. FILION (Eds.)

I. C. B. P. Technical Publication No. 6, Cambridge, 1987, 267 pp., maps, graphs, diagrams. Softback, ISBN 0 946888 108, £18.50.

This publication is based on the results of a symposium on the subject in Canada in 1986. It looks at the cash value as well as cultural importance to human populations of their birds. It mainly deals with the socio-economic resource value of birds from various countries around the world. There are diverse papers on subjects such as *Muttonbirding in Tasmania*, *Waterfowl as Bio-indicators*, *Acid Rain Effects on Waterfowl* and *Seabirds as indicators of Marine Pollution*. Although a fairly technical and learned discourse on birds, the chapters make interesting reading but perhaps highlight the fact that nowhere on earth seems safe from the deliberate or accidental ravages of mankind. For a not very thick paperback, the price of £18.50 seems excessive.

B. ZONFRILLO

## Observations on the Feeding Habits of the Commoner Animals associated with *Cladophora albida* (Huds.) Kütz in Rockpools

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Green algae of the genus *Cladophora* form a conspicuous fringe to rockpools in the Clyde Sea area; their tufted, branching growth form (Fig. 1) creating a sheltered microcosm for a myriad of minute organisms. Elsewhere we have examined the composition of the flora and fauna associated with *Cladophora albida* (Huds.) Kütz. in rockpools from Great Cumbrae Is., Firth of Clyde (Preston & Moore, 1988), its seasonal variation (Preston & Moore, 1989) and temporal aspects of the most diverse group, the harpacticoid copepods (Preston & Moore, in prep.). These contributions alluded to micrograzing as a food gathering technique prevalent amongst this meiofauna (see also Jansson, 1967). Here we examine in detail what is known about the food and feeding habits of species within this association. New data are provided based on direct observations of feeding behaviour and on analyses of gut (or faecal) contents.

### Materials and Methods

Sampling site descriptions and sample processing techniques are detailed extensively in Preston & Moore (1988).

Qualitative information on food items consumed by identified

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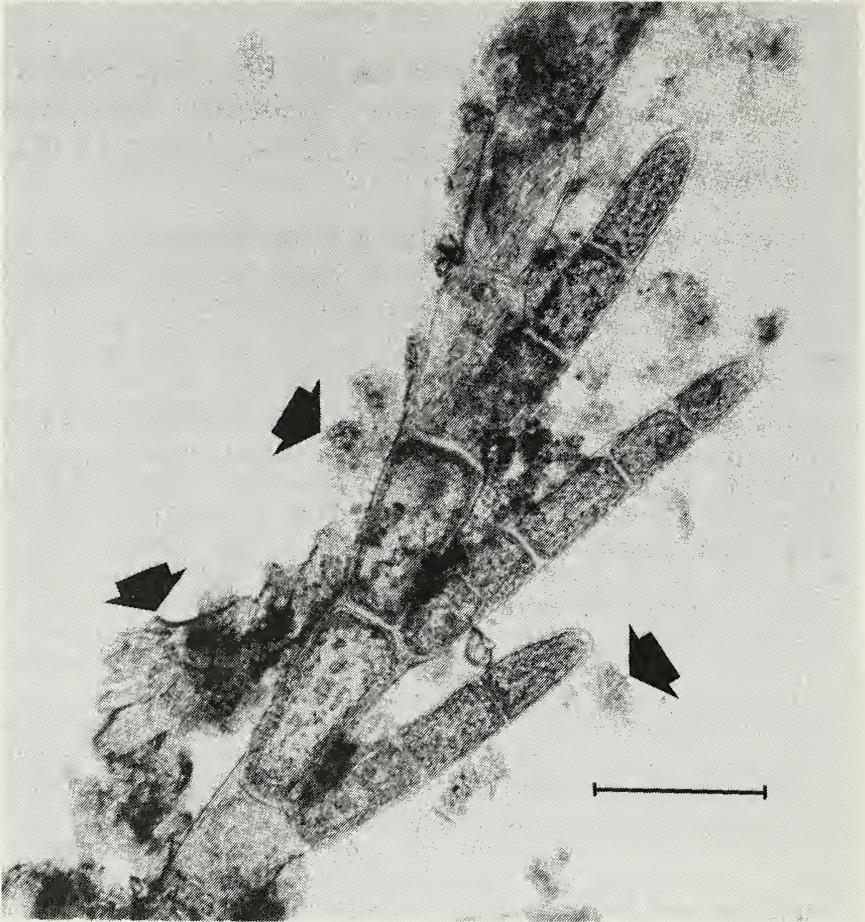


Fig. 1 *Cladophora albida* filament showing pattern of branching and coverage of cell surfaces by micro-epiphytes and detritus (arrows). Bar line = 0.1 mm.

species was collected by one or more of the following methods: a) direct observation of feeding behaviour, b) examination of gut contents and c) the collection and examination of faecal pellets.

For direct observations of feeding behaviour, individuals were placed in a Petri dish with 3 or 4 pieces of *Cladophora* filament (each 1 cm long), with and without epiphytes. Observations were made using a binocular microscope. The gut contents of the more

transparent animals, eg. archiannelids and turbellarians, were examined by restraining live animals in water on a slide under a coverslip supported by a fragment of lens tissue. Microscopical observation of restrained living animals greatly facilitated the understanding of gut structure and function. For the collection of faecal pellets, experimental animals were placed in *ca* 2ml of sea water in the cups of a clear plastic microtitre plate. Groups of up to 10 animals were used in each assessment, except in the case of harpacticoid copepods and turbellarians which were treated individually. This was done because of the greater difficulty of obtaining precise identification beforehand. In such cases, identification was established after the trial. Each animal, or group of animals, was supplied with filaments of *Cladophora* bearing a variety of epiphytes. A clean circular coverslip was placed at the bottom of each depression so that any pellets produced accumulated on it. After 3-4 days, the animals and algal filaments were removed and the seawater gently pipetted out. The coverslip was then removed, placed on a microscope slide for support, and covered with a fresh coverslip (allowing examination from either side). Faecal squashes were examined under a high-power compound microscope.

## Results

The results of this study, supplemented with data from the literature, are presented in Table 1.

Within the *Cladophora* ecosystem, energy for animals is available from a variety of sources: dissolved organic matter (DOM); suspended particulate organic matter (SPOM); deposited detritus trapped among the plant's filaments; living epiphytes in the form of bacteria, Fungi, diatoms, Cyanobacteria (= blue-green algae), red and green filamentous algae; the cell sap of both the *Cladophora* host and its epiphytes; the *Cladophora* host tissue in its entirety; the microfauna (protozoans & rotifers) and finally the meiofauna and macrofauna.

Notable from the data presented in Table 1 is that many species within the *Cladophora* fauna consume food from more than one of these categories. Taking categories in turn, DOM is likely to play an important, if largely unknown, role in the nutrition of meiofaunal sized animals (see e.g. Chia & Warwick, 1969). Even sessile colonists of macro-algae, like bryozoans, may supplement a particulate diet by

**Table 1. The feeding habits of animal species associated with the green alga *Cladophora albida*.**

Species	Present findings	Literature
Turbellaria <i>Provortex</i> sp.	3 individuals, very small green granules in the guts, possibly <i>Cladophora</i> pyrenoids	<i>P. balticus</i> diet includes ciliates, rotifers, cyanophyta but mostly diatoms (Jansson, 1966)
<i>Pseudostomum quadrioculatum</i> (Leukhart)	2 individuals, guts filled with green granules, a single <i>Cocconeis</i> frustule found	—
<i>Plagiostomum vittatum</i> (Leukhart)	1 individual observed drawing suspended particles towards its mouth	—
<i>Monocelis</i> sp.	—	diatoms, oligochaetes, turbellarians in the gut of <i>M. lineata</i> (Luther, 1960). Seen sucking dead oligochaetes (Straarup, 1970)
Nematoda <i>Enoplus communis</i> (Bastian)	—	omnivorous with a latent predatory capacity (Moore, 1971)
Euchromadoridae	—	epigrowth feeders (Warwick, 1977)
Archiannelida <i>Nerilla antennata</i> Schmidt	—	diatoms and detritus (Remane, 1932); organic debris, algae, Protozoa and bacteria (Gelder & Uglow, 1973)
<i>Dinophilus</i> sp.	11 individuals, mainly <i>Cocconeis</i> and most other diatom spp. in gut	<i>D. gryrociliatus</i> microphagous, feeds on bacteria, unicellular algae, diatoms and organic detritus (Jennings & Gelder, 1969)
Polychaeta <i>Fabricia sabella</i> (Ehrenberg)	—	suspension feeder (Lewis, 1968)
Mollusca <i>Limapontia capitata</i> (O.F.Müller)	No faecal pellets ever observed	green algae (Miller, 1961); <i>Cladophora</i> , <i>Enteromorpha</i> (Miller, 1962); <i>Cladophora</i> , <i>Chaetomorpha</i> , <i>Bryopsis</i> (Jensen, 1975); cell sap of <i>Cladophora</i> (Jensen, 1976)

Table 1 cont'd

Species	Present findings	Literature
<i>Skeneopsis planorbis</i> (Fabricius)	6 individuals, faeces contained <i>Cladophora</i> pyrenoids, most diatom species (though very few <i>Rhabdonema</i> frustules)	diatoms and algal cells (Fretter, 1948)
Rissoidea	—	diatoms, detritus, algal fragments (Fretter & Graham, 1962)
Ostracoda <i>Semicytherura nigrescens</i> (Baird)	5 individuals, faeces contained most small diatom species. <i>Cocconeis</i> especially abundant	diatom frustules found in stomach (Müller, 1894); epiphytic algae and diatoms? (Elofson, 1941)
<i>Paradoxostoma variable</i> (Baird)	no faecal pellets ever observed	feeds by sucking juices from algae (Elofson, 1941)
<i>Hirschmannia viridis</i> (O. F. Müller)	6 individuals, faeces contained most small diatoms, <i>Cocconeis</i> and <i>Amphipleura</i> being most abundant	—
Copepoda Algal-dwelling harpacticoids in general	—	herbivorous (Lang, 1948), feeding on unicellular algae attached to larger algae: some spp. may also suck plant juices
<i>Harpacticus gracilis</i> Claus	9 individuals, faeces contained larger diatoms, detritus, copepod nauplii remains. Pellets often completely composed of diatom frustules	—
<i>H. obscurus</i> T. Scott	1 individual, faeces contained most diatom spp. in a granular matrix	—
<i>Dactylopodia vulgaris</i> (G. O. Sars)	19 individuals, faecal pellets contained mostly <i>Cocconeis</i> and <i>Fragillaria</i> and other small diatoms in a granular matrix	—

Table 1 cont'd

Species	Present findings	Literature
<i>Parastenhelia spinosa</i> (Fischer)	6 individuals, faeces contained small diatom frustules and much detritus	—
<i>Laophonte setosa</i> Boeck	11 individuals, faeces contained mainly long thin diatoms <i>Amphipleura</i> and <i>Fragillaria</i> being especially abundant	—
<i>Amphiascus obscurus</i> (Sars)	4 individuals, faeces contained diatoms and cyanobacteria in a granular matrix, also <i>Cladophora</i> zoospores and copepod nauplius larva	—
<i>Mesochra pygmaea</i> (Claus)	1 individual, faeces contained small diatoms in a granular matrix	—
<i>Robertsonia celtica</i> (Monard)	ditto	
<i>Tisbe furcata</i> (Baird)	—	cultured on many foods esp. successful on thin slices of fresh seaweed and dehydrated kelp: probably a scavenger (Johnson & Olson, 1948)
<i>Tachidius (discipes)</i>	—	survived in culture on rotting <i>Cladophora</i> filaments (Jansson, 1967)
Tanaidacea		
<i>Tanais dulongii</i> (Audouin)	3 individuals, faeces contained diatoms, fragments of plant filaments and possible copepod remains	microscopic epiphytes and pennatulata diatoms (Johnson & Attramadal, 1982 as <i>T. cavolinii</i> )
Isopoda		
<i>Idotea pelagica</i> Leach	9 individuals, faeces composed of whole and fragmented diatoms, cell wall fragments, cell contents and chains of whole <i>Cladophora</i> cells	<i>Idotea (baltica)</i> survival rates in culture higher with diatoms than with algal filaments only (Jansson, 1967)

Table 1 cont'd

Species	Present findings	Literature
<i>Idotea</i> sp. juveniles	—	diatoms consumed (Naylor, 1955)
Amphipoda		
<i>Hyale nilssoni</i> (Rathke)	6 individuals, faeces contained whole and fragmented diatoms and <i>Cladophora</i> cell wall fragments, cell contents and chains of 2-3 cells. Often observed grazing the epiphytic flora on <i>Cladophora</i> .	consumes <i>Pelvetia</i> , diatoms and a wide variety of weeds (Moore, 1977)
<i>Apherusa jurinei</i> (Milne-Edwards)	10 individuals, faeces contained all epiphytic species plus <i>Cladophora</i> cell debris (walls and contents)	—
<i>Gammarus</i> sp.	5 individuals, faeces contained fragmented diatoms, <i>Cladophora</i> cell wall debris and cell contents	—
Insecta, Chironomidae		
<i>Halocladius</i> sp. (larvae)	5 individuals, faeces contained diatoms and cell wall fragments of <i>Cladophora</i> . Observed eating rotting tips of <i>Cladophora</i> filaments	chironomid larvae eat mainly diatoms, but also able to eat algal filaments (Jansson, 1967)
Acarina		
<i>Thalassarachna basteri</i> (Johnson)	—	carnivorous (Viets, 1927); eats other halacarids, oligochaetes, polychaetes, small amphipods and its own eggs (Green & Macquitty, 1987)
Rhombognathinae	no faecal pellets ever found	fluid-feeding species, sucking cell sap by means of stylet-like mouthparts (Viets, 1927); algivorous (Green & Macquitty, 1987)

absorbing DOM from host plant exudates (de Burgh & Fankboner, 1979). DOM may also be adsorbed onto the surface of detrital particles, making it available to suspension- and deposit-feeders (Khailov & Finenko, 1970). The role of DOM in the present context might therefore be significant, although it cannot be assessed adequately at present.

SPOM is utilized by sessile (or semi-sessile) suspension-feeders whose exploitation of the *Cladophora* plant is only as a place of attachment. Such animals as *Leucosolenia* sp., *Coryne vanbenedeni*, *Janua pagenstecheri*, *Fabricia sabella*, *Mytilus edulis*, *Lasaea rubra* and *Bowerbankia* sp. are not exclusively phytal species.

Trapped organic detritus (Jansson, 1974) is a food source that is exploited widely by nematodes and harpacticoid copepods. It is, however, the epiphytic microflora which is the most important food source for the archiannelid *Dinophilus* sp., the prosobranch *Skeneopsis planorbis*, the ostracods *Semicytherura nigrescens* and *Hirschmannia viridis* and the harpacticoids *Harpacticus gracilis*, *H. obscurus*, *Laophonte setosa*, *Dactylopodia vulgaris*, *Parastenhelia spinosa*, *Mesochra pygmaea*, *Amphiascus obscurus*, *A. minutus* and *Robertsonia celtica*. All these species consume micro-epiphytes only, as distinct from that group of species which consumes both micro-epiphytes and larger algal filaments.

Sap-sucking is associated in the literature with the ascoglossan *Limapontia capitata*, the ostracod *Paradoxostoma variabile* and halacarids of the genus *Rhombognathides*. No direct observations were made on these species in the present study, but the fact that no faeces were ever collected from them lends credence to supposed fluid-feeding. *Paradoxostoma* spp. may not confine their fluid-feeding to exploiting the cell sap of algae. Horne & Whittaker (1985) drew attention to the observation of Elofson (1941) that they may also feed on dead animal tissues.

*Cladophora* filaments themselves (plus associated micro-epiphytes) were consumed by larger crustaceans within the association, for example the amphipods *Hyale nilssoni*, *Stenothoe monoculoides*, *Apherusa jurinei* and *Gammarus* sp., the isopod *Idotea pelagica* and the tanaid *Tanais dulongii*, but also by the largest crustacean in the pool environment beyond the weed tuft, the prawn *Palaemon elegans*. Chironomid larvae also came into this feeding category.

Microfauna consumers were probably mainly the turbellarians, in this context the eukalyptorhynchid sp. and *Monocelis* sp.

Predators of larger animals within this fauna were few. The mite *Thalassarachna basteri* and the nemerteans would probably take some small crustaceans and annelids. Predation, however, seems largely to stem from organisms outside the *Cladophora* association, ie. from species living at large within the rockpools or else invading them during periods of inundation at high tide. Such predators are mostly fish, eg. the butterfish *Pholis gunnellus*, various gobies and clingfish.

## Discussion

Caution must be exercised in interpreting the data to hand: a) since the remains of soft-bodied organisms in gut contents may not be readily discernible, b) identifiable objects may only have been ingested inadvertently and c) ingestion does not necessarily signify assimilation. Indeed some organisms may pass through an animal's gut unscathed (Mileikowsky, 1974; Porter, 1975). This said, our data have confirmed the prevalence of herbivorous species within the *Cladophora* fauna and, in particular, the great importance of the micro-epiphytic flora as a source of food (see also Preston & Moore, 1988, 1989, in prep.). Harpacticoid copepods, which account for one third of the total number of species in the association, utilize micro-epiphytes extensively for food. Trapped detritus is probably the next most important food type to the fauna. During the summer, when diatoms are scarce (Preston & Moore, 1989), harpacticoids and ostracods may be supported by this material (in addition to nematodes). Detritus not only provides food; it creates habitat, especially for nematodes, as well as tube-building material for *Fabricia sabella* and *Tanais dulongii*.

Although chironomid larvae together with some amphipods and isopods consume *Cladophora* filaments, the overall grazing pressure on the plant itself from animals within the system is low. The abrupt disappearance of the spring growth of *Cladophora* itself is probably attributable to the feeding activity of omnivorous *Palaemon elegans* (see Smaldon, 1979) which were observed in the laboratory consuming large quantities of these delicate new filaments. Interestingly, this situation stands in marked contrast to

that described for the *C. glomerata* fauna in the Baltic Sea (Jansson, 1974, Fig. 24) where grazing by large transient populations of juvenile *Idotea baltica* contributed to the actual disappearance of the *Cladophora* belt at the end of the summer.

The marked lack of predatory species within this fauna suggests that secondary transfer of energy to higher trophic levels takes place beyond the confines of the *Cladophora* vegetation, ie. in the wider environs of the rockpools.

That the greatest concentration of epiphytes was recorded at the distal tips of the *Cladophora* filaments (cf. Jansson, 1969, 1970 on *C. glomerata*) could simply be due to the light environment there being more conducive to photosynthesis. In part also, it could be an indirect result of grazing removal of epiphyte coverage from favoured proximal regions of the tuft which are more protected from external predators. Quite possibly, grazing and production are interactive in the sense that only at filament tips can the growth potential of epiphytes exceed removal by grazers.

Nocturnal activity by the meiofauna could be one means by which more productive distal filament tips might be exploited intermittently at least risk (see Gibbons, 1988). Small animals roaming by day over distal frond tips would presumably be more vulnerable to visual predators, such as fish (note Jansson, 1969; Coull & Wells, 1983). Though presently unknown, any diurnal cycles of activity of this meiofauna involving microspatial redistribution (cf. Ott, 1964; Jansson, 1970) might have considerable implications for energy flow.

Micrograzing is thus a process which dominates the meiofaunal ecology of this phytal system. The abrupt disappearance of many (or all) diatoms in early summer (Preston & Moore, 1989) is probably due to heavy grazing pressure in pools by microherbivores whose populations expand in spring (Preston & Moore, in prep.). The fact that during the summer, often the only epiphytes are Cyanobacteria suggests that these may well be relatively unpalatable to consumers (note Porter, 1977). Meiofaunal grazing may, however, be intense without damaging the host alga. Indeed, the converse may be true. Jansson (1974) attributed an important beneficial rôle to *Cladophora* grazers, that of "window cleaning" the host alga, ie. of promoting its photosynthesis by removing light-obscuring surface fouling

growths and competitors for nutrients (cf. also Nagle, 1968 on detritus removal in eelgrass systems).

The wide variety of energy sources available to the *Cladophora* association, combined with the small-scale geometry (large surface area) of this branching, filamentous (and perennial) weed, doubtless helps to explain the diversity of the faunal assemblage. The diversity of micro-epiphytes (Preston & Moore, 1988) could readily allow food partitioning by closely related species (see Jansson, 1969), eg. of harpacticoid copepods, and could explain how so many species of apparently similar feeding habits coexist successfully (Warwick, 1981).

Ultimately, the relative stability of this fauna (Preston & Moore, 1989, in prep.) may be due as much to the absence of a major *Cladophora*-consuming herbivore as to anything else. Thus *Limapontia capitata* though exploiting *Cladophora* directly (by sap sucking), does so without destroying it as a substratum (Miller, 1962; Jensen, 1976).

## Acknowledgment

A. P. wishes to thank the Department of Education for Northern Ireland for a research studentship.

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## Book Review

### **Ospreys: A Natural and Unnatural History**

ALAN F. POOLE

Cambridge University Press, 1989, 246 pages, black and white photographs, line drawings. Hardback, ISBN 0-521-30623-X, £17.50.

We in Scotland tend to be rather parochial about our fifty or so pairs of nesting Ospreys, so that this particular publication is a timely reminder that the species is virtually a world-wide citizen. Having emerged as a popular symbol for international wild-life conservation, the Osprey has understandably attracted a great deal of scientific attention over the last thirty years. In the present work the author skillfully takes an over-view of the resultant research literature on all aspects of the species biology, without losing the average reader in a plethora of bewildering statistics. Special mention must also be made of the fine line drawings and black and white photographs of Ospreys, especially of the utilisation of man-made structures for supporting their bulky nests. I assume that this remarkable close association with civilisation is what the author had in mind for the "unnatural" part of the Osprey's life history.

Although this well produced work will augment rather than displace the earlier well-thumbed *The Return of the Osprey* (1962) and *The Scottish Ospreys* (1979) on my own bookshelf, it can be thoroughly recommended to ornithological beginners and experts alike.

JOHN MITCHELL

## **A Check-list of the Freshwater Invertebrate Fauna of the Loch Lomond Catchment**

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Loch Lomond is Britain's largest area of freshwater. It is located 25 km north of Glasgow and crosses the Highland Boundary Fault. To the north the loch extends into the southern edge of the highlands, where the bed rocks are mainly schists/schistose grits (metamorphic rocks of the Dalradian series). In the south it spreads into the northern edge of the central lowlands, where the rocks are mainly sandstone of the Devonian age (MacDonald, 1974). The poorly weathering metamorphic rocks in the north tend to produce poor soils, with low pH streams and nutrient poor waters. The richer soils in the south produce streams of a higher pH and water relatively rich in nutrients. Thus the topographical and geological differences between the northern and southern extremes are reflected in chemical and biological differences in the two regions of the loch and its tributaries.

Over the past few years two projects based at the University Field Station, Rowardennan, have been collecting information on the plant and animal communities on Loch Lomondside.

From 1983 to 1986 flora and fauna surveys were made of a number of aquatic and terrestrial sites. Specimens were collected for inclusion in the Harry Slack Memorial Collection (H.S.M.C.) (Adams, 1984). From 1986 to 1987 the animal communities of 17 stream tributaries of Loch Lomond (Fig. 1) were regularly surveyed as part of a study on the effects of acidification in the catchment (Brown and Wardlaw 1989).

Data from both of these programmes form the basis of the check-list presented here. These have been supplemented by species records from published and unpublished work on specific freshwater habitats as far back as 1953, to form one extensive species check-list. Where available information on habitat type and location within the catchment is indicated together with a guide to abundance, however this should be regarded as very subjective owing to the lack of a quantitative definition of abundance categories used by authors.

The check-list is neither complete nor comprehensive. Sampling methods are selective and some sites have been subject to more intensive study than others. In addition records from taxonomically difficult groups where identification to species was not possible have been excluded and so such groups will be under-represented. Nevertheless it is an extensive list with around 450 of the approximately 3500 British freshwater invertebrate species (c. 13%) (Maitland, 1977). This richness of species in the Loch Lomond catchment reflects the wide range of habitats in the area.

The nomenclature adopted is that of Maitland's (1977) Coded Check-list of the Animals Occurring in Freshwater in the British Isles, except for the Coleoptera where the more accepted nomenclature of Kloet and Hincks (1977) has been followed. To avoid excessive repetition, records from flowing water sites have been combined within 4 geographical areas in the catchment: these are shown in Figure 1. Voucher specimens, where retained, have been included in the Harry Slack Memorial Collection (Adams, 1984) as indicated in the check-list.

#### **Collection Sites (see Fig. 1):**

##### **Standing Water:**

Balmaha Pond (BP): Nat. Grid ref. NS 422 908 — a small, shallow (c. 2 m), relatively nutrient-rich, disused works pond. Records source: Harry Slack Memorial Collection (H.S.M.C.) unpublished data.

Dubh Loch (DL): NS 376 965 — a small nutrient-poor loch on the Ross Peninsula. Maximum depth c. 10 m. Records source: H.S.M.C. (unpublished); Plankton — Islam (1987).

Fairy Loch (FL): NS 338 995 — a small, nutrient-poor hill lochan with very clear water, altitude c. 330 m, to the west of Loch Lomond catchment. Records source: H.S.M.C. (unpublished).

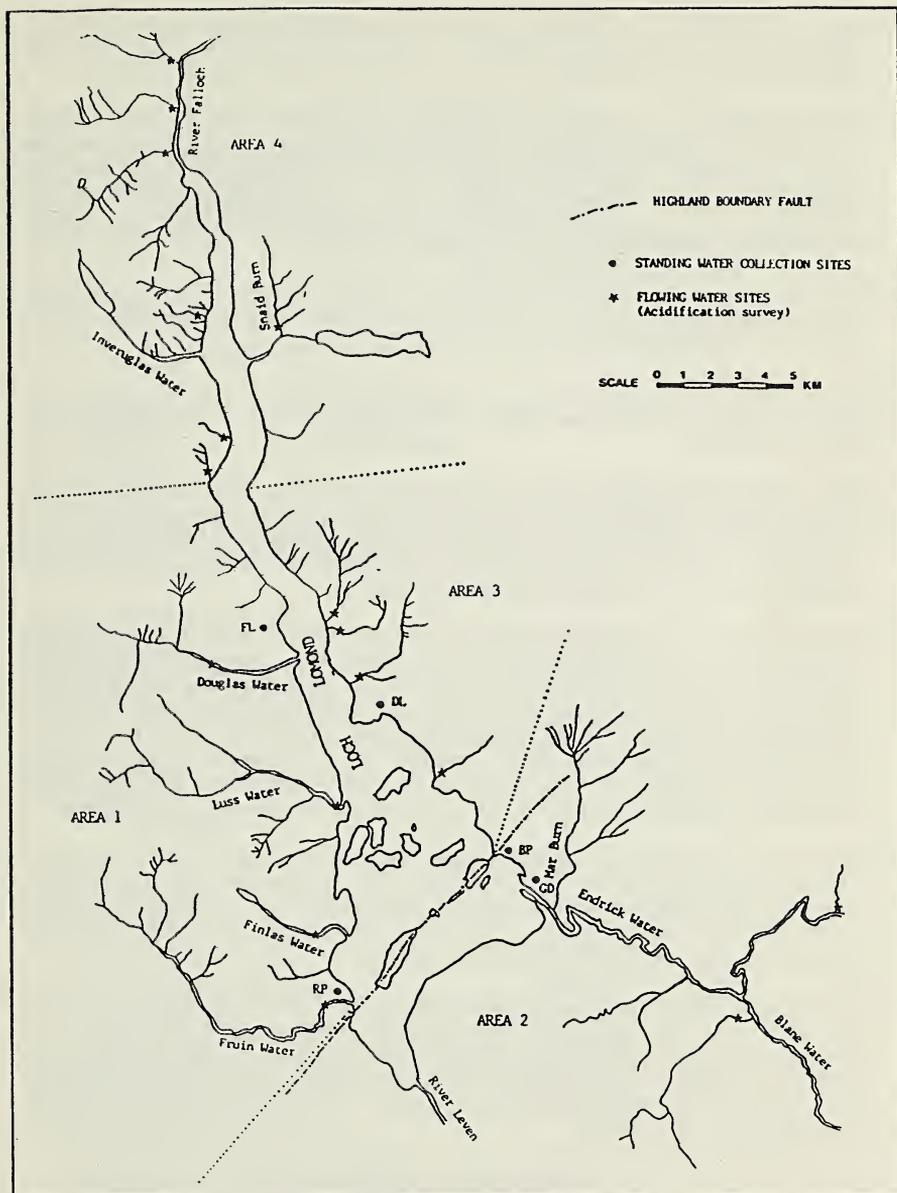


Figure 1 The location of collection sites in the Loch Lomond catchment. See text for site descriptions and key.

Great Drain (GD): NS 429 898 — an ancient drainage ditch, draining the low ground of the Crom Mhin peninsula to the north of the mouth of the River Endrick, into Loch Lomond. Records source: H.S.M.C. (unpublished).

Loch Lomond (LL): for detailed descriptions see e.g. Slack, 1957. For the purposes of this paper distinction has been made between fauna records from the deep water, profundal (Pro) benthos, the shallow water, littoral (Lt) benthos and planktonic species (Plank). Records source: Profundal — Slack (1965), Weerekoon (1953); Littoral — H.S.M.C. (unpublished), Smith et al. (1981); Plankton — Maitland et al. (1981), Tippett (1987).

Mid-Ross Gravel Pits (RP): NS 350-855 — disused gravel workings in the low ground adjacent to Loch Lomond and the Fruin Water. Records source: H.S.M.C. (unpublished).

Flowing water:

Figure 1 shows the four areas within which species records from flowing water sites were pooled.

Area 1: From Tarbet south to the western end of the Highland Boundary Fault.

The catchment here is nutrient-poor upland but there are several tributaries of Loch Lomond of moderate size. Records source: Brown and Wardlaw (1989) sampled 4 tributaries in this area (Fig. 1). Detailed site descriptions and water quality data are to be found in this reference.

Area 2: South of the Highland Boundary Fault (in the west and east of the catchment) but including the Mar Burn catchment in the east. The principal tributary of Loch Lomond in this area is the Endrick system, which drains the low-lying, improved farmland to the south east of the catchment. Records source: Maitland (1966) extensively surveyed numerous sites in the Endrick Water; Brown and Wardlaw (1989) examined 2 streams of the Endrick system (Fig. 1); H.S.M.C. (unpublished). Both Maitland (1966) and Brown and Wardlaw (1989) contain site descriptions and water quality data on the sites investigated.

Area 3: North of the eastern end of the Highland Boundary Fault to north of (and including) the Ardess Burn catchment. The tributaries in this mountainous area are mostly small torrential streams. Brown and Wardlaw (1989) examined 4 streams here (Fig. 1) and give details of water quality and individual sites. Records source: Brown and Wardlaw (1989).

Area 4: From Tarbet in the west and north of the Ardess catchment in the east (not included) northwards. Mountainous area with numerous small torrential stream tributaries and in the extreme north the River Falloch. Brown and Wardlaw (1989) give site descriptions and water quality information for 7 stream sites examined in this area. Records source: Brown and Wardlaw (1989); H.S.M.C. (unpublished).

### Check-list of species

In the following list species are arranged in systematic order along with data on their habitats and/or sites followed by notes on their distribution and/or abundance in the Loch Lomond catchment area. For economy in space the

following abbreviations and symbols have been used:

Habitats and sites (Fig. 1)

FW 1-4	= Flowing water in areas 1-4	BP	= Balmaha Pond
Lt	= Littoral zone	DL	= Dubh Loch
Pro	= Profundal zone	FL	= Fairy Loch
Plank	= Plankton	GD	= Great Drain
		LL	= Loch Lomond
		RP	= Mid-Ross Gravel Pits

Abundance and Distribution (letters in bold type)

+	= Recorded	<b>O</b>	= Occasional	<b>L</b>	= Local
<b>A</b>	= Abundant	<b>R</b>	= Rare	<b>W</b>	= Widespread
<b>C</b>	= Common	<b>U</b>	= Uncommon		
<b>F</b>	= Frequent				

(V) following a specific name indicates that a voucher specimen has been retained in the Harry Slack Memorial Collection.

**PORIFERA**

DESMOSPONGIAE

SPONGILLIDAE

<i>Spongilla lacustris</i> (L.)	LL(Pro)- <b>L,C</b>
<i>Ephydatia fluviatilis</i> (L.)	FW2- <b>L,C</b>

**COELENTERATA**

HYDROZOA

HYDRIDAE

<i>Hydra attenuata</i> Pallas	FW2- <b>L,A</b> ; LL(Pro)- <b>L,C</b>
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**PLATYHELMINTHES**

TURBELLARIA

TRICLADIDA

PLANARIIDAE

<i>Planaria torva</i> (Muller)	LL(Lt)- <b>F</b>
<i>Polycelis nigra</i> (Muller)	FW2- <b>L,C</b> ; LL(Pro)- <b>F</b>
<i>P. tenuis</i> (Ijima)	FW2- <b>+</b>
<i>P. felina</i> (Dalyell)	FW2- <b>L,O</b>
<i>Dugesia lugubris</i> (Schmidt)	FW2- <b>L,C</b>
<i>Phagocata vitta</i> (Duges)	(V) FW2- <b>L,A</b> ; LL(Pro)- <b>+</b>
<i>Crenobia alpina</i> (Dana)	FW2- <b>L,A</b>

DENDROCOELIDAE

<i>Dendrocoelum lacteum</i> (Muller)	(V) FW2- <b>L,C</b> ; LL(Lt,Pro)- <b>F</b>
<i>Bellocephala punctata</i> (Pallas)	LL(Pro)- <b>F</b>

**ROTIFERA**

MONOGONONTA

BRACHIONIDAE

<i>Epiphanes senta</i> (Muller)	Plank:DL- <b>+</b>
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<i>Trichotria tetractis</i> (Ehrenberg)	Plank:DL- +
<i>Euchlanis dilatata</i> Ehrenberg	Plank:DL- +
<i>Keratella cochlearis</i> (Gosse)	Plank:LL-A; Plank:DL- +
<i>K. quadrata</i> (Muller)	Plank:LL- + ; Plank:DL- +
<i>Kellicottia longispina</i> (Kellicott)	Plank:LL-A; Plank:DL- +
<i>Lepadella ovalis</i> (Muller)	Plank:LL- +
<b>LECANIDAE</b>	
<i>Lecane latifrons</i> (Gosse)	Plank:DL- +
<i>L. lunaris</i> (Ehrenberg)	Plank:DL- +
<i>L. ploenensis</i> (Voigt)	Plank:DL- +
<i>L. saginata</i> Harring & Myers	Plank:DL- +
<b>NOTOMMATIDAE</b>	
<i>Monommata longiseta</i> (Muller)	Plank:DL- +
<b>TRICHOCERIDAE</b>	
<i>Trichocerca longiseta</i> (Schrank)	Plank:DL- +
<i>T. similis</i> (Wierzejski)	Plank:DL-C
<b>GASTROPODIDAE</b>	
<i>Ascomorpha ecaudis</i> Perty	Plank:DL- +
<i>A. saltans</i> Bartsch	Plank:DL- +
<i>Chromogaster ovalis</i> (Bergendal)	Plank:DL- +
<b>DICRANOPHORIDAE</b>	
<i>Asplanchna priodonta</i> Gosse	Plank:LL-C; Plank:DL- +
<i>Asplanchnopus multiceps</i> (Schrank)	Plank:DL- +
<b>SYNCHAETIDAE</b>	
<i>Polyarthra vulgaris</i> Carlin	Plank:DL- +
<i>Synchaeta oblonga</i> Ehrenberg	Plank:DL- +
<i>S. pectinata</i> Ehrenberg	Plank:DL- +
<i>Ploesoma hudsoni</i> (Imhof)	Plank:DL- +
<i>P. truncatum</i> (Levander)	Plank:DL- +
<b>TESTUDINELLIDAE</b>	
<i>Filinia terminalis</i> (Plate)	Plank:LL- + ; Plank:DL- +
<b>CONOCHILIDAE</b>	
<i>Conochilus unicornis</i> Rousset	Plank:LL- + ; Plank:DL- +

**POLYZOA**

<b>PHYLACTOLAEMATA</b>	
<b>FREDERICELLIDAE</b>	
<i>Fredericella sultana</i> (Blumenbach)	FW2-L,A
<b>PLUMATELLIDAE</b>	
<i>Plumatella repens</i> (L.)	FW2-L,C
<b>CRISTATELLIDAE</b>	
<i>Cristatella mucedo</i> Cuvier	FW2- + ; LL(Pro)-C

**MOLLUSCA**

<b>GASTROPODA</b>	
<b>VALVATIDAE</b>	
<i>Valvata cristata</i> Muller	FW2-L,U
<i>V. piscinalis</i> (Muller)	LL(Pro)-A
<b>HYDROBIIIDAE</b>	
<i>Potamopyrgus jenkinsi</i> (Smith)	FW2-L,C; LL(Lt)-F
<b>LYMNAEIDAE</b>	
<i>Lymnaea truncatula</i> (Muller)	FW2-L,U
<i>L. stagnalis</i> (L.)	(V) GD- +

<i>L. auricularia</i> (L.)	(V)	FL- +
<i>L. peregra</i> (Muller)	(V)	FW2-L,C; FW4,FL,GD- + ; LL(Lt)-F; LL(Pro)-A
<b>PHYSIDAE</b>		
<i>Physa fontinalis</i> (L.)	(V)	FW2-L,A; FW3- + ; LL(Lt)-C; LL(Pro)-O
<b>PLANORBIDAE</b>		
<i>Planorbis carinatus</i> Muller		FW2-L,U
<i>P. laevis</i> Alder		LL(Lt)-F; LL(Pro)-O
<i>P. albus</i> Muller	(V)	FW2-L,A; FW3- + ; LL(Lt)-F
<i>P. crista</i> (L.)		FW2-L,C
<i>P. contortus</i> (L.)		FW2-L,C
<b>ANCYLIDAE</b>		
<i>Acroloxus lacustris</i> (L.)		FL2-L,C; LL(Lt)-A
<i>Ancylus fluviatilis</i> (Muller)	(V)	FW1-L,F; FW2-W,A; LL(Lt)-F; LL(Pro)-L,A; FL- +
<b>BIVALVIA</b>		
<b>UNIONIDAE</b>		
<i>Anodonta anatina</i> (L.)		FW2-L,U
<b>SPHAERIIDAE</b>		
<i>Sphaerium corneum</i> (L.)		FW2-L; LL(Pro)- +
<i>S. lacustre</i> (Muller)		LL(Pro)- +
<i>Pisidium amnicum</i> (Muller)		FW2-L,C
<i>P. casertanum</i> (Poli)	(V)	FW2-W; LL(Pro)-W,C; DL,BP- +
<i>P. conventus</i> Clessin		LL(Pro)-L,C
<i>P. subtruncatum</i> Malm		FW2-L
<i>P. henslowanum</i> (Sheppard)		FW2-L
<i>P. lilljeborgi</i> Clessin		LL(Pro)-L,O
<i>P. nitidum</i> Jenyns		LL(Pro)-R

**ANNELIDA****OLIGOCHAETA****NAIDIDAE**

<i>Chaetogaster diaphanus</i> (Gruithuisen)		FW2-L,A; LL(Pro)-L,C
<i>C. limnaei</i> von Baer		FW2-L
<i>Uncinails uncinata</i> (Orsted)		FW2-L,C
<i>Ophidonais serpentina</i> (Muller)		FW2-L,A
<i>Nais pseudobtusa</i> Piguët		FW2-L,C
<i>Slavina appendiculata</i> (d'Udekem)		FW2-L,U; LL(Pro)-O
<i>Vejdovskyella comata</i> (Vejdovsky)		LL(Pro)-F
<i>Arcteonais lomondi</i> (Martin)		FW2-L,C; LL(Pro)-C
<i>Ripistes parasita</i> (Schmidt)		FW2-L,U
<i>Stylaria lacustris</i> (L.)		FW2-L,C; LL(Pro)-F
<i>Dero digitata</i> (Muller)		FW2-L,C
<i>Pristina foreli</i> (Piguët)		FW2-L
<i>P. longiseta</i> Ehrenberg		LL(Pro)-R
<b>TUBIFICIDAE</b>		
<i>Tubifex tubifex</i> (Muller)		LL(Pro)-A
<i>T. ignota</i> (Stole)		FW2-L
<i>Limnodrilus hoffmeisteri</i> Claparede		FW2-L,A
<i>Pelosclex ferox</i> (Eisen)		FW2-O; LL(Pro)-A

<i>Rhyacodrilus coccineus</i> (Vejdovsky)	FW2-O
<i>Aulodrilus pluriseta</i> Piguet	FW2-L,C
<b>LUMBRICULIDAE</b>	
<i>Lumbriculus variegatus</i> (Muller)	FW2,LL(Lt,Pro)-A
<i>Stylo-drilus heringianus</i> Claparede	FW2-L,C; LL(Lt)-A; LL(Pro)-F
<b>LUMBRICIDAE</b>	
<i>Eiseniella tetraedra</i> (Savigny)	(V) FW2-L,C; LL(Lt)-F; LL(Pro)-C
<b>HIRUDINEA</b>	
<b>GLOSSIPHONIIDAE</b>	
<i>Theromyzon tessulatum</i> (Muller)	(V) FW2-O; GD- +
<i>Hemiclepsis marginata</i> (Muller)	(V) FW2-R; FW4- +
<i>Glossiphonia heteroclita</i> (L.)	(V) FW2-L,O
<i>G. complanata</i> (L.)	FW2-L,C; LL(Lt)-F; LL(Pro)-O
<i>Batracobdella paludosa</i> (Carena)	FW2-R
<i>Helobdella stagnalis</i> (L.)	(V) FW2-L,C; LL(Lt,Pro)-F
<b>HIRUDIDAE</b>	
<i>Haemopsis sanguisuga</i> (L.)	(V) FW2-R; LL(Lt),GD- +
<b>ERPOBDELLIDAE</b>	
<i>Erpobdella octoculata</i> (L.)	FW2-L,C
<i>Dina lineata</i> (Muller)	FW2-O

## ARTHROPODA

### ARACHNIDA

#### ACARINA

##### SPERCHONIDAE

*Sperchon denticulatus* Koenike

FW2-L,U

*S. glandulosus* Koenike

FW2-W,C

##### LEBERTIIDAE

*Pilolebertia porosa* Thor

FW2-W,C; LL(Pro)- +

##### TORRENTICOLIDAE

*Torrenticola amplexa* (Koenike)

FW2-L,U

*T. elliptica* Maglio

FW2-L,C

##### LIMNESIIDAE

*Limnesia koenikei* Piersig

LL(Pro)- +

*L. maculata* (Muller)

FW2-L,U

*L. undulata* (Muller)

LL(Pro)-L,F

##### HYGROBATIDAE

*Hygrobates fluviatilis* (Strom)

FW2-W,C

*H. longipalpis* (Hermann)

LL(Pro)- +

*H. nigromaculatus* Lebert

FW2-W,C

*Atractides tener* (Thor)

FW2-L,U

*Unionicola crassipes* (Muller)

FW2-L,C; LL(Pro)- +

*Neumania callosa* (Koenike)

LL(Pro)-L,F

##### PIONIDAE

*Piona carnea* (Koch)

LL(Pro)- +

*P. longipalpis* (Krendowsky)

LL(Pro)- +

*P. paucipora* (Thor)

FW2-L,C

*Nautarachna crassa* (Koenike)

FW2-L,U

*Hydrochoreutes ungulatus* (Koch)

LL(Pro)- +

##### MIDEOPSISIDAE

*Mideopsis orbicularis* (Muller)

LL(Pro)-C

## CRUSTACEA

## CLADOCERA

## SIDIDAE

*Diaphanosoma brachyurum*  
(Lieven)

Plank:LL-F; Plank:DL- +

*Latona setifera* (Muller)

LL(Pro)-R

*Sida crystallina* (Muller)

FW2-L,A; LL(Pro)-A

## HOLOPEDIDAE

*Holopedium gibberum* Zaddach

Plank:LL-C; Plank:DL- +

## DAPHNIIDAE

*Ceriodaphnia quadrangula* (Muller)

Plank:LL-C; Plank:DL- +

*Daphnia hyalina* Leydig

Plank:LL-C; Plank:DL- + ;

LL(Pro)- +

*Simocephalus vetulus* (Muller)

FW2-L,A; LL(Pro)-R

*Bosmina coregoni* Baird

Plank:LL-C; Plank:DL- + ;

FW2-L,C

## MACROTHRICIDAE

*Ilyocryptus acutifrons* Sars

LL(Pro)-C

## CHYDORIDAE

*Acroperus elongata* (Sars)

Plank:DL- + ; FW2-R

*Alona affinis* (Leydig)

FW2-L,A; LL(Pro)-O

*A. costata* Sars

Plank:DL- +

*A. guttata* Sars

Plank:DL- +

*Alonella excisa* (Fischer)

Plank:DL- +

*A. exigua* (Lilljeborg)

Plank:DL- +

*Disparalona rostrata* (Koch)

FW2-L,R

*Camptocercus rectirostris* Schodler

LL(Pro)-R

*Chydorus latus* Sars

Plank:DL- +

*C. ovalis* Kurz

Plank:DL- + ; FW2-L,A

*Eurycercus lamellatus* Muller

Plank:DL- + ; FW2-L,A;

LL(Lt)-F; LL(Pro)-A

FW2-L,R

*Pleuroxua uncinatus* Baird

## POLYPHEMIDAE

*Polyphemus pediculus* L.

Plank:LL-F; FW2-L,A;

LL(Pro)- +

*Bythotrephes longimanus* Leydig

Plank:LL-F; LL(Pro)- +

## LEPTODORIDAE

*Leptodora kindtii* (Focke)

Plank:LL-F

## OSTRACODA

## CYPRIDIDAE

*Herpetocypris reptans* (Baird)

FW2-L,A

## COPEPODA

## DIAPTOMIDAE

*Diaptomus gracilis* (Sars)

Plank:LL,DL-A; LL(Pro)-O

## CYCLOPIDAE

*Halicyclops aequoreus* Fischer

Plank:DL- +

*Macrocyclus fuscus* (Jurine)

FW2-L,A

*M. albidus* (Jurine)

FW2-L,O

*Eucyclops macruiroides* (Lilljeborg)

LL(Pro)- +

*Paracyclops fimbriatus* (Fischer)

Plank:DL- + ; FW2-L,F

*P. affinis* (Sars)

FW2- +

*Cyclops abyssorum* Sars

Plank:LL-A; LL(Pro)- +

- Acanthocyclops viridis* (Jurine) FW2-L,C; LL(Pro)-C  
*A. latipes* (Lowndes) Plank:DL- +  
*A. vernalis* (Fischer) FW2-L,F  
*A. languidoides* (Lilljeborg) Plank:DL- +  
*Mescyclops leuckarti* (Claus) Plank:LL-C
- MALACOSTRACA  
 BATHYNELLIDAE  
*Bathynella natans* Vejdovsky FW2-L,O
- ASELLIDAE  
*Asellus aquaticus* (L.) (V) FW2-L,A; LL(Lt)-A; LL(Pro)-C;  
 GD,RP- +  
 FW2-L
- A. meridianus* Racovitza
- GAMMARIDAE  
*Gammarus pulex* (L.) (V) FW2-L,C; FW3,FL,BP- + ;  
 LL(Lt)-C; LL(Pro)-F
- INSECTA  
 EPHEMEROPTERA  
 SIPHLONURIDAE  
*Siphonurus lacustris* Eaton (V) FW1-L,O; FW2-W,U;  
 FW3,FW4- + ; LL(Lt)-F
- S. linnaeanus* (Eaton) (V) FW2- + ; FW4-W,F  
 FW2-L,C
- Ameletus inopinatus* Eaton
- BAETIDAE  
*Baetis scambus* Eaton (V) FW2-W,F; FW4-L,O  
 (V) FW1,FW2-W,A; FW3-W,F;  
 FW4-W,C; LL(Lt)-F
- B. rhodani* (Pictet) (V) FW3,FL- + ; LL(Lt)-F
- B. muticus* (L.) (V) FW1-L,U; FW2-L,C; LL(Lt)-A;  
 LL(Pro)-C
- Centroptilum luteolum* (Muller) (V) FW2-L,F
- C. pennulatum* Eaton (V) FW2, BP- +
- Cloeon dipterum* (L.) (V) FW2-R; LL(Lt)-F; LL(Pro)-C;  
 RP- +
- C. simile* Eaton
- HEPTAGENIIDAE  
*Rhithrogena semicolorata* (Curtis) (V) FW1,FW3-W,F; FW2-L,C;  
 FW4-L,O; FL- +
- Heptagenia lateralis* (Curtis) (V) FW1-W,F; FW2-L,C; FW4-L,F;  
 FL- +
- Ecdyonurus venosus* (Fabricius) (V) FW1-W,F; FW2-W,C; FW4-L,F;  
 LL(Lt)-C  
 FW2-L,C
- E. torrentis* Kimmins (V) FW1,FW2-W,C; FW3-L,F;  
 FW4-L,O; LL(Lt)-F; LL(Pro)-C
- E. dispar* (Curtis) (V) FW1-L,O; FW2-L,C; FW4-L,F
- E. insignis* (Eaton)
- LEPTOPHLEBIIDAE  
*Leptophlebia marginata* (L.) (V) FW2-L,F; FW3,FW4,DL- + ;  
 LL(Lt)-C
- L. vespertina* (L.) (V) LL(Lt)-C; DL- +
- Paraleptophlebia submarginata* (Stephens) (V) FW2-L,C
- P. cincta* (Retzius) (V) FW2-L,F
- Habrophlebia fusca* (Curtis) (V) FW2-L,F

## EPHEMERELLIDAE

- Ephemerella ignita* (Poda) (V) FW1-W,F; FW2-W,C; FW3-L,O;  
FW4-L,F; LL(Lt,Pro)-C  
*E. notata* Eaton (V) FW1,FW4-L,U

## EPHEMERIDAE

- Ephemera danica* Muller (V) LL(Lt)-F; LL(Pro)-C

## CAENIDAE

- Caenis macrura* Stephens FW2-L  
*C. moesta* Bengtsson (V) LL(Lt)-A; RP- +  
*C. horaria* (L.) (V) FW2-R; LL(Lt,Pro)-A; RP- +  
*C. rivulorum* Eaton (V) FW1-L,F; FW2-W

## PLECOPTERA

## TAENIOPTERYGIDAE

- Taeniopteryx nebulosa* (L.) (V) FW2-L,F; FW4-L,O  
*Rhabdiopteryx acuminata* Klapalek (V) FW1,FW4-W,F  
*Brachyptera putata* (Newman) (V) FW3- +  
*B. risi* (Morton) (V) FW1-L,U; FW2-W,C;  
FW3-W,A; FW4-W,F

## NEMOURIDAE

- Protonemura praecox* (Morton) (V) FL- +  
*P. meyeri* (Pictet) (V) FW2-L,C; FW3-L,F; FW4-L,O  
*Amphinemura standfussi* Ris FW2-L,R  
*A. sulcicollis* (Stephens) (V) FW1-W,F; FW2,FW4-W,C;  
FW3-W,C; LL(Lt)-F; LL(Pro)-O  
*Nemurella picteti* Klapalek (V) FW4-L,O; LL(Pro)-O; FL,BP- +  
*Nemoura cinerea* (Retzius) (V) FW1-L,U; FW4-L,F;  
FW3,FL,DL,BP,GD- +  
*N. dubitans* Morton (V) FW3- +  
*N. avicularis* Morton (V) FW2-L,A; FW4- +; LL(Pro)-C  
*N. cambrica* (Stephens) (V) FW1,FW3-L,F; FW2-L,C;  
FW4-L,O; FL- +  
*N. erratica* Classen (V) FW2,FW4-L,U; FW3,BP- +;  
FW4-L,U

## LEUCTRIDAE

- Leuctra geniculata* (Stephens) FW1-L,R; FW2-L,C  
*L. inermis* Kempny (V) FW1,FW2,FW4-W,C; FW3-W,A;  
LL(Lt)-F  
*L. hippopus* (Kempny) (V) FW1,FW2,FW3,FW4-W,C;  
LL(Lt)-F; LL(Pro)-O; BP- +  
*L. nigra* (Olivier) (V) FW1-L,U; FW2-L,C; FW3-L,O;  
FW4-W,F; LL(Lt)-F; LL(Pro)-C;  
BP- +  
*L. fusca* (L.) (V) FW1-W,F; FW2,FW3,FW4-W,C;  
LL(Lt)-F; LL(Pro)-C  
*L. moselyi* Morton (V) FW1,FW2,FW3,FW4-W,C

## CAPNIIDAE

- Capnia bifrons* (Newman) (V) FW1,FW2,FW4-L,O; LL(Lt)-F  
*C. atra* Morton (V) FW1-W,O; FW2,FW3-L,O;  
FW4-L,U  
*C. vidua* Klapalek (V) FW2,FW3-L,F; FW4-L,O

## PERLODIDAE

- Perloides microcephala* (Pictet) (V) FW1,FW2,FW4-L,O

- Diura bicaudata* (L.) (V) FW4-L,U; LL(Lt)-F  
*Isoperla grammatica* (Poda) (V) FW1,FW2-W,F; FW3-W,O;  
FW4-L,F; FL- +
- PERLIDAE  
*Dinocras cephalotes* (Curtis) (V) FW2-L,F; FW4-L,O  
*Perla bipunctata* Pictet (V) FW1-L,U; FW2,FW3,DL- + ;  
FW4-L,F
- CHLOROPERLIDAE  
*Chloroperla torrentium* (Pictet) (V) FW1,FW3,FW4-W,C;  
FW2,LL(Pro)-O; LL(Lt)-A  
*C. tripunctata* (Scopoli) (V) FW1-W,F; FW2,FW4-L,F;  
FW3-W,C; LL(Lt)-F
- ODONATA  
COENAGRIIDAE  
*Pyrrhosoma nymphula* (Sulzer) (V) FW2-L,C; FW3-C; LL(Lt)-F;  
DL,BP,GD- +  
*Ischnura elegans* (Linden) (V) FW2-L,C; DL,BP,GD- +  
*Enallagma cyathigerum*  
(Charpentier) (V) LL(Pro)-O; DL-C; BP- +
- LESTIDAE  
*Lestes sponsa* (Hansemann) (V) DL- +
- AGRIIDAE  
*Agrion virgo* (L.) (V) DL- +
- CORDULEGASTERIDAE  
*Cordulegaster boltonii* (Donovan) (V) FW2,FW4,LL(Lt),DL- +
- AESHNIDAE  
*Aeshna juncea* (L.) (V) FL- +
- CORDULIIDAE  
*Cordulia linaenea* Fraser (V) DL- +
- LIBELLULIDAE  
*Sympetrum scoticum* (Donovan) (V) DL- +
- HEMIPTERA  
VELIIDAE  
*Velia caprai* Tamanini (V) FW2-L,C; FL- +
- GERRIDAE  
*Gerris costai* (Herrich-Schaffer) FW2-L,C  
*G. lateralis* Schummel FW2-L,C  
*G. thoracicus* Schummel (V) FW3,DL,BP- +  
*G. lacustris* (L.) (V) FW2,RP- +  
*G. odontogaster* (Zetterstedt) (V) FL,GD- +
- NEPIDAE  
*Nepa cinerea* L. (V) FW2-L,O; GD- +
- NOTONECTIDAE  
*Notonecta glauca* L. (V) FW2-L,C; FW4,DL,BP,GD- +
- CORIXIDAE  
*Micronecta poweri* (Douglas &  
Scott) FW2-L,C; LL(Pro)-F  
*Cymatia bonsdorffi* (Sahlberg) (V) FW4,RP- + ; LL(Lt)-F  
*Callicorixa praeusta* (Fieber) (V) FW2-L,C; DL- +  
*C. wollastoni* (Douglas & Scott) (V) BP- +  
*Corixa punctata* (Illinger) (V) DL,GD- +  
*Hespercorixa sahlbergi* (Fieber) (V) FW2-R; FL- +

<i>H. moesta</i> (Fieber)	(V)	LL(Lt),BP- +
<i>Arctocoris germari</i> (Fieber)	(V)	GD- +
<i>Sigara dorsalis</i> (Leach)	(V)	FW2-L,A; FW4,BP- +; LL(Lt)-C
<i>S. distincta</i> (Fieber)	(V)	FW2-R; FW4,DL,GD,RP- +; LL(Lt)-F
<i>S. falleni</i> (Fieber)	(V)	FW2-L,A; LL(Lt)-C; DL,BP,GD- +
<i>S. fossarum</i> (Leach)	(V)	FW2-L,O; LL(Lt)-F; DL- +
<i>S. scotti</i> (Fieber)	(V)	DL- +
<i>S. venusta</i> (Douglas & Scott)	(V)	FL- +

## COLEOPTERA

## HALIPLIDAE

<i>Brychius elevatus</i> (Panzer)	(V)	FW1-L,F; FW2- + LL(Pro)-O
<i>Haliphus ruficollis</i> (Degeer)	(V)	RP- +
<i>H. flavicollis</i> Sturm	(V)	FW2,GD- +; LL(Pro)-O
<i>H. lineolatus</i> Mannerheim	(V)	LL(Lt),RP- +
<i>H. fulvus</i> (Fabricius)	(V)	LL(Lt)-O
<i>H. variegatus</i> Sturm	(V)	FW2- +
<i>H. wehnckeii</i> Gerhardt	(V)	FW2- +

## DYTISCIDAE

<i>Laccophilus minutus</i> (L.)	(V)	FW2- +
<i>Hygrotus inaequalis</i> (Fabricius)	(V)	FW2- +
<i>Coelambus novemlineatus</i> (Stephens)	(V)	LL(Lt)- +; LL(Pro)-O
<i>C. nigrolineatus</i> Stephens	(V)	FW2,FW3-O
<i>Potamonectes elegans</i> (Fabricius)	(V)	LL(Lt),RP- +
<i>P. assimilis</i> (Paykull)	(V)	RP- +
<i>Oreodytes sanmarki</i> (Sahlberg)	(V)	FW2,FW3- +
<i>O. septentrionalis</i> (Gyllenhal)	(V)	LL(Lt)-F
<i>Stictotarsus duodecimpustulatus</i> (Fabricius)	(V)	FW3-R; LL(Pro)-O; GD- +
<i>Hydroporus lepidus</i> (Olivier)	(V)	GD- +
<i>H. palustris</i> (L.)	(V)	FW2-L,C
<i>H. rufifrons</i> (Muller)	(V)	FW2-O
<i>H. melanarius</i> Sturm	(V)	FW2-R; DL- +
<i>H. ferrugineus</i> Stephens	(V)	FW2-R
<i>Agabus guttatus</i> (Paykull)	(V)	FW2-O
<i>A. congener</i> (Thunberg)	(V)	DL- +
<i>A. bipustulatus</i> (L.)	(V)	FW2-R
<i>Platambus maculatus</i> (L.)	(V)	FW2-C; LL(Lt)-F; LL(Pro)-O
<i>Ilybius ater</i> (Degeer)	(V)	FW2-R; FL- +
<i>Copelatus haemorrhoidalis</i> (Fabricius)	(V)	DL- +
<i>Rantus bistratus</i> (Bergstraesser)	(V)	FW4,GD- +
<i>Dytiscus semisulcatus</i> Muller	(V)	FW4- +
<i>D. marginalis</i> L.	(V)	FW4,FL- +
<i>Hydaticus transversalis</i> (Pontoppidan)	(V)	FW2-U

## GYRINIDAE

<i>Gyrinus aeratus</i> Stephens	(V)	RP- +
<i>G. substriatus</i> (Stephens)	(V)	FW2-L,C; BP,RP- +
<i>Orectochilus villosus</i> (Muller)	(V)	FW2,LL(Pro)-O

## HYDROPHILIDAE

- Hydraena gracilis* Germar (V) FW2,FW3-L,C  
*Limnebius truncatellus* (Thunberg) FW2-O  
*L. pappus* Mulsant FW2-R  
*Helophorus aquaticus* (L.) FW2-O  
*H. brevivalpis* Bedel (V) FW2-F  
*H. granularis* (L.) FW2-L,C  
*H. flavipes* Fabricius (V) FL- +  
*H. dorsalis* (Marsham) FW2-R  
*Anacaena limbata* (Fabricius) FW2-C  
*Laccobius minutus* (L.) FW2-L,C  
*L. biguttatus* Gerhardt FW2-R  
*L. atrocephalus* Reitter FW2-R

## HELODIDAE

- Helodes marginata* (Fabricius) FW2-L,C  
*Hydrocyphon deflexicollis* (Muller) FW2-L

## DRYOPIDAE

- Dryops ernesti* DesGozis FW2-R

## ELMINTHIDAE

- Elmis aenea* (Muller) (V) FW2,FW3-W,C; FW4-L,C  
*Esolus parallelepipedus* (Muller) (V) FW1,FW2-L,C; LL(Pro)-O  
*Limnius volckmari* (Panzer) (V) FW1,FW2-W,C; FW3-O;  
 FW4-W,F; LL(Lt,Pro)-C  
*Oulimnius tuberculatus* (Muller) (V) FW1-W,F; FW2-L,A; LL(Lt)- + ;  
 LL(Pro)-A  
*Riolus cupreus* (Muller) FW2-R; LL(Pro)-O

## CHRYSOMELIDAE

- Donacia versicolorea* (Brahm) FW2-R  
*D. simplex* (Fabricius) FW2-L,C

## MEGALOPTERA

## SIALIDAE

- Sialis lutaria* (L.) (V) FW2-L,C;  
 FW4,LL(Lt),FL,DL,BP,RP- +  
*S. fuliginosa* Pictet (V) FW2-L,C; GD- +

## NEUROPTERA

## SISYRIDAE

- Sisyra fuscata* (Fabricius) FW2-R

## TRICHOPTERA

## RHYACOPHILIDAE

- Rhyacophila dorsalis* (Curtis) (V) FW1-L,F; FW2-W,C;  
 FW3,FW4-W,F; FL- +  
*R. septentrionis* McLachlan FW2-R  
*R. munda* McLachlan FW2-L; FW4-O  
*Glossosoma boltoni* Curtis FW2-L,F  
*Agapetus fuscipes* Curtis (V) FW2-L,A; LL(Lt)-F  
*A. delicatulus* McLachlan FW2-L,O

## PHILOPOTAMIDAE

- Philopotamus montanus* (Donovan) FW2-L,A

## POLYCENTROPODIDAE

- Neureclipsis bimaculata* (L.) (V) LL(Lt)- +  
*Plectrocnemia conspersa* (Curtis) (V) FW1,FW3-W,F; FW2-L,C;  
 FW4-W,C

- P. geniculata* McLachlan (V) FW4-L,F; LL(Lt)-F; FL- +
- Polycentropus flavomaculatus* (Pictet) (V) FW2-W,A; LL(Lt)-F
- P. irroratus* (Curtis) (V) FW3,DL- +
- P. kingi* McLachlan (V) FW1-L,F; FW4-W,F
- Holocentropus dubius* (Rambur) (V) DL- +
- Cyrnus trimaculatus* (Curtis) FW2-L,C; LL(Pro)- +
- C. flavidus* McLachlan (V) LL(Lt)-F; LL(Pro),DL- +
- PSYCHOMYIIDAE**
- Tinodes waeneri* (L.) (V) FW2-L,F; LL(Lt)-F; LL(Pro)-R
- Lype phaeopa* (Stephens) FW2,LL(Pro)-R
- Psychomyia pusilla* (Fabricius) FW2-W,C
- HYDROPSYCHIDAE**
- Hydropsyche pellucidula* (Curtis) (V) FW1-L,O; FW2-W,O
- H. angustipennis* (Curtis) (V) FW2-L,C
- H. instabilis* (Curtis) (V) FW2-W,F
- H. fulvipes* (Curtis) FW1,FW4-L,F
- Diplectrona felix* McLachlan (V) FL,BP- +
- HYDROPTILIDAE**
- Agraylea multipunctata* Curtis FW2-L,C
- Hydroptila occulta* (Eaton) FW2-W,C
- H. forcipata* (Eaton) FW2-L,O
- Oxyethira simplex* Ris FW2-F
- PHRYGANEIDAE**
- Phryganea grandis* L. (V) FW2,BP- +
- P. varia* Fabricius (V) LL(Lt)-R
- LIMNEPHILIDAE**
- Drusus annulatus* Stephens (V) FW2-L,O
- Limnephilus rhombicus* (L.) (V) FW3,LL(Lt),DL- +
- L. marmoratus* Curtis (V) FW3,LL(Lt),DL- + ; LL(Pro)-F
- L. decipiens* Kolenati (V) LL(Lt)- +
- L. affinis* Curtis (V) LL(Lt)- +
- L. vittatus* (Fabricius) FW2-L,C
- L. extricatus* McLachlan FW2-R
- L. fuscicornis* (Rambur) FW2- +
- Glyphotaenius pellucidus* (Retzius) (V) FW3- +
- Anobolia nervosa* Curtis (V) FW2-L,C; LL(Lt)- +
- Potamophylax latipennis* (Curtis) (V) FW2,BP- + ; FW3-L,O
- Halesus radiatus* (Curtis) (V) FW2,FW3,FL- +
- H. digitatus* (Schrank) (V) LL(Pro)-R; BP- +
- Chaetopteryx villosa* (Fabricius) (V) LL(Lt)- + ; LL(Pro)-R
- BERAEIDAE**
- Beraea maurus* (Curtis) FW2-L,R
- ODONTOCERIDAE**
- Odontocerum albicorne* (Scopoli) (V) FW2,FW3,LL(Lt),DL- +
- LEPTOCERIDAE**
- Athripsodes nigronevus* (Retzius) FW2-L
- A. aterrimus* (Stephens) (V) FW2-L,O
- A. bilineatus* (L.) FW2-W
- Mystacides azurea* (L.) LL(Pro)- +
- M. longicornis* (L.) LL(Pro)- +
- Oecetis ochracea* (Curtis) LL(Pro)- +

<i>O. lacustris</i> (Pictet)		LL(Pro)- +
<b>GOERIDAE</b>		
<i>Goera pilosa</i> (Fabricius)	(V)	FW2-L,O; LL(Pro)-R
<b>LEPIDOSTOMATIDAE</b>		
<i>Lepidostoma hirtum</i> (Fabricius)	(V)	FW2- +; LL(Lt,Pro)-C
<b>SERICOSTOMATIDAE</b>		
<i>Sericostoma personatum</i> (Spence)	(V)	FW2- +; LL(Lt)-F; LL(Pro)-C
<b>LEPIDOPTERA</b>		
<b>PYRALIDAE</b>		
<i>Nymphula nymphaeata</i> (L.)		FW2-L,C
<b>DIPTERA</b>		
<b>CHAOBORIDAE</b>		
<i>Chaoborus flavicans</i> (Meigen)		LL(Pro)-W,C; DL-C
<b>CULICIDAE</b>		
<i>Culex pipiens</i> L.		FW2-R
<b>CERATOPOGONIDAE</b>		
<i>Dasyhelea holocericea</i> (Meigen)		LL(Pro)-O
<i>Oecacta kibunensis</i> Tokunaga		LL(Pro)-C
<i>Neostilobezzia ochracea</i> (Winnertz)		LL(Pro)-O
<i>Mallochonelea nitida</i> (Macquart)		LL(Pro)- +
<i>Probezziella seminigra</i> (Panzer)		LL(Pro)- +
<i>Palpomyia quadrispinosa</i> Goetghebuer		LL(Pro)-C
<b>CHIRONOMIDAE</b>		
<i>Apsectrotanypus trifascipennis</i> (Zetterstedt)		LL(Pro)-O
<i>Macropelopia goetghebueri</i> (Kieffer)		LL(Pro)-O
<i>Procladius choreus</i> (Meigen)		FW2-L,C; LL(Pro)-W,C
<i>P. crassinervis</i> (Zetterstedt)		LL(Pro)-C
<i>Psilotanypus rufovittatus</i> (Wulp)		LL(Pro)- +
<i>Ablabesmyia monilis</i> (L.)	(V)	LL(Pro)- +
<i>Krenopelopia binotata</i> (Wiedemann)		LL(Pro)- +
<i>K. nigropunctata</i> (Staegar)		LL(Pro)- +
<i>Thienemannimyia carnea</i> (Fabricius)		LL(Pro)- +
<i>Protanypus morio</i> (Zetterstedt)		LL(Pro)-W,F
<i>Diamesa permacra</i> (Walker)		FW2-R
<i>Potthastia longimana</i> Kieffer		FW2-R
<i>Brillia longifurca</i> Kieffer		FW2-R
<i>B. modesta</i> (Meigen)		FW2-R
<i>Cricotopus ephippium</i> (Zetterstedt)		LL(Pro)- +
<i>C. tremulus</i> (L.)		FW2-L,C
<i>Isocladius sylvestris</i> (Fabricius)		LL(Pro)- +
<i>I. trifasciatus</i> (Panzer)		FW2-L,O
<i>Eukiefferiella ilkleyensis</i> (Edwards)		FW2-W,C
<i>Heterotanytarsus apicalis</i> (Kieffer)	(V)	LL(Pro)-C
<i>Heterotrissocladius marcidus</i> (Walker)		FW2-R; LL(Pro)- +
<i>Orthocladius oblidens</i> (Walker)		FW2-W,C; LL(Pro)- +
<i>O. rubicundus</i> (Meigen)		FW2-L,C
<i>Prodiamesa olivacea</i> (Meigen)		FW2-L,C; LL(Pro)-W,F
<i>Spectrocladius sordidellus</i> (Zetterstedt)		LL(Pro)- +
<i>Rheocricotopus dispar</i> (Goetghebuer)		FW2-L,O

<i>Chaetocladius piger</i> (Goetghebuer)		FW2-L,C
<i>Corynoneura lacustris</i> Edwards		LL(Pro)-+
<i>C. scutellata</i> Winnertz		FW2-L,C
<i>Metriocnemus atratulus</i> (Zetterstedt)		FW2-R
<i>M. fuscipes</i> (Meigen)		FW2-L,F
<i>M. martinii</i> Thienemann		FW2-R
<i>M. ursinis</i> (Holmgren)		FW2-R
<i>Parakiefferiella bathophila</i> (Kieffer)		LL(Pro)-+
<i>Paralimnophyes hydrophilus</i> (Goetghebuer)		FW2-L
<i>Pseudorhocladius curtistylus</i> (Goetghebuer)		LL(Pro)-+
<i>Smittia nudopennis</i> (Goetghebuer)		FW2-R
<i>Chironomus anthracinus</i> Zetterstedt (V)		FW2-R; LL(Pro)-+
<i>C. cingulatus</i> Meigen		FW2-L,C
<i>Demeijerea rufipes</i> (L.)		FW2-L,O
<i>Demicryptochironomus vulneratus</i> (Zetterstedt)		LL(Pro)-+
<i>Einfeldia longipes</i> (Staeger)		LL(Pro)-+
<i>Harnischia curtilamellatus</i> (Malloch)		LL(Pro)-+
<i>Microtendipes nitidus</i> (Meigen)		LL(Pro)-+
<i>M. pedullus</i> (Degeer)		LL(Pro)-+
<i>Parachironomus digitalis</i> (Edwards)		FW2-O
<i>Pentapedilum nubens</i> (Edwards)		LL(Pro)-+
<i>Phaenopsectra flavipes</i> (Meigen)		LL(Pro)-+
<i>Polypedilum acutum</i> Kieffer		LL(Pro)-+
<i>P. albicornis</i> (Meigen)		FW2-L,O; LL(Pro)-+
<i>P. convictum</i> (Walker)	(V)	LL(Pro)-L,C
<i>P. pullum</i> (Zetterstedt)		LL(Pro)-+
<i>P. scalaenum</i> (Schrank)		FW2-L,O
<i>Pseudochironomus prasinatus</i> (Staeger)	(V)	LL(Pro)-+
<i>Sergentia coracina</i> (Zetterstedt)		LL(Pro)-L,A
<i>Stenochironomus gibbus</i> (Fabricius)		LL(Pro)-+
<i>Stictochironomous pictulus</i> (Meigen)		FW2-L,C
<i>Cladotanytarsus atridorsum</i> Kieffer		LL(Pro)-+
<i>C. manchus</i> (Walker)		FW2-L,A
<i>Microspectra atrofasciata</i> Kieffer		FW2-L,C
<i>Paratanytarsus inopertus</i> (Walker)		FW2-L,O
<i>Tanytarsus glabrescens</i> Edwards		LL(Pro)-+
<i>T. gregarius</i> Kieffer	(V)	LL(Pro)-+
<i>T. holochlorus</i> Edwards	(V)	LL(Pro)-+
<i>T. signatus</i> (Wulp)	(V)	LL(Pro)-L,A
<i>Stempellina bausei</i> (Kieffer)	(V)	LL(Pro)-L,C
<i>Stempellinella brevis</i> (Edwards)	(V)	LL(Pro)-C
SIMULIIDAE		
<i>Eusimulium latipes</i> Meigen		FW2-L,C
<i>E. aureum</i> Fries		FW2-L,C
<i>Wilhelmia equinum</i> L.		FW2-L,C

<i>Simulium reptans</i> L.	FW2-L,O
<i>S. monticola</i> Friederichs	FW2-L,C
<i>S. variegatum</i> Meigen	FW2-L,F
<i>S. ornatum</i> Meigen	FW2-L,C

### Acknowledgments

Thanks are due to Brian French and Tommy Brennan for technical help. David MacFadyen and Frances Taylor aided with routine identification and Dr. R. A. Crowson confirmed the identity of many of the Coleoptera. We also thank Tony Huckstep for his painstaking preparation of this check-list. Much of this work was carried out under a grant from the M. S. C.

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## **A Selection of Garden Escapes in Dunbartonshire (V.C. 99)**

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G84 7PU

Despite increasing interest in them established garden plants have not received much attention locally. Grierson (1931) said that 'hortules' were 'common and the least interesting. Considering their opportunities, they naturalise themselves but seldom.' Lee's list (1933) was deliberately meagre, and this may have contributed to the discouragement of local recorders.

A rich and diverse flora has been discovered during the 1km. square Dunbartonshire recording scheme started in 1975. The small size of the recording units has raised some species from the 'rare' or 'uncommon' category to 'common' or 'frequent'. In almost built-over areas the derelict land has been carefully searched. It is often the only open ground, apart from gardens, and here the finds have been rewarding.

It appears with hindsight that Grierson failed to appreciate the factors necessary for the establishment of a rich garden flora; one of these is time. He considered he had identified all the likely escapes and held out little hope for others. Two further factors are the expansion of new building round the perimeter of cities, towns and villages on a scale possibly equal to that of the 1850s and '60s, and the success of plant hybridists, especially with herbaceous plants from about the end of the 1930s, which caused older garden forms and species to become unpopular. The result, in the case of goldenrods, is clearly visible in much of the lowlands today. Michaelmas daisies have colonised extensive areas; on the east bank of the Leven in late summer they make a blue haze.

Little is known about villa and cottage gardening in the 19th and early 20th centuries in central and south-west Scotland, but

there are glimpses in Fleming (1880) and Sweet (1889), while the larger estates were featured by Maxwell (1923).

In earlier times unfashionable plants would have found their way from the 'Big house' into cottage and villa gardens, but by the time selectors and breeders had made available abundant and inexpensive novelties, the unwanted species and forms would be dumped. The shores of the Gareloch and Loch Long bear witness to this, having a most interesting adventive flora including an almost red montbretia, a very fine form of kidney-leaved saxifrage and some freesia-scented double phoenix daffodils which are still unnamed. As for *Reynoutria japonica*, Lee records it on the 'Bank of the Gareloch in several places'. Apart from road widening and the dense woods at Mambeg and Rahane, this used to grow almost all the way to Coulport, and provides shelter and protection for a wide range of smaller plants.

Dunbartonshire's alien flora is being subjected to far greater threats than the native. Tidying-up operations and the developing of vacant spaces have made it a race to identify plants before they vanish, sometimes from their only station. A cut-petalled *Geranium* grew on waste ground, luckily a cutting was taken, for about two weeks later the land had been swept bare and a new bungalow had been built on it.

The following are a few of the more interesting garden escapes:—

#### PINACEAE

*Larix kaempferi* (Lamb.) Carrière Japanese larch.

The common larch has not established itself, but *L. kaempferi* occurs in two sites, at one, in Rosneath it has coned in successive years and the ground is thick with seedlings at many stages.

#### CUPRESSACEAE

*Chamaecyparis lawsoniana* (A. Murray) Parl.

West Helensburgh has several wall-tops with bonsai-ed seedlings. Over 20 were counted on one wall and in another place a tree was found cone-bearing in 1986.

#### SALICACEAE

*Salix udensis* Traut. & May 'Sekka'.

This curious willow with fasciated, flattened tips to the branches was introduced to the Helensburgh area by a shrub nursery in the 1960s. About three

pot-bound specimens were thrown into a bog in a wood at Camis Eskan and 20 years later they form a dense grove.

## URTICACEAE

*Soleira soleirola* (Req.) Dandy

Mind-your-own-business is in four 1km. squares, except for one place, on old walls, in Helensburgh, Rhu and Cardross.

## POLYGONACEAE

*Aconogonum campanulatum* (Hooker fil.) Hara

The bell-flowered knotweed is attractive, but only suitable for large, wild gardens. It occurs in 12 stations.

*Persicaria polystachia* (Wallich ex Meissner) Gross.

Himalayan knotweed is less showy than the last, but has only been found in four 1km. squares, despite its being equally rampant.

## CARYOPHYLLACEAE

*Saponaria officinalis* L.

Soapwort is usually seen in the double flowered form, 'Flore-pleno'. One of this was found on the shore at Cove, but was subsequently smothered by dumping five years later. The single form, some of it almost white-flowered, occurs on the shore east of Dumbarton.

## PAPAVERACEAE

*Meconopsis cambrica* (L.) Vig. 'Aurantiaca'.

The orange-flowered form of the Welsh poppy seems less able to escape and spread than the yellow — five as opposed to 49 squares have 'Aurantiaca'. When will the new red-flowered one appear in the wild?

*Papaver pseudo-orientale* Medreder

The so-called oriental poppies of gardens are this species according to recent research. Old unimproved forms, smaller than the modern kinds, are found in two places.

## CRUCIFERAE

*Cardamine raphanifolia* Pourret

The puce lady's smock is usually a rather lurid shade, but in Upper Helensburgh beside a stream, deep purple-flowered and white forms grow among the normal coloured. The common type is also found in the Loch Lomond area.

*Saxifragaceae*

The garden London prides are much more complicated than authors would lead one to believe — we appear to have good naturalised colonies of *Saxifraga hirsuta*, *S. x polita* and the more common *S. x urbium*. In the 1870s *S. hirsuta* types were grown for their leaves as named varieties.

*Aruncus dioica* (Walter) Fernald

Goat's beard, besides persisting, is able to seed profusely at Upper Helensburgh and Shandon. It is also found as mostly solitary plants, in nine other squares.

*Rodgersia podophylla* A. Gray

Rodger's bronzeleaf, forming a sheet several feet square, was discovered by a member of the Dumbarton Natural History Society, beside the Leven, well away from houses.

*Peltaphyllum peltatum* (Torr.) Engler.

A colony about 12 feet across and three feet deep has been enclosed by building development and is now part of a new garden in West Helensburgh. There are two other records, both much smaller, and one has been extirpated.

## GROSSULARIACEAE

*Ribes nigrum* L.

Black currant, tending to form thickets, is found in 23 squares.

*R. rubrum* L.

Red currants, solitary or in small colonies, occur in 16 squares.

*R. sanguineum* Pursh.

Flowering currant, by far the commonest currant, is often seen stunted and gnarled on top of walls. It is known from 27 squares.

## ROSACEAE

The following *Spiraeas* of the *Salicifolia* group are present as garden escapes: *S. douglasii* Hooker subsp. *douglasii* in eight squares, *S. douglasii* Hooker x *salicifolia* L. in six squares and *S. x rosalba* Dippel (*S. salicifolia* L. x *S. alba* Duroi). The influence of *S. alba* makes the flowers of the latter shell pink. A huge colony is behind a hedge of the road to Rosneath Caravan Park and there is a much smaller one in Canniesburn Woods at Westeron.

*Filipendula kamtschatica* var. *rosea* (Pallas) Maximowicz

This is often listed as *F. gigantea* or *F. palmata*. A showy plant and safe for modern gardens, it grows in two squares.

*Rubus spectabilis* Pursh.

Salmonberry was first noticed in V.C. 99 at Arrochar by Grierson in 1920, and by Mrs Peter Ewing as established in 'a hedge at Helensburgh'. It is now in fourteen squares, almost all on the Gareloch or Loch Long-side.

*Rosa rugosa* Thunb.

The Japanese rose with its emerald-green leaves and impressed veins, grows in 12 squares.

*R. 'Hollandica'*.

A cross between *R. rugosa* and either *R. cinnamomea* L. or the similar *R. marretii* Lével, this is frequently mistaken for *R. rugosa*, but the hybrid has smoother, greyer foliage and the veins are not a feature. It forms alarming thickets and has been found in 12 squares.

*R. wichuriana* Crépin

This forms dense mounds with the flowers small and bramble-like. It is closely related to, and in the past has frequently crossed with, *R. multiflora* Thunb. We have two of the former and one enormous *R. multiflora*. Also in this group are the ramblers; we have 'Dorothy Perkins' and a scarlet Rambler on the railway embankment between Helensburgh and Craigendoran.

## ONAGRACEAE

*Fuchsia magellanica* Lam.

The widely differing ideas of authors about this species makes naming difficult. Ours vary from quite plump-budded, but not quite 'Globosa,' to what is thought to be the true slender var. *gracilis* (Lindl.) Bailey. This is in one square; ten other squares have more ordinary kinds.

## ARALIACEA

*Hedera hibernica* (Kirchner) Bean 'Hibernica'

The so-called Irish ivy is well naturalised in 72 squares, and 'Digitata', the sharp-leaved Irish ivy with its long acute lobes, is found in nine squares.

*H. colchica* K. Koch

The Colchis or Persian ivy has large heart-shaped glossy leaves and is unbellifer-scented and very rampant. It is naturalised in 12 squares, and can be seen in many hedges. Var. *dentata* (Hibberd) Lawrence has dull, much paler foliage, is less scented and has 'prickles' on the margins of its thinner, longer leaves, where the veins obtrude. It occurs in only three squares.

## SOLANACEAE

*Solanum dulcamara* L. var. *alba* Weston

White-flowered woody nightshade has been found in five squares. A very pale lilac colour form, a presumed hybrid between the white and the normal flower coloured plant, has been found in two squares. Var. *villosissimum* Desv. has densely pubescent foliage so distinct it is visible from a considerable distance. It occurs in two squares. Var. *indivisum* Bioss. the Persian nightshade, has considerably larger leaves almost all entire and larger fruits. It has one station, near the canal at Westerton.

## COMPOSITAE

Asters are well represented in V.C. 99. *Aster x versicolor* Willdenow occurs in two squares. It has mahogany-ruby robust stems but it not otherwise distinct. *A. novi-belgii* L. is in 19 squares, but we have another 24 colonies which require further examination. *A. lanceolatus* Willdenow is very slender in all its parts and has very small pale blue or off-white flowers. It can be seen on an embankment above Helensburgh Upper Station and is in four other localities. *A. x salignus* Willdenow is in four squares and by the canal-side at Westerton there is a superb tall form with grey-blue flowers.

## LILACEAE

*Allium uniflorum* Kellogg

Dunbartonshire is not rich in alien species of *Allium*, but this one makes up for the lack. Thought to be the first escape in Britain, it has rosy ransoms-like flowers and is increasing in a loamy wood in Cardross.

## GRAMINACEAE

*Cortaderia selloana* (Schultes & Schultes fil.) Ascherson & Graeber.

Pampas grass, along with several other species, set seed after the hot summer of 1984. In West Helensburgh there are now several sturdy young plants.

## ARACEAE

*Arum italicum* Miller subsp. *italicum*.

Italian lords-and-ladies grows in seven squares mostly on the shore near Cove. The net-veined garden form 'Pictum' hort. was found between Kilcreggan and Cove in the 1950s. This species seldom flowers.

*A. maculatum* L. var. *immaculatum* (Reichenbach) Mutel

The spotless form of lords-and-ladies is much commoner than the spotted (*forma maculatum*) which often occurs in very small clumps (23 squares as opposed to six).

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## Acknowledgments

The Council and Publishing Committee of the Glasgow Natural History Society wish to express their gratitude to B.P. EXPLORATION plc for a grant of £250, to the UNIVERSITY FIELD STATION for a grant of £75 and to those members of the Society whose anonymous donations have greatly helped in the production of this extended issue of *The Glasgow Naturalist*.

## **The Fish Populations of Scottish Sea Lochs with Particular Reference to those of the Firth of Lorne Area**

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In a review of the fish populations of the west coast of Scotland, Gordon and De Silva (1980) and Gordon (1981) concluded that, with the exception of the Clyde Sea Area, relatively little was known of these populations compared with those of other areas of the British Isles. The main reason for this was that, until its decline in the late 1960s, the main fishery on the west coast was for herring and relatively little attention was paid to the other fish stocks. The fish populations of the sea lochs were until recently poorly known. Gordon and De Silva (1980) identified three areas on the west coast between the Mull of Kintyre and Cape Wrath which had been the subject of special interest — the Loch Sween area (noted for the wartime attempts at increasing productivity of sea lochs by artificial enrichment with fertilisers), Lochs Ewe and Torridon (the former being the site of a major study of sandy beach ecology by the Department of Agriculture and Fisheries for Scotland which included studies on the flatfish populations and the latter used for experimental work) and the Firth of Lorne complex (interest in which arose from the establishment of the Dunstaffnage Marine Research Laboratory at the entrance to Loch Etive in 1968 at a time when there was increasing interest in exploiting the resources of the sea lochs, notably for aquaculture).

In this paper current knowledge of fish populations in the Firth of Lorne area is summarised and the results of a bottom trawling survey, conducted between 1969 and 1980, are discussed in detail. An attempt is also made to draw general conclusions concerning the possible fauna of other lochs on the west coast of Scotland.

## Firth of Lorne

### (A) The Fishes

Sea lochs can be considered as a specialised type of estuary and there have been many studies of estuarine fishes in recent years (see Haedrich, 1983 for a recent review). Because of their mobility fishes are less amenable to classification into assemblages than other more sessile organisms but one classification which is frequently used is that of McHugh (1967). He recognised the following assemblages.

- (1) Fresh water fish that occasionally enter brackish water.
- (2) Truly estuarine species that spend their entire lives in the estuary.
- (3) Anadromous and catadromous species. The former leave the sea and enter freshwater to spawn, and the latter leave freshwater to spawn in the sea).
- (4) Marine species that pay regular seasonal visits to the estuary usually as adults.
- (5) Marine species that use the estuary primarily as a nursery ground usually spawning and spending much of their adult life at sea, but often returning to the estuary seasonally.
- (6) Adventitious visitors that appear irregularly and have no apparent estuarine requirements.

I will now consider how appropriate this classification is for the sea lochs of the Firth of Lorne Area. This is based on the trawling surveys of the lochs (Gordon and De Silva 1980; Gordon 1981), littoral and sublittoral surveys (Gibson and Ezzi 1987 and references therein) and on previously unpublished observations.

(1) The only species which readily conforms with this category is the 3-spine stickleback (*Gasterosteus aculeatus* L.) which is taken by beach seine and beam trawl close to the shore. Some relatively large catches have been made by a midwater trawl fished through the brackish upper layers of upper Loch Etive.

(2) Probably the only two species which can be considered truly estuarine are the flounder (*Platichthys flesus* (L.)) and the grey mullet (*Crenimugil labrosus* (Risso)). The flounder is present in all lochs but is seldom abundant perhaps because suitable substrates are limited. Little is known of the grey mullet, probably because they are seldom caught by trawls. Their occasional capture by

salmon nets and visual sightings suggests that they are probably quite common.

(3) The salmon (*Salmo salar* L.) and the sea trout (*Salmo trutta* L.) are the only common anadromous species of the sea lochs. Little is known of the habits of the salmon in the lochs but it is probable that they spend little time there either as adults or smolts. The sea trout on the other hand spends a considerable time in the lochs. Pemberton (1976a,b) has described the migrations of sea trout between the rivers and the sea lochs in the Firth of Lorne area and also studied their diets.

The only catadromous species is the eel (*Anguilla anguilla* (L.)) which frequents the shore line of most of the lochs.

(4) Perhaps the most familiar species which enters the sea lochs seasonally as adults is the mackerel (*Scomber scombrus* L.). It enters the lochs in the late summer and autumn and this migration is probably related to the piscivorous nature of its diet and the abundance of young fish utilising the sea lochs as nursery areas at this time of year (see below). Other species enter the lochs seasonally but they are less clearly defined because there is always a residual population throughout the year. The spotted dogfish (*Scylorhinus caniculus* (L.)) is present in the more open sea lochs at all times of year but is most abundant in the late summer, autumn and winter. In some fjordic sea lochs it is virtually absent in the spring and early summer but present during the remainder of the year. The spur dogfish (*Squalus acanthias* (L.)) is seasonally more abundant in the more open sea lochs but was never recorded in Loch Spelve. The population of spur dogfish in Loch Etive was abundant throughout the year suggesting that non-migratory populations may exist in some of the larger lochs. Several other species which can be considered as permanent members of the fish fauna show increased abundance during the late summer and autumn. Examples are the grey gurnard (*Eutrigla gurnardus* (L.)), the long rough dab (*Hippoglossoides platessoides* (Fabricius)) and the witch (*Glyptocephalus cynoglossus* (L.)). This increase in abundance may be partly due to a recruitment of the young of the year but the possibility of an immigration of adults cannot be excluded.

Another species which appears to fall into this category is the snake blenny (*Lumpenus lampretaeformis* (Walbaum)) which occupies burrows in the seabed. Its occurrence in the Firth of Lorne

and Loch Linnhe has been described by Gordon and Duncan (1979). It first appeared in the catches in March, reached peak abundance in May and had totally disappeared from the catches by November. Although the possibility of a seasonal migration cannot be excluded it is possible that during the winter it remains in its burrow.

(5) The role of estuaries as nursery grounds for young fish is well documented (Haedrich, 1983) and the sea lochs provide no exception. Two species of clupeid migrate into the lochs as juveniles and have been the subject of a detailed study by De Silva (1973a,b,c,d). The herring populations are dominated by O-group individuals belonging to two different stocks. Autumn spawned herring, probably of Minch origin, enter the lochs in April and spring spawned herring, of Clyde origin, enter in June. Peak abundance is reached in late summer and early autumn and thereafter the numbers decline rapidly although in some lochs, such as Loch Etive, they may persist for longer periods. In addition to constituting an important component of the midwater and bottom trawl catches, especially in the shallower lochs, young herring shoal close inshore and are an important food source for species such as sea trout. Older herring occur sporadically in most sea lochs. O-group sprats are more irregular in the timing of their migration into the lochs but once present tend to remain for longer than herring. Peak abundance in bottom trawl catches is in August or September. The tendency for sprats to remain longer together with an immigration of older sprats in the winter led to a sprat fishery in some west coast sea lochs (Langton, 1969). De Silva (1973d) found sprats both in advanced stages of maturity and spent but from the absence of running ripe fish or eggs and larvae he concluded that they spawn in the open sea. The diets of O-group herring and sprats were almost identical and De Silva (1973c) concluded that competition for food would be important if food supplies were limited.

Fourteen species of gadoid fish have been recorded in the Firth of Lorne area but only three are taken in appreciable numbers as juveniles in all years. These are the whiting (*Merlangius merlangus* (L.)), the Norway pout (*Trisopterus esmarkii* (Nilsson)) and the poor cod (*Trisopterus minutus* (L.)). The haddock (*Melanogrammus aeglefinus* (L.)) can be abundant in years when there is a strong year-class. The saithe (*Pollachius virens* (L.)) and the cod (*Gadus morhua* L.) are common close inshore in the summer and autumn but are seldom taken by trawls.

The whiting were present as O-group in all the lochs. They were first captured by bottom trawls in June or July and reached peak abundance in November or December (Gordon, 1977a; Cooper, 1979, 1980). Thereafter there was a marked decline in abundance although in some of the deeper lochs they may persist for longer periods. Occasionally I-group and II-group whiting migrate into the lochs in the autumn but their numbers are small compared with the O-group. A limited spawning was observed in the deep upper basin of Loch Etive but has not been observed in any of the other lochs or even at the offshore Tìree Passage station where there is an adult population (Cooper, 1983). Cooper (1979, 1980) showed that O-group whiting were abundant at the offshore stations in the early summer but when they appeared in the sea lochs, numbers offshore declined suggesting that whiting actively migrated into the lochs. The diet of whiting in the sea lochs has been described by Gordon (1977b).

O-group Norway pout first appeared in the sea lochs in June or July and like whiting reached maximum abundance in the autumn (Gordon, 1979c; Cooper, 1979, 1983). Its occurrence in Loch Etive was sporadic and it was never abundant probably because of the reduced salinity of this loch (Gordon, 1977c). The populations of Norway pout persisted for longer in the deeper lochs but there was no evidence that these older fish spawned there or indeed at the offshore stations where adult populations occurred. Cooper (1979, 1983) concluded that the O-group populations first became established at the offshore stations and that the colonisation of the sea lochs was the result of a spreading of this population rather than an active migration of most of the population inshore as was the case for the whiting. The distribution and life style of the poor cod was similar to that of the Norway pout (Cooper, 1979, 1980).

The importance of the sea lochs as nursery areas for young flatfish is probably limited by the lack of suitable sandy beaches for O-group fish. Where such beaches occur, such as in the Firth of Lorne, Gibson (1973) has shown that they are populated by O-group plaice (*Pleuronectes platessa* L.) and to a lesser extent by other flatfish, including the common dab (*Limanda limanda* (L.)). None of these species was common as adults. The most abundant adult flatfish in bottom trawl catches was the long rough dab but little is known of its life history. Larval long rough dabs were not abundant in plankton hauls which suggests that recruitment is from more offshore areas.

(6) Relatively few fish fall into the category of adventitious visitors and most when they occur are comparatively rare. The blue whiting (*Micromesistius poutassou* (Risso)), an oceanic gadoid, has been caught in some years in Loch Linnhe and on separate occasions in Loch Sunart and the upper Sound of Mull (Gordon, 1977d). The hake (*Merluccius merluccius* (L.)) has been recorded at all stations except Lochs Etive and Spelve and although most were juveniles there was no apparent seasonal or annual trend in their occurrence. The horse mackerel (*Trachurus trachurus* (L.)) and the black mouth dogfish (*Galeus melastomus* Rafinesque-Schmaltz) are also occasional visitors in some lochs. Loch Linnhe, perhaps because of its greater depth and less restricted entrance, attracts a larger number of rarer species, examples being the greater forkbeard (*Phycis blennoides* (Brunnich)), an outer shelf/slope dwelling gadoid, and the oceanic pearlside (*Maurolicus muelleri* (Gmelin)).

The above classification is useful as a framework for describing the fishes of the sea lochs of the Firth of Lorne area. Many species such as the gurnard, dragonet, the gobies and some flatfish have been excluded because they occur in both the sea lochs and the offshore areas and there is apparently little difference between the two areas in terms of their population structure and life history. The distinction between estuarine and inshore fish populations has been discussed by Haedrich (1983) and the concept of an extended estuarine zone for fishes, where the criteria are defined in terms of hydrography rather than topography, was introduced by McHugh (1967).

## **(B) Comparisons between the sea lochs and the inner shelf**

Between 1969 and 1980 bottom trawling surveys were carried out in Loch Etive (2 stations), the Firth of Lorne, Loch Linnhe, Loch Spelve, Loch Sunart, Bloody Bay (Upper Sound of Mull) and Tiree Passage (Fig. 1). In the early years only the Firth of Lorne and the lochs closest to Oban were surveyed but gradually the survey was extended to include the other lochs. The Tiree Passage was sampled later in the survey and sampling ceased in Lochs Etive, Spelve and Sunart. The trawls used and the method of fishing have been described in detail by De Silva (1973) and Cooper (1979).

In this section the assemblages of fishes at each of the stations will be compared and an attempt will be made to relate them to

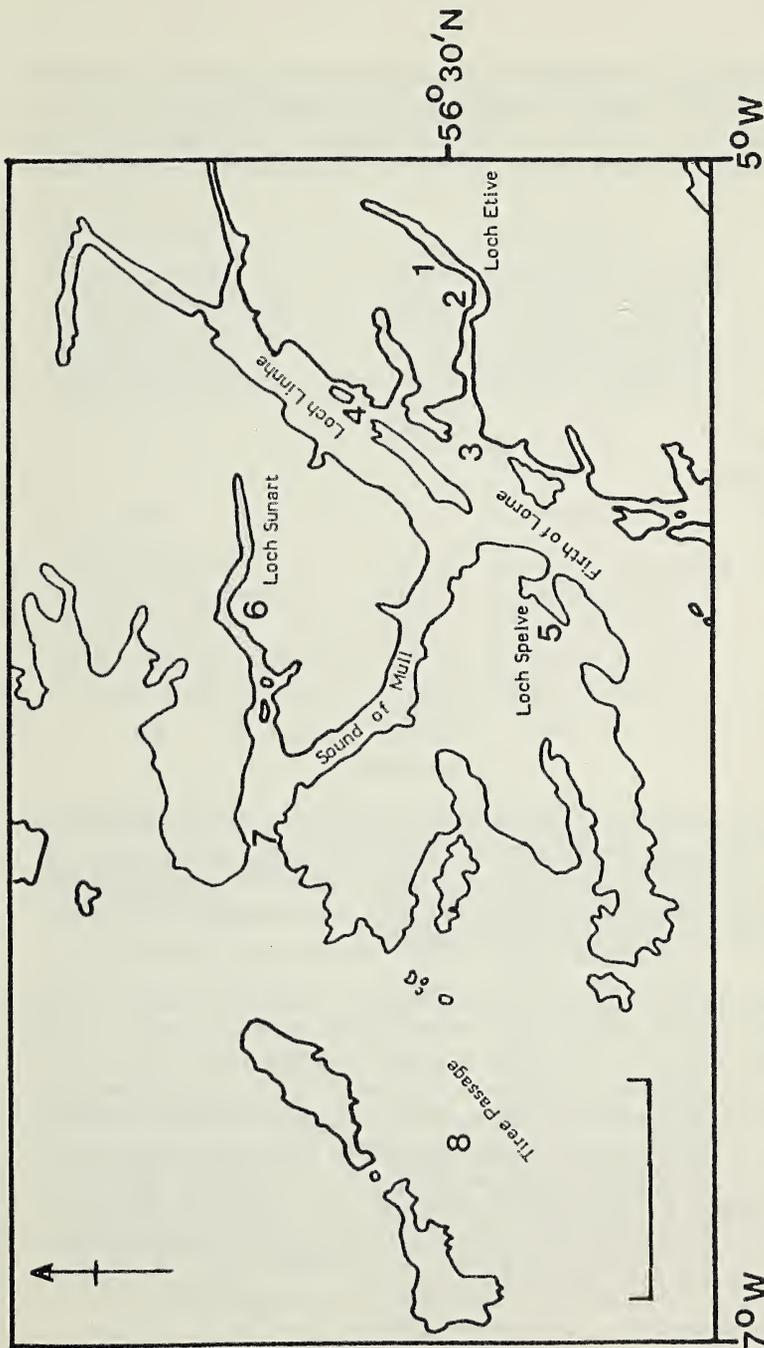


Fig. 1 Chart showing the stations sampled by the bottom trawl. (Scale line 25 km). The mean station depths are given below.

1 Loch Etive (upper)	(Eu)	1969-'74	102m	5 Loch Spelve	(Sp)	1969-'73	25m
2 Loch Etive (lower)	(El)	1969-'75	45m	6 Loch Sunart	(Su)	1969-'72	80m
3 Firth of Lorne	(F)	1969-'80	47m	7 Bloody Bay (Upper Sound of Mull)	(B)	1969-'77	50m
4 Loch Linnhe	(L)	1969-'80	90m	8 Three Passage	(T)	1972-'80	80m

hydrography and topography. As a preliminary step it is necessary to determine whether the sampling at each station was adequate. The cumulative numbers of species caught in successive bottom trawls at each station is shown in Fig. 2. The solid lines were derived

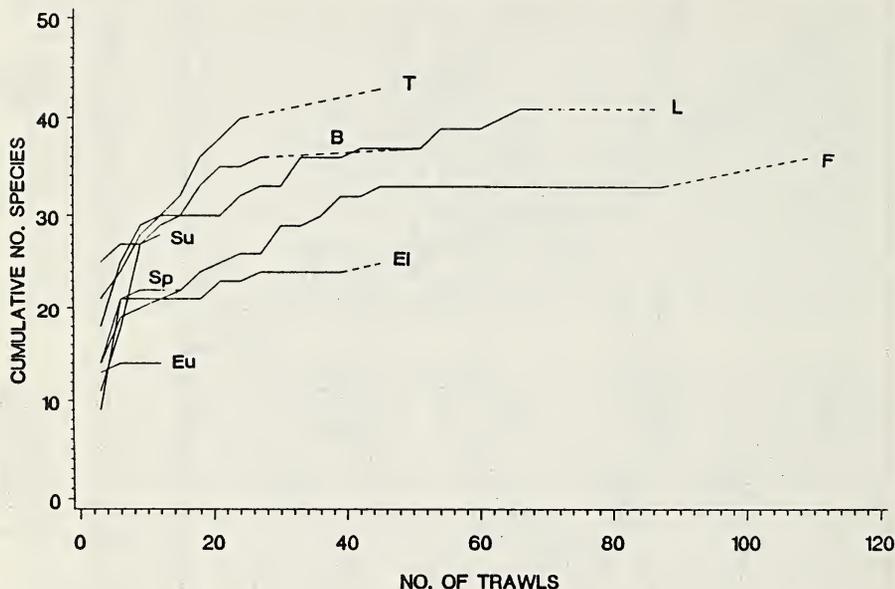


Fig. 2 The cumulative number of species in every third trawl at each station for the whole sampling period (see caption to Fig. 1). The solid lines are for trawls where the total catch was recorded and the dashed lines are for subsequent trawls where only rare species were recorded.

from trawl catches where the total number of species was recorded. At some stations trawling aimed at collecting particular species, such as gadoids, and the only other species recorded were those which were rare or unusual. Additional species obtained by this method are shown by dashed lines. The number of species increased rapidly at first and then gradually declined until few new species were encountered indicating that the sampling was adequate at all stations except perhaps Loch Sunart. Relatively few species dominate the catches as is shown in Table 1 where the five most abundant species account for a minimum of 83.9% of the total catch. Therefore, although the total number of species in Loch Sunart may not have been determined the dominant species have been adequately sampled.

**Table 1** The five most abundant fish species at each station for all trawls irrespective of year or season. (The numbers in brackets are percentages)

<b>Firth of Lorne</b>		<b>Loch Linnhe</b>	
<i>Sprattus sprattus</i>	(49.6)	<i>Merlangius merlangus</i>	(39.7)
<i>Merlangius merlangus</i>	(22.6)	<i>Trisopterus esmarkii</i>	(22.0)
<i>Trisopterus esmarkii</i>	(11.5)	<i>Trisopterus minutus</i>	(10.2)
<i>Clupea harengus</i>	( 8.7)	<i>Lumpenus lampretaeformis</i>	( 7.1)
<i>Trisopterus minutus</i>	<u>( 4.0)</u>	<i>Sprattus sprattus</i>	<u>( 4.9)</u>
	(96.4)		(83.9)
<b>Loch Spelve</b>		<b>Loch Sunart</b>	
<i>Sprattus sprattus</i>	(45.0)	<i>Merlangius merlangus</i>	(65.0)
<i>Merlangius merlangus</i>	(14.7)	<i>Trisopterus esmarkii</i>	(16.0)
<i>Clupea harengus</i>	(12.3)	<i>Trisopterus minutus</i>	( 7.3)
<i>Hippoglossoides platessoides</i>	( 8.7)	<i>Squalus acanthias</i>	( 4.4)
<i>Trisopterus minutus</i>	<u>( 8.5)</u>	<i>Clupea harengus</i>	<u>( 1.8)</u>
	(89.2)		(94.5)
<b>Loch Etive (lower)</b>		<b>Bloody Bay</b>	
<i>Merlangius merlangus</i>	(46.7)	<i>Trisopterus esmarkii</i>	(54.3)
<i>Clupea harengus</i>	(37.8)	<i>Merlangius merlangus</i>	(26.2)
<i>Squalus acanthias</i>	( 5.7)	<i>Sprattus sprattus</i>	(11.0)
<i>Hippoglossoides platessoides</i>	( 2.7)	<i>Clupea harengus</i>	( 4.1)
<i>Eutrigla gurnardus</i>	<u>( 1.5)</u>	<i>Trisopterus minutus</i>	<u>( 1.9)</u>
	(94.4)		(97.5)
<b>Loch Etive (upper)</b>		<b>Tiree Passage</b>	
<i>Merlangius merlangus</i>	(45.0)	<i>Trisopterus esmarkii</i>	(85.4)
<i>Squalus acanthias</i>	(19.3)	<i>Merlangius merlangus</i>	( 5.7)
<i>Trisopterus minutus</i>	(13.4)	<i>Melanogrammus aeglefinus</i>	( 3.7)
<i>Glyptocephalus cynoglossus</i>	( 6.3)	<i>Trisopterus minutus</i>	( 2.8)
<i>Eutrigla gurnardus</i>	<u>( 4.7)</u>	<i>Hippoglossoides platessoides</i>	<u>( 1.0)</u>
	(88.7)		(98.6)

Boesch (1977) has reviewed the methods of assessing similarity between samples in population ecology and has discussed their limitations. The Jaccard method, which only takes into account presence or absence of species, was used to calculate a matrix of interstation similarity and from this a dendrogram was drawn using group average sorting (Fig. 3A). It shows that the more open stations

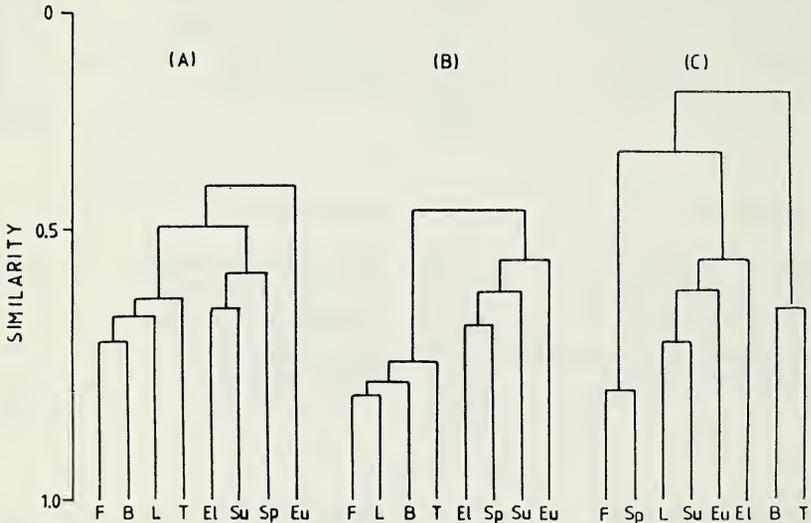


Fig. 3 Dendrograms of interstation similarity. The similarity of each station to every other station is calculated and the results subjected to cluster analysis (see text). The dendrogram is a useful visual method of presenting the results on a scale of 0 (zero similarity) to 1 (100% similarity). Dendrogram A shows that stations F and B are most similar at 0.7 (70% similarity) and that L and T subsequently link at 0.65 and 0.62 to form a cluster. El, Su and Sp successively link to form a second cluster. These clusters link at 0.5 or 50% similarity while Eu links with both these clusters at 0.42 or 42%. A, Jaccard coefficient (presence or absence). B, Bray Curtis coefficient on root-root transformed quantitative data. C, Bray Curtis percentage similarity on quantitative data. Abbreviations: F, Firth of Lorne. Sp, Loch Spelve. L, Loch Linnhe. Su, Loch Sunart. Eu, Loch Etive (upper). El, Loch Etive (lower). B, Bloody Bay. T, Tیره Passage.

of the Firth of Lorne, Loch Linnhe, Bloody Bay and Tiree Passage form a cluster distinct from the fjordic lochs, Lochs Etive (lower), Sunart and Spelve which all have narrow shallow sills. The deep upper basin of Loch Etive is dissimilar to all the other stations because of its impoverished fauna (Fig. 2). A widely used quantitative similarity measure is the Bray-Curtis coefficient. To scale down the influence of dominant, abundant species Field, Clark and Warwick (1982) recommended first transforming the data using a root-root transformation. This was done on the total catch for each station irrespective of the season or year of capture and the resulting dendrogram of interstation similarity is shown in Fig. 3B. The result was very similar to that obtained by the presence or absence method except that the deep upper Loch Etive station now clustered with the fjordic lochs.

Another frequently used quantitative similarity measure is the percentage similarity, which is the Bray Curtis method applied to data which have been standardised to percentages. This method is more influenced by abundant species and since abundant species are important at all the stations (Table 1) this method was used to construct a dendrogram of interstation similarity (Fig. 3C). The stations form three main clusters namely (1) the Firth of Lorne and Loch Spelve, (2) Lochs Sunart, Linnhe and Etive (both stations) and (3) Bloody Bay and Tiree with the latter cluster being more dissimilar to the remainder.

A further analysis was then carried out on these clusters. All the data for each station were combined at two-monthly intervals and expressed as catch per hour of trawling for the dominant species and the total catch, and to simplify the presentation the stations were grouped in pairs. These results are shown in Fig. 4 and it is clear that each group shows a different by-monthly abundance of the dominant species. In the Firth of Lorne and Loch Spelve the sprat is dominant in the autumn and winter and the whiting is also important. At the deeper Lochs Linnhe and Sunart stations sprats are not as abundant and whiting become the dominant species. In Loch Etive herring and whiting are of about equal importance while at Bloody Bay and Tiree Passage, the Norway pout is the dominant species. There is also a trend for the catch per hour of all species to decline from the most open stations (Bloody Bay and Tiree) to the most topographically isolated (Loch Etive). Whilst it is likely that this latter trend has some validity it must be treated with some caution because not all stations were sampled in the same year and

therefore no allowance has been made for variations in year-class strength of the dominant species.

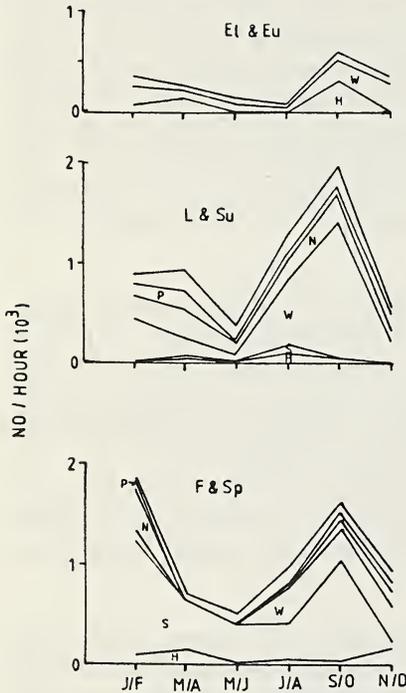
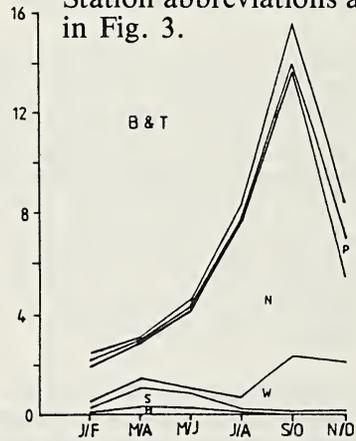


Fig. 4 Catch per hour at bi-monthly intervals over the whole sampling period for station pairs showing the total catch (top line) and the proportions of the dominant species. H, herring. W, whiting. P, poor cod. N, Norway pout. S, sprat. Station abbreviations are as in Fig. 3.



A further complication is that a more efficient trawl was used later in the survey and was used exclusively at some stations (e.g. Three Passage) while other stations were sampled by both trawls. The results shown in Fig. 4 may appear to contradict statements made earlier with reference to the timing of the migration of juvenile clupeids and some gadoids into the sea lochs (pp. 564). This is because most enter the sea lochs in the pelagic phase and were sampled by a midwater trawl while the data in Fig. 4 is based entirely on bottom trawl catches.

In conclusion, the presence or absence method and the root-root transformation of quantitative data weighted against dominant species separate the fish assemblages of the sea lochs, in terms of their species composition, into an inner shelf fauna with the more

open sea lochs being more similar to the inner shelf than to the fjordic lochs. The reasons for this separation must be many but the most important are probably that the narrow, shallow entrances of the fjordic lochs restrict the movement of fish and the greater physiological stress, caused by the variable salinity, prevents some species surviving. This latter effect is most clearly seen in Loch Etive which has the greatest freshwater input. The percentage similarity method yields associations based mainly on the most abundant species which utilise the sea lochs as nursery areas. To some extent these associations are related more to the depth and proximity of the stations rather than their topography or hydrography. For example Loch Spelve, despite being a fjordic loch, has a similar depth to the Firth of Lorne Station and opens directly into it. Bloody Bay and Tìree Passage although differing in depth can be regarded as part of the inner shelf. In the remaining association Lochs Linnhe and Sunart, which are of similar depth, cluster first, followed by the Loch Etive deep station and finally lower Loch Etive which is shallower.

### **Other sea lochs on the west coast of Scotland**

Comparisons between the fish populations of the sea lochs of the Firth of Lorne complex with those of the remainder of the west coast are difficult because of the lack of published information for other areas. The lochs to the south of the Firth of Lorne are relatively shallow and the adjacent shelf is also shallow < 50m. It is probable that the fish fauna of these lochs is relatively poor and dominated by an annual immigration of O-group clupeids and whiting. The relatively small freshwater catchment areas probably means that they are not influenced by the extremes of salinity as are many of the lochs of the Firth of Lorne area. The sea lochs to the north of the Ardnamurchan peninsula are as varied in topography as those of the Firth of Lorne. There are, however, two important differences. Firstly they are closer to the deeper waters (> 100m) of the Minch, and secondly the freshwater input tends to be less than that of the Firth of Lorne. If the faunas of these lochs are extensions of the inner shelf then the fish populations of these lochs will probably be more similar to those of the Minch. The fact that adult whiting can be caught all the year round in Loch Shieldaig and adult haddock occur in Loch Torridon at certain times of year suggests that this is indeed the case (personal observation). The herring fisheries which were carried out in many of these sea lochs also suggest closer affinities with the deep water of the Minches. In these respects the

fish fauna of the sea lochs north of Ardnamurchan probably have a greater similarity to those of the Clyde Sea Area than to the Firth of Lorne Area.

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## Advertisement

Lee, J. R. 1933, *The Flora of the Clyde Area*.

Professionally bound copies of the original printing of this Flora can now be provided to order, price £7.50 to members of the *Glasgow Natural History Society* and to the book trade, £10.00 to others (p. & p. 50p extra). This is still the only work of its type on the area and is in diminishing supply.

Obtainable from *The Librarian* at the address given on the inside of the back cover.

## Obituary

### ARCHIBALD GRAHAM KENNETH (1915 – 1989)

Friends of Archie Kenneth, a member of the Society since 1966, were saddened by the news of his death on 27 July, 1989.

Living near Ardrishaig, Archie found it difficult to attend our meetings and excursions, but he rarely missed the joint GNHS/BSBI exhibition meetings held in Glasgow biennially. Field botany was his main natural history interest and for many years he concentrated on the flora of Knapdale and Kintyre, V.C.101, where he was BSBI recorder. In 1964 he published *The Flora of Danna*, a small island in Knapdale, followed by a supplement in 1971, and in 1979 he produced *The Flora of Kintyre* jointly with Miss M. H. Cunningham of Campbeltown. In 1985 his *Additions to the Flora of Kintyre* were published in *Glasg. Nat.*, 21: 1-12.

In later years, Archie regularly visited the mountains of West Ross and Sutherland where he made a particular study of the *Alpina* section of the hawkweeds (*Hieracium*). His work in this critical group made a valuable contribution to its taxonomy and several new species, as yet undescribed, were found. It is fitting that one of these is to be named after him.

He was also interested in marsh orchids (*Dactylorhiza* spp.) and studied puzzling populations in his home area and in the north-west, publishing papers on their taxonomy with D. J. Tennant and others in *Watsonia*. Having a great eye for new or unusual plants, Archie discovered many rarities such as *Lathyrus palustris* and *Cirsium dissectum* in Knapdale and the club-moss *Diphasiastrum x issleri* in Sutherland which would have been overlooked by many.

He rarely attended organised field meetings, preferring his own company or that of one or two fellow botanists. In the field his stride was deceptively unhurried but usually left others trailing behind. He never wore climbing boots but preferred old brogues. Old trousers, a tweed jacket, a gabardine raincoat (if it looked like rain) and a knitted bonnet completed his attire. He carried only a small haversack with his lunch and specimens and a stout hazel crook which was indispensable in awkward places.

This kindly enthusiast will be greatly missed. We extend our deepest sympathy to his wife Janet, daughter Mary and son Iain.

ALLAN McG. STIRLING

## Insect Records from the West of Scotland in 1988

Compiled by I. C. CHRISTIE

Gartlea, Caldervan by Alexandria

Conditions in the first half of 1988 were favourable to insect life, those in the second half unfavourable. After a mild wet winter the season opened with an exceptionally fine week at the beginning of April and proceeded steadily in mixed weather till June 7th. The remainder of June was dry, sunny and warm, so that, by the end of the month, insect life cycles were considerably more advanced than in previous years, including 1987, which was itself 'early'. This was fortunate, in that it appeared to counteract the effects of the next four months, which were largely dull and wet. Though the season ended poorly, the disastrous results of the wet summer of 1985 were not repeated, and 1989 saw insect populations at reasonable levels.

Previous articles in this series have dealt with Lepidoptera alone. Records from other orders are included on this occasion, in the hope that they will provide wider interest.

Specific names and reference numbers of Lepidoptera are as in Bradley, J. D. & Fletcher, D.S., 1979, *A Recorder's Log Book or Label List of British Butterflies and Moths*. Specific names of Syrphidae are as in Stubbs, A. E. & Falk, S. J., 1983, *British Hoverflies*, and all others are as in the Check Lists of Kloet & Hincks. Most records refer to 1988, but a few others are included where appropriate.

### LEPIDOPTERA

11. *Eriocrania haworthi* Bradl., Gartlea, Loch Lomond, V.C.99, 13 to 18/4/88, several, ICC.

131. *Lampronia oehlmanniella* (Hub.), Loch Don, Isle of Mull, V.C.103, 18/6/88, ICC.

*Glasg. Nat. 21 part 5 (1990)*

132. *L. praelatella* (D. & S.), Carsaig, Isle of Mull, V.C.103, 13/6/88, ICC.
138. *L. fuscata* (Tengst.), Flanders Moss, Thornhill, V.C.87, 17/4/88, 10 old galls on birch twigs, 8 of which were parasitized; Braehead Moss, V.C.77, 23/4/88, one old gall, KPB.
145. *Nemophora minimella* (D. & S.), colony at Gartlea, Loch Lomond, V.C.99, late July 1988, ICC.
292. *Caloptilia leucapennella* (Steph.), Gartlea, Loch Lomond, V.C.99, 6/4/88, ICC.
414. *Argyresthia arcella* (Fab.), Oldhall, Paisley, V.C.76, 25/6/88, JM.
511. *Coleophora orbitella* Zell., Gartlea, Loch Lomond, V.C.99, 5/9/88, 4 larvae on birch, ICC.
512. *C. binderella* (Koll.), Carnwath Moss, V.C.77, 11/9/88, one case on birch, KPB.
530. *C. lixella* Zell., Carsaig, Isle of Mull, V.C.103, 16/6/88, many, ICC.
541. *C. pyrrehulipennella* Zell., Flanders Moss, Thornhill, V.C.87, 21/5/88, cased larva feeding on *Ledum groenlandicum*, ICC, and 7/9/88, cased larva feeding on bog myrtle, KPB. These are thought to be previously unrecorded food plants.
553. *C. striatipennella* Nyl., Carsaig, Isle of Mull, V.C.103, 16/6/88, ICC; Bac Mor, Treshnish Isles, V.C.103, 24/6/87, PW.
624. *Biselachista trapeziella* Stt., Finnich Glen, Drymen, V.C.86, 27/3/88, larva in *Luzula sylvatica* emerged 19/5/88, RKJ.
710. *Agonopteryx conterminella* (Zell.), Robertson Park, Paisley, V.C.76, 3/7/88, JM.
883. *Mompha raschkiella* (Zell.), Lagganulva, Isle of Mull, V.C.103, 11/6/88, ICC.
888. *M. propinquella* (Stt.), Scoor and Tavool, Isle of Mull, V.C.103, 7 and 9/8/88, ICC.
915. *Scythris picaepennis* (Haw.), Carsaig, Isle of Mull, V.C.103, 12/6/88, ICC; Ardmeanach, Isle of Mull, V.C.103, 26/6/85, PW.
924. *Hysterophora maculosana* (Haw.), Cathkin Braes and Cowglen Golf Course, Glasgow, V.C.77, 12/6/88, RKJ.
1059. *Acleris abietana* (Hub.), Kishorn, Loch Carron, V.C.105, 28/4/87, Philip Brown per KPB.
1257. *Cydia nigricana* (Fab.), colonies near Barrhead and at Paisley Moss, V.C.76, June-July 1988, JM.
1553. *Anthocharis cardamines* (L.), Orange-tip, Onich, Loch Linnhe, V.C.97, (12/5/88), PW.
1651. *Cilix glaucata* (Scop.), Chinese Character, Kilbirnie Loch, V.C.75, 30/5/88, JM.
1655. *Tethea or* (D. & S.), Poplar Lutestring, Scoor and Tavool, Isle of Mull, V.C.103, early August 1988, many larvae on aspen, ICC.
2010. *Odontotia carmelita* (Esp.), Scarce Prominent, Falls of Clyde, Lanark, V.C.77, early May 1988, RKJ.
2137. *Eurois occulta* L., Great Brocade, Barcaldine, Oban, V.C.98, 5/8/88, JCAC.
2385. *Spodoptera exigua* (Hub.), Small Mottled Willow, Barcaldine, Oban, V.C.98, 8 to 17/9/88, three, JCAC.
2440. *Plusia putnami* Grote, "Gracilis", Gartlea, Loch Lomond, V.C.99, 26/6/88 to 5/8/88, four, ICC; Oldhall, Paisley, V.C.76, 4/7/88, JM. First records for these sites.

## NEUROPTERA

## CHRYSOPIDAE

*Chrysopa perla* (L.), Newmilns, Ayrshire, V.C.75, 9/6/84, FRW; Bunhouse Road, Glasgow, V.C.77, 18/7/84, RS; Stevenston, Ayrshire, V.C.75, 22/6/88, EGH.

## HEMIPTERA

## NEPIDAE

*Nepa cinerea* L., Water Scorpion, Gallanach, Isle of Coll, V.C.103, 13/7/88, KPB.

## COLEOPTERA

## SILPHIDAE

*Dendroxena quadrimaculata* (Scop.), Glen Artney, Comrie, V.C.88, 29/5/88, RKJ; Rowardennan, Loch Lomond, 14/5/84, ICC.

## LUCANIDAE

*Sinodendron cylindricum* (L.), near Strathaven, V.C.77, 27/7/85, one female, EGH.

## GEOTRUPIDAE

*Geotrupes vernalis* (L.), Mingary, Ardnamurchan, V.C.97, 20/7/88, many, ICC; Ardmeanach, Isle of Mull, V.C.103, 13/6/89, ICC.

## SCARABAEIDAE

*Euchlora dubia* (Scop.), Stevenston, Ayrshire, V.C.75, 22/6/88, in sand dunes, EGH.

## HYMENOPTERA

## APIDAE

*Andrena cineraria* L., Tioran, Isle of Mull, V.C.103, 15/6/88, ICC.

## DIPTERA

## TIPULIDAE

*Ctenophora atrata* (L.), Mingary, Ardnamurchan, V.C.97, 8/6/88, two, ICC; Carsaig, Isle of Mull, V.C.103, 14/6/89, ICC.

*Tipula fascipennis* Meigen, Newmilns, Ayrshire, V.C.75, 8/7/84, FRW; Paisley Moss, V.C.76, 10/7/85, EGH; Comrie, V.C.87, 9/7/88, RS.

*Dicranota pavidata* (Haliday), Craighead Quarry, Girvan, V.C.75, 20/7/88, EGH.

*D. robusta* Lundstroem, Dungavel, Lanarkshire, V.C.77, 15/5/88, EGH.

*D. simulans* Lackschewitz, Dungavel, Lanarkshire, V.C.77, 29/5/88, EGH.

*Ula sylvatica* (Meigen), Linn Park, Glasgow, V.C.77, 16/6/87, EGH.

*Rhabdomastix edwardsi* Tjeder, Dungavel, Lanarkshire, V.C.77, 29/5/88, EGH.

*Ormosia aciculata* Edwards, near Strathaven, V.C.77, 16/5/85, EGH; Bennane Head, Ballantrae, V.C.75, 24/5/86, EGH.

*Molophilus bifidus* Goetghebuer, near Strathaven, V.C.77, 27 & 31/7/85, two, EGH.

*M. propinquus* (Egger), Dungavel, Lanarkshire, V.C.77, 29/5/88, EGH.

*M. pusillus* Edwards, Bennane Head, Ballantrae, V.C.75, 24/5/86; Brodick, Isle of Arran, V.C.100, 2/10/86; East Kilbride, V.C.77, 31/10/86; Chatelherault, Hamilton, V.C.77, 4/9/88, all EGH.

#### STRATIOMYIDAE

*Beris morrisii* Dale, Carmyle, Glasgow, V.C.77, 21/4/87, emerged from Giant Hogweed stem, EGH.

#### EMPIDAE

*Tachydromia morio* (Zetterstedt), Dungavel, Lanarkshire, V.C.77, 29/5/88, EGH.

*Clinocera fontinalis* (Haliday), River Nith, near Sanquhar, V.C.72, 25/4/86, EGH.

#### SYRPHIDAE

*Platycheirus melanopsis* Loew, Meall nan Gabhar, Succoth, Dalmally, V.C.98, 10/7/86, EGH.

*Dasysyrphus tricinctus* (Fallen), Torrinch, Loch Lomond, V.C.99, 4/6/88, several, ICC.

*Parhelophilus versicolor* (Fab.), Stevenston, Ayrshire, V.C.75, 22/6/88, EGH.

*Pipiza austriaca* Meigen, Shewalton Sandpits, Irvine, V.C.75, 18/7/87, EGH.

*Brachypalpoides lenta* (Meigen), Glasdrum, Loch Creran, V.C.98, 9/6/88, several, PW; Letterwalton, Loch Creran, V.C.98, 12/6/88, PW; Rowardennan, Loch Lomond, V.C.86, 4/6/83, ICC.

*Xylota sylvarum* (L.), Gartlea, Loch Lomond, V.C.99, 13/7/86, ICC.

*Microdon mutabilis* (L.), Carsaig to Shiaba, Ross of Mull, V.C.103, mid-June 1988, several, ICC.

#### OESTRIDAE

*Cephenemyia auribarbis* (Meigen), Deer Bot Fly, Carsaig Arches, Isle of Mull, V.C.103, 13/6/88, ICC.

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FRW — F. R. Woodward, Kelvingrove Art Gallery & Museum

PW — P. Wormell, 9 Letterwalton, Ledaig, Connel, Argyll

(See note at foot of page 583)

## Further Observations on the Lepidoptera of the Isle of Coll, Inner Hebrides

K. P. BLAND

35 Charterhall Road, Edinburgh EH9 3HS

The following species have been added to the recently published list of Lepidoptera recorded from the Isle of Coll (Bland, Christie & Wormell, 1987). The same notations are used.

### NEPTICULIDAE

+ \* 48. *Trifurcula cryptella* (Stt.); NM25; larval mines common in leaves of *Lotus corniculatus* on Eilean Eatharna, 15.vii.1988.

\* 116. *Stigmella lapponica* (Wocke); NM25; single vacated leafmine in *Betula pendula* near the Lodge, 13.vii.1988.

### INCURVARIIDAE

\* 132. *Incurvaria praelatella* ((D. & S.)); NM26; collected as leafmines in *Potentilla erecta* on Eilean Mòr, 28.vii.1988. Cases cut out 7.viii.1988.

### CHOREUTIDAE

\* 388. *Prochoreutis myllerana* (Fab.); NM15; reared from larvae on *Scutellaria galericulata* at Port an Dùine, 14.vii.1988.

### EPERMENIIDAE

\* 483. *Epermenia chaerophyllella* (Goeze); NM25; larvae on *Heracleum sphondylium* on Eilean Eatharna, 16.vii.1987, and in Arinagour, 20.vii.1988.

### COLEOPHORIDAE

\* 553. *Coleophora striatipennella* Tengs.; NM25; larval cases on seed-capsules of *Cerastium fontanum* on Eilean Eatharna, 15.vii.1988.

### ELACHISTIDAE

+ \* 626. *Biselachista serricornis* (Stt.); NM15; one by lochan near Dùn Dubh, 16.vii.1988.

### OECOPHORIDAE

\* 706. *Agonopterix nervosa* (Haw.); NM25; one taken near New Pier by M. Harper, vi.1988.

### GELECHIIDAE

+ \* 780. *Bryotropha similis* (Stt.); NM25,26; one taken at Eileraig Bay,

*Glasg. Nat. 21 part 5 (1990)*

13.vii.1985 and one on Eilean Eatharna, 16.vii.1987.

+ \* 792. *Mirificarma mulinella* (Zell.); NM15; two beaten from *Ulex europaeus* at Ballard, 17.vii.1988.

#### MOMPHIDAE

+ \* 883. *Mompha raschkiella* (Zell.); NM25; leafmines in *Epilobium angustifolium* near Loch an Dùin, 13.vii.1988.

#### TORTRICIDAE

+ \* 1168. *Gypsonoma sociana* (Haw.); NM25; singletons to light at Arinagour, 12/13.vii.1987 and 13/14.vii.1988.

+ \* 1239. *Pammema rhediella* (Clerck); NM15; reared from larvae in fruits and leaves of cultivated Apple from Grishipoll, vii.1987.

\* 1271. *Cydia gallicana* (Guen.); NM26; reared from larvae in seedheads of *Daucus carota* at Cornaigbeg, ix.1986. Also one imago at Cornaigbeg, 21.vii.1988.

#### GEOMETRIDAE

\* 1740. *Epirrhoe galiata* ((D. & S.)); NM25; one to light at Arinagour, 15/16.vii.1988.

\* 1860. *Chloroclystis rectangulata* (Linn.); NM25; one to light at Arinagour, 15/16.vii.1988.

\* 1961. *Campaea margaritata* (Linn.); one to light at Arinagour, 11/12.vii.1987.  
1969. *Dyscia fagarja* (Thunb.); NM26; one male at Creag nan Clamhan, 21.vii.1988 thus confirming the continued presence of this species on the island. Last seen 1947.

#### Additional recorded grid squares:—

*Hepialus humuli* NM25; *Stigmella serella* NM26; *Monopis laevigella* NM25; *Phyllonorycter emberizaepenella* NM15; *Coleophora viminella* NM15; *Philedonides lunana* NM25; *Acleris hastiana* NM15; *A.hyemana* NM26; *Epiblema uddmanniana* NM15; *Eucosma campoliliana* NM25; *E.hohenwartiana* NM15; *Pyrausta cespitalis* NM25; *Mutuuraia terrealis* NM15,25; *Xanthorhoe designata* NM25; *Eulithis populata* NM25; *E.pyraliata* NM25; *Perizoma didymata* NM25; *Eupithecia satyrata* NM15; *E.absinthiata* NM26; *E.distinctaria* NM15; *Aplocera plagiata* NM25; *Selidosema brunnearia* NM25.

#### Additional pabulum recorded on Coll:—

*Caloptilia stigmatella* — *Populus nigra*; *Plutella xylostella* — *Nasturtium officinale*; *Endrosis sarcitrella* — Wheatear's nest; *Philedonides lunana* — *Myrica gale*, *Lotus corniculatus*; *Cnephasia conspersana* — *Antennaria dioica* flower-heads; *Acleris hyemana* — *Salix repens*; *A.variegana* — *Corylus avellana*; *Pieris napi* — *Nasturtium officinale*; *Lasiocampa quercus callunae* — *Salix repens*; *Saturnia pavonia* — *Filipendula ulmaria*; *Eulithis testata* — *Salix aurita*; *Eupithecia satyrata* — *Potentilla erecta*; *E. absinthiata* — *Centaurea nigra* flowers; *E.distinctaria* — *Thymus drucei* flowers; *Opisthagraptis luteolata* — *Sorbus aucupariae*; *Phalera bucephala* — *Quercus ?robur*; *Acronicta euphorbiae* — *Rumex longifolium*, *Filipendula ulmaria*; *Euplexia lucipara* — *Pteridium aquilinum*, *Dryopteris filix-mas*.

#### Additional comments:—

263. *Lyonetia clerkella* Three imagines were taken at light in Arinagour,

vii. 1988 but no larval mines were seen in the village.

685. *Levipalpus hepatariella* The larvae of this species has now been discovered to feed on *Antennaria dioica* in Europe.

1799. *Operophtera brumata* Two small bushes of *Prunus spinosa* are still present near the Church (vii.1988).

### Acknowledgments

I am grateful to Dr Michael Harper for allowing me to include his record of *Agonopterix nervosa*.

### Reference

BLAND, K. P., CHRISTIE, I. C. & WORMELL, P. 1987. The Lepidoptera of the Isle of Coll, Inner Hebrides. *Glasgow Naturalist* 21(3), 309-330.

### The late Mr E. C. Pelham-Clinton: an appreciation.

The contributors to the *Insect Records from the West of Scotland* series were dismayed to learn of the death of Mr E. C. Pelham-Clinton at Christmas 1988. The recent revival of interest in Scottish Lepidoptera has been due largely to his example and enthusiasm, and has been sustained by his willingness to identify any specimen, no matter how worn. His knowledge of the Scottish fauna was unique, gained from many years of painstaking study, and was shared with all who sought his advice. At the same time, on the rare occasion when it was possible to show him something new, the nugget of information was received with obvious pleasure, and added to his store. He is sorely missed by us all. His name lives on in the little moth *Scrobipalpa clintoni* Povolny, which he first found in Ardnamurchan, and is now known to inhabit many shores of the western mainland and the Hebrides.

I. C. C.

## Errata and Corrigenda

### Volume 20

- p. 451, line 8: for "V.C. 100, Clyde Isles" read "V.C.75, Ayrshire".  
 453, last line: for "sea spring" read "sea spray".

### Volume 21

- p. 10, line 43: for "*striastrum*" read "*striatum*".  
 23, line 31: for "*Shoenus*" read "*Schoenus*".  
 24, line 23: for "*campestris*" read "*pseudoplatanus*".  
 30, line 34: for "Foxlove" read "Foxglove".  
 31, line 3: for "*scottica*" read "*scotica*".  
     line 5: for "*nemerosa*" read "*nemorosa*".  
 34, line 43: "*Carex flacca*" is now officially "Glaucous Sedge".  
 35, line 41: for "*oderatum*" read "*odoratum*".  
 36, line 41: for "*pseudoplanatus*" read "*pseudoplatanus*".  
 37, line 19: for "*pseudoplanatus*" read "*pseudoplatanus*".  
 75, line 18: for 78 read 77, line 29; p. 76, line 25; p. 77, lines 18, 23, 29;  
     p. 78, lines 6, 18, 43; p. 79, line 10: for "GHNS" read  
     "GNHS".  
 79, line 19: after "Meek" insert "GNHS – Glasgow Natural History  
     Society".  
 113, line 7: for "nettle stems" read "heather stems".  
 176, line 36: for "hear" read "near".  
 178, delete lines 35 and 36.  
 193, under heading 1969 column 4 and heading 1981 column 4 for  
     "CBB" read "GBB; line 10 (Egamol) under heading 1969,  
     column 4 for "61" read "16".  
 237, line 2: for "5" read "6".  
 361, line 14: for 000 read 360.  
 382, line 12: for "*Fontanalis*" read "*Fontinalis*".  
 443, line 39: for "Balcaldine" read "Barcaldine".  
 459, line 12: for "*Cystopterus*" read "*Cystopteris*".  
 464, line 27: for "*arenaria*" read "*arenarius*".  
 473, line 7: for "spp." read "ssp".  
 492, line 25: for "another generation of the bugs" read "another  
     generation of larvae".  
 501, line 9: for 000 read 500.

*(The editor is grateful to members who noted the errors listed above.)*

# The Natural History of the Muck Islands, North Ebudes

## 6. Moths and Butterflies

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The Lepidoptera of the Inner Hebrides, and especially of the more northerly isles (V.C. 103, Mid Ebudes and V.C. 104, North Ebudes) have been extensively studied during the last half century and detailed lists are available for several islands. The Isle of Muck (514 ha), the smallest inhabited island amongst the Small Isles of Inverness-shire, and its uninhabited satellites, Horse Island (21 ha), Lamb Island (2.7 ha) and Eagamol (1.7 ha) have, however, been practically ignored by lepidopterists and the only published records appear to be those of Harrison (1938a, 1938b, 1941, 1946), of McEwen (1985) and of Christie (1985, 1986). The purpose of this paper is to rectify this gap in our knowledge. The geology, topography and vegetation of the Muck Islands have been described by Dobson and Dobson (1985) and need not be repeated here.

### Methods

Some 33 visits, varying in duration from one to 20 days, were made to the islands between the years 1977 and 1988 and all months except October, were covered. All parts of Muck and Lamb Island, apart from private gardens, were visited repeatedly and the tidal Horse Island was visited whenever possible. Eagamol, accessible only by boat was visited three times. The islands are divided

among four 10km squares of the National Grid, NM 37, 38, 47 and 48, with by far the greatest area and the greatest diversity of habitat occurring in square 47. Consequently this square was worked more extensively and was recorded more completely than the others.

Methods of collecting included sweep-netting and beating of foliage; examination of foliage, plant stems, etc.; extraction of moss, lichen and litter samples by Tullgren funnel; year-round pit-fall trapping and the use of a portable "Heath" ultra-violet light trap. Identifications were checked in many cases by examination of the genitalia and/or by reference to recognised authorities. Voucher specimens are retained in the author's collection.

## Results

Species found in the Muck Islands are listed below with details of their habitats, distribution and abundance. Also, to enable comparisons to be made, the occurrence of these species in other islands within the North and Mid-Ebudes and also in the Outer Hebrides is indicated. These records, too numerous to attribute to individual authors in the text, have been derived from the literature as follows: Canna and Sanday — Bertram, 1939; Campbell, 1970; Eigg — Kevan, 1940; Coll — Bland, Christie and Wormell, 1987; Bland, 1990; Rum, Canna and Coll — Wormell, 1982, 1983; Outer Hebrides — Waterston, 1981.

### List of species

Species are listed with scientific names as in Kloet and Hincks (1972) with corrections by Emmet (1987). The order of entry, the reference numbers and the common names are as in Bradley and Fletcher (1986). Place names are as in Dobson & Dobson (1985) and Dobson (1987). M=Muck; L=Lamb Island; H=Horse Island; Ea=Eagamol; Ca=Canna; Cl=Coll; E=Eigg; R=Rum; OH=Outer Hebrides, V.C. 110; 37,38,47,48=10km National Grid square (NM). Records in bold brackets, ( ), from literature are not confirmed by present survey. Species marked \* were verified by dissection of genitalia.

#### MICROPTERIGIDAE

\*4. *Micropteryx aruncella* (Scop.); M,H;38,47,48; common and widespread; (Ca, Cl, R. OH).

## HEPIALIDAE

14. *Hepialus humuli* (Linn.), Ghost Moth; M;48; few at light, Gallanach, late June; (Ca,Cl,E,R,OH).

15. *H. sylvina* (Linn.), Orange Swift; M;47; one at light, Central Lochan E., 4/8/82; (R,Ca).

18. *H. fusconebulosa* (DeG.), Map-winged Swift; M; 47,48; common and widespread; (Ca,Cl,E,R,OH).

## NEPTICULIDAE

66. *Stigmella sorbi* (Stt.); M;47; larval mines on leaves of *Sorbus aucuparia*; (Cl,R,OH).

## ZYGAENIDAE

169. *Zygaena filipendulae* (Linn.), Six-spot Burnet; M,H;38,47; common, widespread; larvae on *Lotus corniculatus*; (Ca,Cl,E,R,OH).

172. *Z. purpuralis caledonensis* Reiss, Transparent Burnet; M,H;38,47; common and widespread; (Ca,Cl,E,R). (Rec. MacEwen, 1985, M.).

## TINEIDAE

\*228. *Monopis weaverella* (Scott.); M;47; one at Port Mor, 24/5/84.

## OCHSENHEIMERIIDAE

\*252. *Ochsenheimeria urella* (F.vR.) (= *bisontella* (L.&Z.)); M;47; few, Camas Mor and Wire Park, early Aug.; (Ca,Cl,R).

## GRACILLARIIDAE

293. *Caloptilia syringella* (Fabr.); M;47; larvae in leaf rolls on *Fraxinus excelsior* in Wire Park Plantation; (Ca,Cl,R,OH).

\*341. *Phyllonorycter maestingella* (Mull.); M;47; one on *Sorbus aucuparia* in Central Wood, 21/5/85; (R,OH).

## CHOREUTIDAE

\*385. *Anthophila fabriciana* (Linn.); M,H;38,48; common, mostly on *Urtica dioica*; (Ca,Cl,R,OH).

## GLYPHIPTERIGIDAE

\*391. *Glyphipterix simplicella* (Steph.), Cocksfoot Moth; M,H;38,47; locally abundant; (Cl,OH).

\*397. *G. thrasonella* (Scop.); M,H;37,38,47,48; widespread and common; (Ca,Cl,R,OH).

## YPONOMEUTIDAE

\*418. *Argyresthia conjugella* Zell., Apple Fruit Moth; M;47; one in Port Mor Wood, 8/7/81; (Ca,Cl,R,OH).

\*424. *Yponomeuta evonymella* (Linn.), Bird-cherry Ermine; M;48; one at light near road, mid-Muck, 2/8/82; (Ca,R).

460. *Ypsolopha parenthesella* (Linn.); M;47; one at light, Rock Park Plantation, 7/9/82, (checked by Pelham-Clinton); (R).

464. *Plutella xylostella* (Linn.), Diamond-back Moth; M;47; not uncommon; (Ca,Cl,R,OH).

#### COLEOPHORIDAE

\*553. *Coleophora striatipennella* Tengs.; M;48; one near Gallanach; (Ca,Cl).

#### ELACHISTIDAE

\*601. *Elachista albifrontella* (Hubn.); M;47; one in Central Wood, 14/7/81; (Ca,Cl,R,OH).

\*603. *E. subnigrella* Dougl.; M;48; one in bogs near N. coast, 3/8/80 (noted by Christie, 1985; (Ca,Cl).

\*610. *E. argentella* (Clerck); M,H,Ea;38,48; widespread, locally common; (Ca,Cl,R).

\*633. *Cosmiotes stabilella* (Stt.); M;47; not uncommon in Central Wood.

#### OECOPHORIDAE

\*647. *Hofmannophila pseudospretella* (Stt.), Brown House-moth; M;47,48; a pest in some buildings, also in fields by Central Lochan W.; (Ca,Cl,R,OH).

648. *Endrosis sarcitrella* (Linn.), White-shouldered House-moth; M;47,48; common in buildings, also found in field; (Ca,Cl,R,OH).

\*676. *Depressaria pulcherrimella* (Stt.); M,H;38,47,48; common and widespread (palp also examined).

\*688. *Agonopteryx heracliiana* (Linn.); M;47,48; two records, Port Mor and Gallanach, Mar.-Apr.; (Ca,Cl,R,OH).

#### GELECHIIDAE

\*787. *Bryotropha terrella* (D.&S.); M;L;47,48; widespread, probably common; (Ca,Cl,R,OH).

\*797. *Neofaculta ericetella* (Geyer); M;47; one near Beul nan Fang, 10/6/82; (Ca,Cl,R,OH).

811. *Scrobipalpa samadensis plantaginella* (Stt.); M;48; pupa in root of *Plantago coronopus*, Coralag, June '88; (Ca,Cl,R,OH).

\*817. *S. clintoni* Pov.; M,H;38,47,48; larval holes common in old stems of *Rumex crispus* (det. Knill-Jones), one adult at Port Mor (noted by Christie, 1986); (Ca).

820. *S. artemisiella* (Treits.), Thyme Moth; M;47; one on cliff-tops E. of Camas Mor; 21/6/82, (det. Pelham-Clinton); (Ca,Cl,R).

#### MOMPHIDAE

\*899. *Pancalia leuwenhoekella* (Linn.), M;48; one in pitfall trap near Am Maol (noted by Christie, 1985).

#### COCHYLIDAE

\*936. *Cochylimorpha straminea* (Haw.); M;48; one at light, Toaluinn, 14/7/82; (Ca,Cl,OH).

\*954. *Eupoecilia angustana* (Hubn.); M;48; common at Gallanach; (Ca,Cl,R,OH).

\*960. *Falseuncaria ruficiliana* (Haw.); M;47; one at light, Port Mor Wood, 20/5/81; (Ca,Cl,R,OH).

## TORTRICIDAE

- \*1029. *Eana osseana* (Scop.); M;47,48; common and widespread; (Ca, Cl, R, OH).
- \*1031. *E. penziana colquhounana* Barr.; M;37,47,48; common and widespread; (Cl; as *penziana* (Thun. & Beck.) Ca, R, OH).
- \*1041. *Acleris sparsana* (D. & S.); M;47; two bred out of leaves of *Acer pseudoplatanus*, Port Mor Wood; (Ca, R, OH).
- \*1043. *A. aspersana* (Hubn.); M;47,48; common and widespread, comes to light; (Ca, Cl, R, OH).
1055. *A. hyemana* (Haw.); M;37,47,48; widely distributed (det. Pelham-Clinton); (Cl, R, OH).
- \*1076. *Olethreutes lacunana* (D. & S.); M;48; one, Toaluinn 13/7/82; (Cl, R, OH).
- \*1109. *Lobesia littoralis* (H. & W.); M;37; one near N. W. coast, 17/7/81; (Ca, Cl, R, OH).
- \*1111. *Bactra lancealana* (Hubn.); M, H;38,47,48; widely distributed; (Ca, Cl, R, OH).
- \*1159. *Rhobopota naevana* (Hubn.) (= *unipunctana* (Haw.)), Holly Tortrix; M;48; one, Aird nan Uan, 6/8/82; (Cl).
- \*1163. *Zeiraphera ratzeburgiana* (Ratz.); M;47; one on larch, Central Wood, 25/7/82. (N.B. This is distinct from the Larch Tortrix *Z. diniana* (Guen.) which occurs in Ca, Cl and R).
- 1184a. *Epiblema cirsiana* Zell; M;48; few, Gallanach and Wire Park Plantation areas; (det. Pelham-Clinton); (?Cl, reared from *Cirsium palustre*).
- \*1201. *Eucosma cana* (Haw.); M;48; occasionally at light in mid-July, Gallanach; (Ca, Cl, R, OH).
- \*1271. *Cydia gallicana* (Guen.); M;37; one, Achadh na Creige, 11/7/82, (noted by Christie, 1985); (Ca, Cl).
- \*1282. *Dichrorampha montanana* (Dup.); M;48; common at and near Gallanach (det. Bland); (Ca, Cl, OH).

## PYRALIDAE

- \*1293. *Chrysoteuchia culmella* (Linn.); M;37,38,47,48; common and widespread; (Ca, Cl, R, OH).
- \*1301. *C. lathoniellus* (Zinck.) (= *pratella* (Linn.) sensu auctt., = *nemorella* (Thun.) sensu auctt.); M;47,48; common; (Ca, Cl, R, OH).
- \*1302. *C. perlella* (Scop.); M;47,48; common; (Ca, Cl, R, OH).
- \*1304. *Agriphila straminella* (D. & S.); M;47,48; common; (?Ca, Cl, R, OH).
- \*1309. *A. geniculea* (Haw.); M;47; one, Camas Mor, 7/80; (Ca, Cl, R).
- \*1333. *Scoparia pyralella* (D. & S.) (= *arundinata* (Thun.) = *dubitalis* (Hubn.); M;47; common; (Ca, Cl).
- \*1342. *Eudonia angustea* (Curt.); M;47; common; (Cl, OH).
1345. *Elophila nymphaea* (Linn.), Brown China-mark; M;47; common near Central Lochans; (Ca, Cl, R, OH).
- \*1365. *Pyrausta cespitalis* (D. & S.); M;38,47,48; widespread; (Ca, Cl, R, OH).
- \*1379. *Mutuuraia terrealis* (Treits.); M;48; one at light, Gallanach, 29/6/88; (Cl, R).
- \*1388. *Udea lutealis* (Hubn.) (= *elutalis* (D. & S.) sensu auctt.); one at light, Central Wood, 3/8/80; (Ca, Cl, E, R, OH).
1428. *Aphomia sociella* (Linn.), Bee Moth; M;47; one near Central Lochan E., 4/8/82; (det. Knill-Jones); (Ca, Cl, R, OH).

\*1462. *Pempeliella diluta* (Haw.) (= *dilutella* (Hubn.) sensu auct.); M;37,48; widespread; (Ca,Cl,R).

#### PTEROPHORIDAE

1502. *Platyptilia isodactylus* (Zell.); M;48; one at light, Toaluinn, 15/7/82 (det. Pelham-Clinton); (Ca,Cl,R,OH).

#### PIERIDAE

1549. *Pieris brassicae* (Linn.), Large White; M;48; common near Gallanach farm and gardens; (Ca,Cl,E,R,OH).

1551. *P. napi* (Linn.), Green-veined White; M,H;38,47,48; abundant and generally distributed (rec. Harrison, 1938b, M,H); (Ca,Cl,E,R,OH).

#### LYCAENIDAE

1555. *Callophrys rubi* (Linn.), Green Hairstreak; M;47,48; few in May; (Ca,Cl,R).

1574. *Polyommatus icarus* (Rott.), Common Blue; M,H;38,47,48; common, ubiquitous; (Ca,Cl,E,R,OH).

#### NYMPHALIDAE

1590. *Vanessa atalanta* (Linn.), Red Admiral; M;47,48; occasionals between May and Aug. No evidence of breeding; (Ca,Cl,R,OH). (Rec. MacEwen, 1985, M).

1591. *Cynthia cardui* (Linn.), Painted Lady; common, larvae on thistles; (Ca,Cl,R,OH). (Rec. MacEwen, 1985, M).

1593. *Aglais urticae* (Linn.), Small Tortoiseshell; M;47,48; common, larvae on nettles (rec. Harrison 1938b, M,H); (Ca,Cl,E,R,OH).

1607. *Argynnis aglaja* (Linn.), Dark Green Fritillary; M;37,48; common some years, especially so in '78; (Ca,Cl,E,R,OH).

#### SATYRIDAE

1614. *Pararge aegeria* (Linn.), Speckled Wood; M;47; common in and around Central Wood; (Ca,R). (Rec. MacEwen, 1985, M).

1621. *Hipparchia semele* (Linn.), The Grayling; M;37,47; small breeding population present; (Ca,Cl,E,R,OH). (Rec. MacEwen, 1985, M).

1626. *Maniola jurtina* (Linn.), Meadow Brown; M;47; common and widespread; (Ca,Cl,E,R,OH).

1627. *Coenonympha pamphilus* (Linn.), Small Heath; M;37,47,48; common and ubiquitous (rec. Harrison, 1938b, M); (Ca,Cl,E,R,OH).

#### LASIOCAMPIDAE

1637. *Lasioampa quercus callunae* Pal., Northern Eggar; M;37,47,48; widespread and breeding; (Ca,Cl,E,R,OH). (Rec. MacEwen, 1985, M).

1638. *Macrothylacia rubi* (Linn.), Fox Moth; M;47,48; widespread and breeding; (Ca,Cl,E,R,OH).

1640. *Philudoria potatoria* (Linn.), The Drinker; M;47,48; common and widespread, breeding; (Ca,Cl,E,R). (Rec. MacEwen, 1985, M).

## SATURNIIDAE

1643. *Pavonia pavonia* (Linn.), Emperor Moth; M;47; small breeding population on *Calluna vulgaris*, Beinn Airein; (Ca,Cl,E,R,OH). (Rec. MacEwen, 1985, M).

## GEOMETRIDAE

\*1719. *Orthonama vittata* (Borkh.), Oblique Carpet; M;47;48; few at light; (Ca,Cl,R,OH).

\*1722. *Xanthorhoe designata* (Hufn.), Flame Carpet; M;47; not uncommon; (Ca,Cl,R,OH).

\*1723. *X. munitata* (Hubn.), Red Carpet; M;47,48; few in mid-July; (Ca,Cl,R,OH).

\*1725. *X. ferrugata* (Clerck), Dark-barred Twin-spot Carpet; M;47,48; widely distributed; (Ca,Cl,R,?OH).

\*1727. *X. montanata* (D. & S.), Silver-ground Carpet; M;47,48; common (rec. Harrison, 1946, M); (Ca,Cl,E,R,OH).

\*1728. *X. fluctuata* (Linn.), Garden Carpet; M;47,48; common and widespread; (Ca,Cl,R,OH).

\*1732. *Scotopteryx chenopodiata* (Linn.), Shaded Broad-bar; one, Camas Mor, 5/8/82; (Ca,Cl,E,R,OH).

\*1740. *Epirrhone galiata* (D. & S.), Galium Carpet; M;47; one at light, Port Mor, 15/6/82; (Ca,Cl).

1742. *Campptogramma bilineata* (Linn.), Yellow Shell; M;37; one, N.W. Muck, 11/7/81; (Ca,Cl,E,R,OH).

\*1743. *Entephria flavicinctata* (Hubn.), Yellow-ringed Carpet; M;47; one at light, Am Maol, 5/8/82; (Ca,Cl,R,OH).

\*1746. *Anticlea badiata* (D. & S.), Shoulder Stripe; M;47; one at light, Rock Park Wood, 13/5/82; (Ca,Cl,R).

\*1747. *A. derivata* (D. & S.), The Streamer; M;47; one at light, Central Wood, 19/5/83; (Ca,R).

\*1752. *Cosmorhoe ocellata* (Linn.), Purple Bar; M;47,48; at light, common and widespread; (Ca,Cl,R,OH).

\*1753. *Nebula salicata* (Hubn.), Striped Twin-spot Carpet; M;47; at light, common and widespread; (Ca,Cl,R,OH).

\*1755. *Eulithis testata* (Linn.), The Chevron; M;47,48; at light, widely distributed; (Ca,Cl,R,OH).

1756. *E. populata* (Linn.), Northern Spinach; M;47; one at light, Port Mor, 17/7/82; (Ca,Cl,E,R,OH).

\*1758. *E. pyraliata* (D. & S.), Barred Straw; M;47; one at light, Port Mor, 16/7/82; (Cl).

\*1762. *Chloroclysta citrata* (Linn.), Dark Marbled Carpet; M;47,48; at light, widespread; (Ca,Cl,E,R,OH).

\*1764. *C. truncata* (Hufn.), Common Marbled Carpet; M;47; one by Central Lochan E., 4/8/82; (Ca,Cl,E,R,OH).

\*1768. *Thera obeliscata* (Hubn.), Grey Pine Carpet; M;47; common in wooded areas; (Ca,Cl,R,OH).

\*1770. *T. cognata* (Thunb.), Chestnut-coloured Carpet; M;47,48; uncommon; (Ca,Cl,R,OH).

\*1775. *Colostygia multistrigaria* (Haw.), Mottled Grey; M;47; uncommon (rec. Harrison, 1946, M); (Ca,Cl,R).

\*1777. *Hydriomena furcata* (Thunb.), July Highflyer; M;37,48; few in

swamps, larvae on *Salix aurita* (det. Knill-Jones) (larvae very common on hazel and willow, E,M,R, Harrison, 1946); (Ca,Cl,R,OH).

\*1778. *H. impluviata* (D. & S.), May Highflyer; M;47; one at light, Central Wood, 19/5/83; (Ca,R,OH).

\*1799. *Operophtera brumata* (Linn.), Winter Moth; M;37; larva on *Salix aurita*, 23/5/83 (det. Knill-Jones); (Ca,Cl,R,OH).

\*1807. *Perizoma albulata* (D. & S.), Grass Rivulet; M,H;38,48; uncommon; (Ca,Cl,E,R,OH).

\*1817. *Eupithecia pulchellata hebudium* Sheld, Foxglove Pug; M;47,48; single records from Camas na Cairidh, Port Mor and Gallanach in June; (*pulchellata* Steph. from Ca,R,OH).

\*1830. *Eupithecia absinthiata* (Clerck); Wormwood Pug; M;47; common at Port Mor; (Ca,Cl,R).

\*1837. *E. subfuscata* (Haw.), Grey Pug; M;47; one at light, Central Wood, 13/6/82; (Ca,Cl,R,OH).

\*1843. *E. distinctaria* H.-S., Thyme Pug; M;47; two at light, Gallanach area, June; (Ca,Cl,R,OH).

\*1846. *E. nanata* (Hubn.), Narrow-winged Pug; one at light, Taoluinn, 14/7/82; (Ca,Cl,E,R,OH).

\*1851. *E. virgaureata* Doubl., Golden-rod Pug; M;47; common in Central Wood; (Ca,Cl,R).

\*1867. *Aplocera plagiata* (Linn.), Treble-bar; M;47,48; widely distributed; (Ca,Cl,R,OH).

\*1884. *Abraxas grossulariata* (Linn.), The Magpie; M;37,47,48; common and widespread; (Ca,Cl,E,R,OH).

\*1902. *Petrophora chlorosata* (Scop.), Brown Silver-line; M;47; two at light, Central Wood, 23/5/85; (Ca,R).

\*1906. *Opisthograptis luteolata* (Linn.), Brimstone Moth; M;47,48; two records, Port Mor and Gallanach, at light, mid-June (Ca,Cl,E,R,OH).

1917. *Selenia dentaria* (Fabr.), Early Thorn; M;47; two records, Rock Park Plantation and Central Wood, at light, mid-May; (Ca,R).

1920. *Odontopera bidentata* (Clerck), Scalloped Hazel; M;47; one, Port Mor Wood, 20/5/81; (Ca,R,OH).

1928. *Lycia zonaria* (D. & S.), Belted Beauty; M,H;37,38,47,48; common and widespread, larvae feeding on *Iris pseudacorus* (det. MacLaurin); (Ca,Cl,R,OH). (Rec. MacEwen, 1985, M).

1941. *Alcis repandata* (Linn.), Mottled Beauty; M;47; one at light, Square Wood, 12/7/81; (Ca,Cl,R,OH).

1952. *Ematurga atomaria* (Linn.), Common Heath; M;47; one, Uchd 'a Ghraillair, 22/5/85; (Ca,Cl,R,OH).

1955. *Cabera pusaria* (Linn.), Common White Wave; M;47; few in Central Wood, June-July; (Ca,Cl,R,OH).

\*1962. *Hylaea fasciaria* (Linn.), Barred Red; M;47; one, Port Mor Wood, 26/7/84; (Ca,R).

\*1963. *Gnophos obfuscatus* (D. & S.), Scotch Annulet; M;47,48; few at light, Central Wood and near road, mid-Muck, early Aug.; (Ca,Cl,R,OH).

\*1964. *G. obscuratus* (D. & S.), the Annulet; M;48; one at light, Am Maol, 5/8/82; (Ca,Cl,R).

\*1969. *Dyscia fagaria* (Thunb.), Grey Scalloped Bar; M;48; one at light, Gallanach, 27/6/86; (Ca,Cl,R,OH).

## SPHINGIDAE

1981. *Laothoe populi* (Linn.), Popular Hawk-moth; M;48; occasionals at light in June, larvae on *Salix aurita*; (Ca,Cl,R).

## NOTODONTIDAE

1995. *Cerura vinula* (L.), Puss Moth; M;47; larva on *Salix aurita*; (Ca,Cl,R,OH). (Rec. MacEwen, 1985, M).

## ARCTIIDAE

2036. *Setina irrorella* (L.), Dew Moth; M;47; common and widespread; (Ca,R).

(2056. *Parasemia plantaginis* L., Wood Tiger. (Rec. by Harrison, 1946, M,R); (Ca,Cl,E,R,OH)).

2057. *Arctia caja* (L.), Garden Tiger; M;37,47,48; adults and larvae common and widespread; (Ca,Cl,E,R,OH).

2060. *Spilosoma lubricipeda* (L.), White Ermine; M;47,48; local; (Ca,Cl,E,R,OH).

2061. *S. luteum* (Hufn.), Buff Ermine; M;47,48; common and widespread; (Ca,Cl,R,OH).

(2064. *Phragmatobia fuliginosa* L., Ruby Tiger. Rec. by Harrison, 1946, as common on heather in M,R; (Ca,Cl,R,OH).)

## NOCTUIDAE

2080. *Euxoa obelisca* (D. & S.), Square-spot Dart; M;48; one at light near road, mid-Muck, 2/8/82; (Ca,R).

\*2081. *E. tritici* (L.), White-line Dart; M; one, early Aug. '82, (Ca,Cl,R,OH).

2089. *Agrotis exclamationis* (L.), Heart and Dart; M;47,48; common and widespread; (Ca,Cl,R,OH).

2102. *Ochropleura plecta* (L.), Flame Shoulder; M;47,48; common and widespread; (Ca,Cl,E,R,OH).

2104. *Standfussiana lucernea* (L.), Northern Rustic; M;47,48; common and widespread; (Ca,Cl,R,OH).

2107. *Noctua pronuba* (L.), Large Yellow Underwing; M;47,48; abundant and widespread. (Rec. by Harrison, 1946, as abundant everywhere); (Ca,Cl,E,R,OH).

2109. *N. comes* (Hb.), Lesser Yellow Underwing; M;37,47,48; common and widespread; (Ca,Cl,E,R,OH).

2111. *N. janthina* (D. & S.); Lesser Broad-bordered Yellow Underwing; M;47,48; common and widespread; (Ca,Cl,R,OH).

2117. *Paradiarsia glareosa* (Esp.), Autumnal Rustic; M;47,48; occasional; (Ca,Cl,R,OH).

2118. *Lycophotia porphyrea* (D. & S.), True Lovers Knot; M;47,48; common and widespread; (Ca,Cl,E,R,OH).

\*2120. *Diarsia mendica* (F.), Ingrailed Clay; M;48; one near Gallanach, 1/7/88; (Ca,Cl,?E as *Graphiphora festiva* Hb.,R,OH).

\*2124. *D. florida* (Schm.), Fen Square-spot; M,H;38,47,48; common and widespread (confirmed. Pelham-Clinton); (Cl).

2128. *Xestia triangulum* (Hufn.), Double Square-spot; M;48; one at Toalunn, 15/7/82; (Cl,R).

\*2130. *X. baja* (D. & S.), Dotted Clay; M;47; occasional; (Ca,Cl,R,OH).

\*2133. *X. sexstrigata* (Haw.), Six-striped Rustic; M;48; one at Camas na

Cairidh; (Ca,Cl,R,OH).

\*2134. *X. xanthographa* (D. & S.), Square-spot Rustic; M;47,48; occasional. (Rec. Harrison, 1946, M,E); (Ca,Cl,R,OH).

\*2139. *Cerastis rubricosa* (D. & S.), Red Chestnut; M;47,48; occasional in woods; (Ca,Cl,R,OH).

\*2147. *Hada nana* (Hufn.), The Shears; M; 47,48; common in N. Muck; (Ca,Cl,R,OH).

2158. *Lacanobia thalassina* (Hufn.), Pale-shouldered Brocade; M;47; few in Central Wood; (Ca,R,OH).

\*2160. *L. oleracea* (L.), Bright-line Brown-eye; M;47,48; common and widespread; (Ca,Cl,E,R,OH).

\*2162. *Papestra biren* (Goeze), Glaucon Shears; M;47,48; occasionals at light; (Ca,R,OH).

\*2163. *Ceramica pisi* (L.), Broom Moth; M;47,48; common, widespread; (Ca,Cl,R,OH).

\*2166. *Hadena rivularis* (F.), The Campion; M;47,48; widespread; (Ca,Cl,R,OH).

\*2171. *H. confusa* (Hufn.), Marbled Coronet; M;48; two at Gallanach, 27/6/86; (Ca,Cl,R,OH).

\*2174. *H. caesia* (D. & S.), The Grey; M;47; one at Port Mor, 21/5/81, (Ca,R).

\*2176. *Cerapteryx graminis* (L.), Antler Moth; M;37,47,48; very common and widespread; (Ca,Cl,E,R,OH).

\*2187. *Orthosia cerasi* (F.) (= *stabilis* (D. & S.)), Common Quaker; few in Central Wood; (Ca,Cl,R).

(2190. *Orthosia gothica* L., Hebrew Character; Rec. Harrison, 1946, M. (Ca,Cl,R,OH).)

\*2198. *Mythimna impura* (Hb.), Smoky Wainscot; M;37,47,48; common and widespread; (Ca,Cl,E,R,OH).

\*2216. *Cucullia umbratica* (L.), The Shark; M;48; one near Camas na Cairidh, 9/6/82; (Ca,Cl,R,OH).

\*2225. *Brachyolomia viminalis* (F.), Minor Shoulder-knot; M;48; one near Central Barn, 2/8/82; (Ca,Cl,R,OH).

\*2231. *Aporophyla lutulenta* (D. & S.), Deep-brown Dart; M;47; one, Central Wood, 5/6/82, (det. Pelham-Clinton); (Ca,Cl,R,OH).

\*2232. *A. nigra* (Haw.), Black Rustic; M;47,48; widespread; (Ca,Cl,R,OH).

\*2250. *Minotype adusta* (Esp.), Dark Brocade; M;47,48; widespread; (Ca,Cl,R?,OH).

\*2254. *Antitype chi* (L.), Grey Chi; M;48; one, Am Maol, 5/8/82; (Ca,Cl,R,OH).

\*2270. *Omphaloscelis lunosa* (Haw.), Lunar Underwing; M;47,48; widespread; (Ca,Cl,R).

\*2284. *Acronicta psi* (L.), Grey Dagger; M;48; one, Gallanach, 29/6/88; (Ca,Cl,R,OH).

\*2289. *A. rumicis* (L.), Knot Grass; M;48; occasional near Gallanach; (Ca,Cl,E,R,OH).

2303. *Thalpophila matura* (Hufn.), Straw Underwing; M;37,47,48; widespread; (Ca,Cl,R).

\*2305. *Euplexia lucipara* (L.), Small Angle Shades; M;47,48; widespread; (Ca,Cl,E,R,OH).

\*2321. *Apamea monoglypha* (Hufn.), Dark Arches; M;47,48; abundant and widespread; (Ca,Cl,E,R,OH).

2322. *A. lithoxyla* (D. & S.), Light Arches; M;48; one near Camas na

Cairidh, 9/6/82; (Ca,Cl,E,OH).

\*2326. *A. crenata* (Hufn.), Clouded-bordered Brindle; M;47,48; few at Port Mor and nr. Central Barn; (Ca,Cl,R,OH).

\*2329. *A. furva* (D. & S.), The Confused; M;47,48; widespread; (Ca,Cl,R,OH).

\*2330. *A. remissa* (Hb.), Dusky Brocade; M;47,48; common and widespread; (Ca,Cl,R,OH).

2340. *Oligia fasciuncula* (Haw.), Middle-barred Minor; M;48; few N. Muck; (Ca,Cl,R,OH).

\*2343. *Mesapamea secalis* (L.), Common Rustic; M;47,48; widespread; (Ca,Cl,E,R,OH).

2345. *Photodes minima* (Haw.), Small Dotted Buff; M;47,48; few in central area; (Ca,Cl,R,OH).

\*2350. *P. pygmina* (Haw.), Small Wainscot; M;47; several in central area; (Ca,Cl,R,OH).

2357. *Amphipoea lucens* (Freyer), Large Ear; M;48; several in N. Muck, (Det. Pelham-Clinton); (Ca,Cl,E,R,?OH).

\*2361. *Hydraecia micacea* (Esp.), Rosy Rustic; M;47,48; widespread; (Ca,Cl,R,OH).

2368. *Celaena leucostigma* (Hb.), The Crescent; M;47; one near Port Mor, 1/8/82; (Ca,Cl,R,E,OH).

\*2382. *Hoplodrina blanda* (D. & S.), The Rustic; M;47,48; few in central area; (Ca,Cl,R,OH).

2394. *Stilbia anomala* (Haw.), The Anomalous; M;48; two by Central Barn, 3/8/82; (Ca,Cl,R,OH).

2434. *Diachrysia chrysitis* (L.), Burnished Brass; M;37,47,48; common and widespread; (Ca,Cl,E,R,OH).

2439. *Plusia festucae* (L.), Gold Spot; M;37,47,48; common and widespread; (Ca,Cl,R,OH).

2441. *Autographa gamma* (L.), Silver Y; M;37,47,48; common and widespread; (rec. by Harrison, 1938a, M); (Ca,Cl,E,R,OH).

2442. *A. pulchrina* (Haw.), Beautiful Golden Y; M;47,48; widespread; (Ca,Cl,E,R,OH).

\*2450. *Abrostola triplasia* (L.), The Spectacle; M;47; widespread; (Ca,Cl,R,OH).

(2462. *Callistege mi* (Clerck), Mother Shipton; rec. Harrison, 1941; rare in M—Harrison, 1946; (M,R,OH).)

2474. *Rivula sericealis* (Scop.), Straw Dot; M;48; one near Rock Park, 13/7/82; (Ca—ms. correction to Campbell, 1970, Cl,R,OH).

2477. *Hypera proboscidalis* (L.), The Snout; M;48; one at Gallanach, 29/6/88; (Ca,Cl,R,OH).

## Discussion

This paper adds 170 species of Lepidoptera to the published lists for the Muck Islands bringing the present total from all sources to 196. Four of the species recorded previously were not found during the present survey but may have been overlooked because they occur elsewhere in the Small Islands group of Inverness-shire.

As might be expected, many species of Lepidoptera found in the Muck Islands also occur in the neighbouring islands. Allowing for uncertainties, about 178 of these species occur in Canna, 176 in Rum and 167 in Coll. There was also a marked similarity to the fauna of the Outer Hebrides, there being about 152 species in common. Six of the species recorded from the Muck Islands appear not yet to have been found in any of the other islands considered here.

The majority of species found are common and widely distributed in the U.K. but several, such as *Zygaena purpuralis caledonensis*, *Hadena caesia*, *Eupithecia pulchellata hebudium* and *Pararge aegeria*, are essentially West Coast and/or Hebridean forms. *Diarsia florida* has been found in Muck and Coll but its distribution elsewhere is uncertain because it is barely distinguishable from and hence much confused with *D. rubi* Vieweg. Several rarities were present. *Lycia zonaria*, a Red Data Book Species, is common both on Muck and Horse Island and *Mutuuraia terrealis*, which has been proposed as a Red Data Book Species (Bland *et al.*, 1987), was found once.

### Acknowledgments

I am grateful to Dr. K. P. Bland, Mr I. C. Christie, Dr. R. Knill-Jones, Mr A. M. McLaurin and the late Mr E. C. Pelham-Clinton for advice and for help with determinations, to Dr. J. L. Campbell, Mr P. Wormell and Mr J. R. Waterston for reprints of their publications and to Mr and Mrs Lawrence MacEwen for their generous hospitality and for permission to work on Muck. My wife, Ruth, as ever, provided constant support and encouragement.

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RUTH H. DOBSON (Librarian)

## Aberrant Greater Butterfly Orchids (*Platanthera chlorantha*) in the Glasgow Area

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Greater Butterfly Orchid (*Platanthera chlorantha* (Custer) Reichb.) occurs in nine of the 90 tetrads comprising the area being studied for a Flora of Glasgow (Dickson, 1984). In the southwest of the area on the north-facing railway embankment at Kennishead Road (National Grid Reference NS 536 601) a large stand (at least 50 plants covering c.50 square metres) was discovered in 1986. At one end of the population were three plants which at first glance looked sufficiently distinct to be taken for a different orchid. In 1987 there were about the same number of Greater Butterfly Orchids and four of the distinctive type. Only two of the distinctive type were seen in 1988. That the orchids grow in a tall growth of such species as False Oat (*Arrhenatherum elatius* (L.) Beauv. ex J. & C. Presl), Cocksfoot (*Dactylis glomerata* L.), Rosebay Willowherb (*Chamerion angustifolium* (L.) J. Holms), Gowan (*Leucanthemum vulgare* Lam.), Hawkweeds (*Hieracium* spp.) and Horsetails (*Equisetum sylvaticum* L. and *E. arvense* L.) makes them difficult to find and count. Two other orchids grow on the Kennishead embankment; these are Common Spotted Orchid (*Dactylorhiza fuchsii* (Druce) Soo), the commonest orchid in the Glasgow area (at least 70 of the 90 tetrads) and Twayblade (*Listera ovata* (L.) R. Br.) in eight tetrads.

The peculiar flowers of the Kennishead plants lack spurs and the labellum has lost its long narrow shape, being like the lateral sepals (outer perianth segments) in size and form (Plate 1). Moreover, the labellum is as white as the other perianth segments with no hint of the greenishness of normal flowers. Consequently the flowers all look whiter than usual. The 15 flowers of the largest



Plate 1: An aberrant specimen of the Greater Butterfly Orchid from the Kennishead area of Glasgow. Photograph by Norman Tait.

of the 1987 abnormal plants have been examined. They are variable with regard to the stance of the lateral petals, some being more widespread than others. This gives the upper parts of these flowers a less hooded appearance than normal. The shape of the stigma is also variable. There are short, pointed, more or less petaloid outgrowths from the lower end. This feature is much more marked in some flowers than others. The overall aspect of the flowers is that of radial symmetry (actinomorphy) rather than bilateral symmetry (zygomorphy), the usual state in orchids.

The Kennishead flowers are reminiscent of those of  $\times$  *Pseudanthera breadalbanensis*, a presumed hybrid of Small White Orchid (*Pseudorchis albida* (L.) A. & D. Löve) and Greater Butterfly Orchid described by McKean (1982) from Perthshire. The more spreading lateral petals (inner perianth segments) of some of the Kennishead flowers is a difference from *Pseudanthera* as is the petaloid outgrowths from the stigma. Nevertheless, are the Kennishead plants  $\times$  *Pseudanthera*? *Pseudorchis* has been long extinct in the Glasgow area. The last record was made before 1813, more than 7km southeast of Kennishead (Hopkirk, 1813); therefore one of the putative parents is missing. Are the Kennishead plants hybrids between Greater Butterfly Orchid and some other orchid, perhaps Twayblade or Common Spotted Orchid which grow nearby? Twayblade appears never to hybridise (Hunt et al., 1975) and although Common Spotted Orchid does commonly hybridise, not seemingly with Greater Butterfly Orchid (Hunt, 1975).

Except for  $\times$  *Pseudanthera*, Greater Butterfly Orchid has been reported as crossing only with Lesser Butterfly Orchid (*P. bifolia* (L.) L. C. M. Richard) which is not known to grow around Glasgow now. There are old records from Possil Marsh and the Cathkin Hills, both far removed from Kennishead Road. Hunt (1975, p.488) dismisses crosses of Lesser and Greater Butterfly Orchids claiming that “. . . it is probable that the specimens are aberrant forms of one or other of the putative parents in which peloric and other abnormalities are quite frequent.” Except for the presence of three spurs per flower, an abnormal plant of Greater Butterfly Orchid with some of the lower flowers looking like those at Kennishead has been reported from Skye (Fowler, 1980). Landwehr (1982) has drawn a flower, very like those of the Kennishead plants, that he refers to the form *monstrosa-regularis* Mutel.

According to Summerhayes (1968) the labellum resembling the

other perianth segments is a state that many different orchids have shown. When a plant normally with zygomorphic flowers produces actinomorphic flowers it exhibits peloria, a condition discussed in detail for British Orchids by Bateman (1985) who defines three states.

**Peloria (Type A):** This is a rare condition in which the flowers have three labella (lips).

**Peloria (Type B):** This is an extremely rare condition in which the three petals (inner perianth segments) are alike, the labellum not being differentiated.

**Pseudopeloria:** In this more frequent condition the labellum resembles the lateral sepals (two outer perianth segments).

This last state describes the flowers of the Kennishead plants.

I conclude that the actinomorphic flowers from Kennishead are pseudopeloric aberrations of Greater Butterfly Orchid. The discovery of these plants may be taken to support the suggestion by Bateman (1985) that  $\times$  *Pseudanthera* is not a hybrid but a pseudopeloric variant of Greater Butterfly Orchid.

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## Recent Vascular Plant Records for Bute

A. R. CHURCH<sup>1</sup> and J. H. DICKSON<sup>2</sup>

The Youth Hostel, Lochranza, Isle of Arran<sup>1</sup> and  
Department of Botany, The University of Glasgow<sup>2</sup>

A number of new (\*) and interesting records for the island are presented with some notes. Several are certainly not rarities and must have been noted by others, though any sightings have failed to materialise as published records and have not been referred to the Biological Records Centre at Huntingdon. Others, too, were noted by the energetic and thorough Victorians, and by the no less diligent James Robertson a century earlier in 1768 (Dickson, 1986). Grid references are given for the southwestern corner of the 1km square in which a plant was recorded. ARC and JHD indicates records by A. R. Church and J. H. Dickson respectively.

\**Avenula pubescens* (Hudson) Dumort. Downy Oat-grass

(1) Abundant above the beach, north end of Kilchattan Bay, 09/55. (2) Scree below basic dyke intrusion near Hawk's Nib, south of Kilchattan, 11/53. (3) Basic outcrop at Uamh Capuill, South Garrochty, 09/52. (4) Maritime heath at Barr Point, west of Kilchattan, 08/53. All ARC, June 1988.

A local species of base-rich grassland in western Scotland, it is probably overlooked because of its early flowering and/or confusion with the much commoner *Arrhenatherum elatius*. Surprisingly there is a record of the much rarer *Avenula pratense* from the south end of the island; this requires confirmation.

*Blysmus rufus* (Hudson) Link. Saltmarsh Flat-sedge

(1) Near South Garrochty, with *Carex distans* and *C. serotina*, 08/52. (2) Kerrycroy Bay, 10/61. (3) White Port, south of Kilchattan, 10/54. ARC, June 1988.

This is certainly overlooked in fragmentary saltmarshes amongst rocks, as are *Carex distans* and *C. extensa*. All these were noted by Prof. J. H. Balfour in 1866 between Rothesay and Mount Stuart and have apparently remained unrecorded since then (Anonymous 1902).

\**Carex dioica* L. Dioecious Sedge

(1) Boggy flush on raised beach at White Port, south of Kilchattan, 11/54 (2) Moorland flush c. 1km south of Bull Loch, alt. 190m, 01/72. ARC, June 1988.

Although previously unrecorded, this plant is easily overlooked.

*C. distans* L. Distant Sedge

- (1) Boggy shoreline, White Port, south of Kilchattan, 11/54 (2) Barr Point, 08/53  
 (3) South Garrochty, 08/52 (4) Scalpsie Bay, 05/57. ARC, June 1988.

This is a saltmarsh species, local in the region. It is interesting to speculate on whether or not James Robertson did see this in June 1768 (Dickson, 1986) as he could have noted it within a mile of his arrival point, Kilchattan village.

*C. extensa* Good. Long-bracted Sedge

- (1) White Port, south of Kilchattan, 11/54 (2) Barr Point, 08/53 (3) Kerrycroy Bay, 10/61. ARC, June 1988.

*C. pilulifera* L. Pill Sedge

- (1) South of Kilchattan village, NS15. (2) Near Barlia Hill, NR97. ARC, June 1988.

Surprisingly unrecorded since Ballantyne, 1911 (Dickson, 1986), this is a widespread plant in Scotland. It grows in moorland and rough pasture, frequently colonising thin peaty soil after muirburn.

*Conium maculatum* L. Hemlock

- (1) Abundant in mouth of cave near Hawk's Nib, 11/53 JHD, 1981 and ARC, June 1988.

This stand of Hemlock has been known for a long time to members of the Buteshire Natural History Society.

*Eleocharis multicaulis* (Sm.) Desv. Many-stalked Spike-rush

- (1) Near Barlia Hill, 99/71. ARC, June 1988.

A species of acidic, boggy flushes not noted since 1908; it probably occurs elsewhere on the Dalradian schists at the north end of the island.

*\*Epilobium ciliatum* Rafin. American Willowherb

- (1) Waste ground near the old cinema, Rothesay, 08/64. ARC, June 1988.

Unrecorded in Bute till now this alien is almost certainly widespread, as it is elsewhere in the region, following its recent rapid migration northwards (Preston, 1989).

*\*Equisetum x littorale* Kuhlew ex Rupr. Shore Horsetail

- (1) North side of Suidhe plantation, adjacent to footpath, 09/55. ARC, June 1988.

There is a fine colony, in wet ground on the boundary between woodland and arable field, growing with both parents, *E. arvense* and *E. fluviatile*. It probably occurs elsewhere.

*\*Festuca gigantea* (L.) Vill. Giant Fescue

- (1) Mount Stuart, 10 or 11/59. (2) Lenihuline, 99/69 or 70. (3) Scalpsie, 05/58. All JHD, August 1982.

*\*Fumaria bastardii* Boreau Tall Ramping-fumitory

- (1) Top of beach c. 1km north of Kilchattan village, 10/56. (2) Sandy, disturbed ground at top of beach, Straad, 04/61. ARC, June 1988.

*\*F. muralis* Koch Common Ramping-fumitory

- (1) Midpark, Inchmarnock, 02/59. JHD, June 1984. (2) Top of sandy beach c. ½km north of Kilchattan village, 09/55. ARC, June 1988.

The *Fumaria* species seem to have been poorly recorded in Bute, perhaps because of identification difficulties. It would be interesting to know the comparative frequency of the different ones.

*Geranium lucidum* L. Shining Crane's-bill

(1) Near Hawk's Nib, south of Kilchattan, 11/53. Native. ARC, June 1988.

There is a large patch of this plant with strikingly red foliage amongst *G. robertianum* in gravelly scree below a basic dyke intrusion. There are late 19th cent. records for it in all the larger Clyde Isles, though it is not clear whether they represent native sites or not. A single native colony has also recently been found on calciferous sandstone at the Fallen Rocks in N.E. Arran only a few kilometres away. The Bute site is otherwise noteworthy for a number of other basiphilous species which are very local or rare as natives including *Avenula pubescens*, *Parietaria diffusa*, *Polypodium cambricum*, *Verbascum thapsus* and *Vicia hirsuta*.

\**Hieracium caledonicum* F. J. Hanb. Hawkweed

(1) Coastline crag at Dunstrone Fort, 2km west of Kilchattan, 08/54. Det. D. McCosh. Collected ARC, June 1988.

\**H. dicella* P. D. Sell & C. West Hawkweed

(1) Northeast facing cliff at Hawk's Nib, 2km south of Kilchattan, 11/53. Det. D. McCosh. Collected ARC, June 1988.

There are no records for *Hieracia* from Bute in the 'Critical Supplement to the Atlas of the British Flora' and no other published records known to ARC or JHD.

*Juniperus communis* L. Juniper

(1) Scalpsie Bay, 05/58. JHD, August 1982. (2) Southern part of Inchmarnock, JHD, June 1984. (3) Barr Point, 2km southwest of Kilchattan, 08/53. ARC, June 1988.

Site (3) is an interesting complex of coastal heath, basic flushes and fragmentary saltmarsh including prostrate *Juniperus*, *Antennaria dioica*, *Avenula pubescens*, *Carex distans*, *C. extensa*, *Geranium sanguineum*, *Ligusticum scoticum* and *Schoenus nigricans*.

\**Lamium molucellifolium* Fries. Northern Dead-nettle

(1) Arable field west of Kingarth, 08/56. (2) Arable field next to shore at Ardsalpsie Point, 04/57. ARC, June 1988.

It would be interesting to know how widespread this is amongst the arable and waste-ground *Lamium* spp. in the island.

*Medicago lupulina* L. Black Medick

(1) In quantity amongst rough grass, shoreline of St. Ninian's Bay, 03/61. ARC, June 1988.

*Myosotis secunda* A. Murray Creeping Forget-me-not

(1) Rhubodach/Balnakailly, 02/74. JHD, July 1982.

First post 1908 record. Further records were made by ARC in 1988 at Scalpsie, south of Kilchattan and south of Stravanan. This is a species of rather acidic marshy ground and is much the commonest water Forget-me-not in Arran's coastal marshes. Has *M. scorpioides* been over-recorded at the expense of this?

*Parietaria judaica* L. Pellitory-of-the-wall

(1) Shoreline cliffs near Hawk's Nib, south of Kilchattan, 11/53. ARC, June 1988.

In basic rock crevices very close to the shore and apparently native. This plant, rare in the region, is otherwise noted from old walls, as at Kingarth, a site well-known to members of the Buteshire Natural History Society.

*Pimpinella saxifraga* L. Burnet-saxifrage

(1) Ardscaipie, 05/58. JHD, July 1983. (2) south of Kilchattan, JHD, August 1982.

\**Polypodium cambricum* L. Southern Polypody

(1) Coastline cliff near Hawk's Nib, south of Kilchattan, 11/53. Det. A. McG. Stirling. ARC, June 1988.

A small colony grows on a southeast facing volcanic dyke. For further comments on this rare Scottish diploid segregate of the *P. vulgare* complex see Rutherford & Stirling 1973. The Bute plant occurs strictly within the ecological observations contained therein.

*Populus tremula* L. Aspen

(1) Southeast Inchmarnock, 02/58. JHD, 1984. (2) About 10 small trees on crags near the shore on the north side of Barlia Hill 99/72. ARC, June 1988. (3) One or two small trees on crags above Laggan Burn, Muclich Hill (near Bull Loch), 00/72. ARC, June 1988.

This confirms James Robertson's 1768 record for Bute as distinct from Inchmarnock (Dickson 1986).

*Trifolium campestre* Schreber Hop Trefoil

(1) Amongst rough grass at the top of the beach at the north end of Kilchattan Bay, 09/55. ARC, June 1988.

This is the first post 1908 record.

\**Salix viminalis* L. Osier

(1) By ruined chapel, Kirkmichael, 99/70. ARC, June 1988.

*Verbascum thapsus* L. Great Mullein

(1) Near Hawk's Nib, south of Kilchattan, 11/53. JHD, July 1981, ARC, June 1988.

In 1988 there was a solitary plant in base-rich scree below a volcanic dyke. Occurs as single plants or small groups in similar sunny sites at the south end of Arran where it is undoubtedly native. There is a previous published record for 1894 in *The Annals of the Andersonian Naturalists' Society*, III 1908, but such a large and conspicuous plant did not remain unnoticed since then, being familiar to members of the Buteshire Natural History Society in its only Bute locality.

*Vicia lathyroides* L. Spring Vetch

(1) Uamh Capuill, South Garrochty, 09/52. ARC, June 1988.

This is a diminutive spring-flowering vetch restricted to base-rich soil and is rare in the region. On all these counts there are likely to be few records. It does, therefore further credit to James Robertson who recorded it in late June 1768 (Dickson 1986) when most plants would already have finished their annual cycle and be small shrivelled remains on the thin, sun-exposed soil. There are no other published records since that time. The volcanic outcrop at this site is also noteworthy for a number of other mainly basiphilous species, forming a distinct community including *Arenaria serpyllifolia*, *Anthyllis vulneraria*, *Asplenium rutamuraria*, *Avenula pubescens*, *Erophila verna*, *Geranium molle*, *Myosotis discolor*, *M. arvensis* (dwarf), *Sagina subulata*, *Sherardia arvensis*, *Valerianella locusta* and *Vulpia bromoides*.

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## Short Notes

COMPILED BY A. McG. STIRLING

### Botanical

#### Recent finds of Killarney Fern (*Trichomanes speciosum* Willd.) in Arran, Clyde Isles

A. R. CHURCH

This very rare native species was rediscovered in Scotland in its major historic locality, Arran, in 1981 (A. H. Somerville, 1981, *Trans. Bot. Soc. Edinb.*, 43: 343; 1982, *BSBI. Scott. News Letter*, 4: 4), an event which undoubtedly stimulated further interest in this, our largest filmy-fern, with the possibility of more plants remaining obscurely hidden. It was therefore with little surprise, though with great excitement, that the author, together with Tony Smith of Whiting Bay, discovered a solitary plant on 26 February 1988, several miles from the previous find. Naturally, further searching ensued in similar situations and the author found two more plants in March 1988 and March 1989 in an entirely new location.

Most if not all of the historical and recently discovered Arran plants are located in deeply shaded, damp but not wet rock crevices of coarse, fairly porous material such as sandstones. Usually facing north, the sites are protected in summer by a dense growth of large, deciduous pteridophytes, especially bracken, and sometimes trees, maintaining a moist microclimate even during the warmest months. In winter the decayed canopy allows more light and the combination of proximity to the sea together with the northerly aspect protects the plants from the coldest weather and desiccating westerly winds. This permits some growth during the milder periods which is probably essential for the well-being of this slow-growing evergreen Atlantic species. The ecology of *Trichomanes* in Arran closely parallels that of the much commoner *Hymenophyllum tunbrigense* although the smaller frond size and adpressed growth habit of the latter species allows it to survive in a marginally more exposed environment.

At each site known to the author there are only solitary plants, although two are situated within 200m of each other. They generally have a depauperate and even moribund appearance with many partly, and some almost completely, decayed fronds — a condition probably explained by the relative dryness of the sites compared to published descriptions and the fact that the species is at the northern limit of its range.

The healthiest plant is a compact, nearly circular clump, measuring about 20cm across with up to thirty fronds to a maximum of 10cm. The other two are smaller, growing in less favourable, darker situations, and in one case may now consist of two plants, the straggling rhizome of the original plant having separated into two parts with groups of fronds some 15cm apart, although it is difficult to investigate the nature of the plants in the tight spaces without unnecessary disturbance. It is possible the plants are very long-lived, the rhizomes slowly creeping, dividing and sending up just one or two fronds a year as the older ones slowly die away.

The small number of historical finds (W. Stewart, 1903, *Trans. Nat. Hist. Soc. Glasg.* VI: 18), suggests that, in this particular case, the plant is so rare in Scotland that little damage was done to its long term future by the Victorian collectors. It seems unlikely that the plants are never fertile and those that remain are possibly isolated remnants of a larger population which may have thrived in a warmer Atlantic period several thousand years ago. Perhaps others may yet be found in the Clyde area where conditions permit along sheltered coastlines.

It must be emphasised that *Trichomanes speciosum* is a species protected from collecting in any shape or form under the terms of the Wildlife and Countryside Act 1981.

**Three new Plant Records for Ailsa Craig,  
Ayrshire V.C.75**

B. ZONFRILLO

Coltsfoot (*Tussilago farfara*)

This species was discovered on 25 July 1989, growing in a steep, damp crevice on the north side of the Craig near to the old disused foghorn. It has, surprisingly, not been previously reported for Ailsa, perhaps due to its early flowering. Three or four plants were present.

### Herb Robert (*Geranium robertianum*)

Two plants were discovered on 17 July 1989 growing among the fallen stones of the old Smiddy building on the east side of the Craig. This building was ruined in the late 1950s.

### Long-headed Poppy (*Papaver dubium*)

A single plant was present in July 1984 at the entrance to the Gashouse building. This building is used as a store for supplies delivered to the lighthouse and it seems likely that the poppy was imported with materials delivered there. It has not appeared subsequently.

These records are notified as new to the flora of Ailsa Craig, being additional to the list of Mitchell, 1972 in *Western Nat.* 1: 26.

### The occurrence of a new subspecies of Bracken

ALISON RUTHERFORD

Recent research into *Pteridium aquilinum* (L.) Kuhn, by Dr C. N. Page of the Royal Botanic Garden, Edinburgh, has revealed the existence of two new subspecies of bracken in Britain (*Watsonia* 17, 4 (1989)). One, the Atlantic or White-haired Bracken, subsp. *atlanticum* C. N. Page, was first found on the north coast of Arran, Clyde Isles, and has subsequently been noted in parts of Ayrshire (Byne Hill, Girvan) and Dunbartonshire (Inchmurrin, Loch Lomond, and in the Helensburgh area). This subspecies appears to favour basic conditions at relatively low altitude, and so far has only been found at one locality away from the west coast (Logierait, E. Perth). At the Byne Hill it occurs in considerable quantity over a wide area, but elsewhere it can be quite scarce and more or less closely associated with normal bracken.

Atlantic bracken is very distinct when still unrolling its croziers, which can be as late as the end of September. The unexpanded pinnae tips are densely clothed with shining white hairs with no cinnamon-brown hairs among them. They unfurl slowly, the extremities remaining like little white balls, and the pinnae are arched downwards. An illustration of this feature accompanies an article by the writer in *BSBI News* No. 52 (Sept. 1989). The undersides of the young fronds are also covered with silky white hairs

which continue down the stipe to the ground. However, these stipe hairs are less dense and tend to be lost with increasing maturity of the fronds.

There is also a difference in the colour and texture of this bracken, the shade of green being much softer and the texture, especially when young, rather mealy. The pinnules are mostly untoothed.

There are intermediates, possibly hybrids, between subsp. *atlanticum* and the common bracken which may look rather similar to the subspecies, but these have some admixture of ginger-coloured hairs on the croziers and undersides, and most have some pinnule tothing.

#### **Hairy Gallant Soldier in Kilmarnock** R. S. LI. GRIFFITH

In September 1989 an unusual plant was passed to me by Charles Woodward of Kilmarnock's Dick Institute for confirmation of its identity. The plant was Hairy Gallant Soldier (*Galinsoga quadriradiata*, formerly *G. ciliata*) which had been found growing in an allotment at Ossington Gardens in Kilmarnock by Stewart Wilson of Grange Academy. Mr Stewart had first noticed it there five years ago, although not in such great abundance as now.

This member of the Compositae has obtained its common name in an interesting and unusual way. It is a native of South America and when its close relative *G. parviflora* was first introduced in the 18th century to Kew Gardens the locals were curious as to its name when it appeared in the neighbourhood gardens and mispronounced the generic name as "Gallant Soldier", a name that has persisted and which has also been adopted for the more recently introduced species.

The following additional records have been reported for Ayrshire VC75:— a garden in Kilmarnock (R. C. Walls, 1956), a municipal garden in Beith (H. A. McAllister, 1963), Troon (Mrs J. Walker, 1971) and Maybole (Mrs Wilson, date ?). *G. parviflora* has been recorded twice, from West Kilbride and Ayr, but these require confirmation.

I would like to thank A. McG. Stirling for the additional records and for final confirmation of the plant's identity.

**Bristly Hawk's-beard eventually identified  
in the Glasgow area**

P. MACPHERSON

Two unusual *Crepis* plants were seen in a rough lawn at the Southern General Hospital (NS 5365) in July 1984. A specimen was identified as *C. vesicaria* subsp. *haenseleri* (Beaked Hawk's-beard) at the British Museum with the added comment that "this species can be hispid". The following year a group of nine plants with similar features grew on a rough grassy bank in the Linthouse Industrial Area (NS 5466). In August 1988, a large sprawling *Crepis* was seen on a pathside at Millburn (NS 6160). An identification of *C. setosa* (Bristly Hawk's-beard) was made in this case, and a few days later a further plant was detected on waste ground in Govan (NS 5565). Material from the two earlier sightings was then re-examined and correctly identified as *C. setosa*. All these records are from V.C.77, Lanarkshire.

Plants seen among grass in a landscaped area at Duntocher (NS 4972), Dunbartonshire, V.C.99 in 1984 were originally thought to be *Picris hieracioides* but were re-determined, also in 1988, as *Crepis setosa*.

The achene in *C. setosa* is beaked as in *C. vesicaria*, but in the latter the involucre lacks the prickly yellow bristles of *C. setosa* which also has conspicuous bristles on peduncles and stems.

*C. setosa* is generally regarded as being a casual in arable fields, especially of clover, and is sufficiently rare not have been included by Perring and Walters in *The Atlas of the British Flora* (1962). In three of the five records the plants may have been introduced in grass seed. No further plants have been found at any of the sites despite satisfactory seed production. This is however a plant of which those recording in the west of Scotland should now be aware.

**Viviparous Fescue at Lochfauld Farm,  
Possil, Glasgow**

LORNA J. SMITH

On 21 August 1989, during a survey of marshland under threat of development, Mrs Edna Stewart and the author discovered a small bing near Lochfauld Farm, Possil, VC77. The vegetation to the north comprised scrub and was unremarkable; however, to the top and to the south of the bing at 50m O.D. (composed of burnt shale, a by-product of ironstone mining) the vegetation was more representative of moorland and rocky places with *Pilosella officinarum*, *Vaccinium myrtillus*, and, surprisingly, a stand of *Festuca vivipara*. The *Festuca* was subsequently positively identified by Dr M. Wilkinson, University of Leicester, who emphasised its ability to spread to suitable habitats although typically a plant of much more elevated sites, particularly mountain grassland.

There appear to be no previous records of this species at low altitude in Central Scotland although on the west coast it can be found around sea-level (e.g. in Arran and Kintyre). The origin of *Festuca vivipara* to this site is unknown, but it is hoped that it will spread to a more permanent habitat within the district. Specimens have been placed in the herbaria at Kelvingrove Museum (GLAM) and Glasgow University Botany Department (GL).

(Compiler's note: Bings seem to provide a congenial man-made habitat for several plant species more typically associated with mountain and moorland sites. The *Vaccinium myrtillus* mentioned here, heather and some of the clubmosses are good examples.)

***Filipendula vulgaris* native in Ayrshire**      A. McG. STIRLING

In late 1987 I was informed by Mr Dominic Counsell of the NCC Ayr Office that Dropwort (*Filipendula vulgaris*) had been found in the summer of the same year during an NCC survey of uplands over 500ft in south Ayrshire. The reported situation and nature of the site appeared to entirely preclude any question of garden origin or deliberate introduction. A leaf specimen supplied by Mr Counsell was undoubtedly that of *F. vulgaris*.

Circumstances prevented my visiting the site during 1988, but in early September 1989 I was able to do so and found the plants

without difficulty from the map reference supplied. They grew at the foot of a stabilised scree slope below a low range of dolerite crags at about 700ft altitude on the south side of Knockdaw Hill, 3.5km N.E. of Colmonell (NX 1688). The site is in open, hilly terrain approximately 1.5km from the nearest road, and the *Filipendula* is certainly native there.

The first impression was of a rather acidiphile vegetation with *Calluna* and *Erica cinerea* prominent, but closer inspection revealed the presence of several species, including Rock Rose (*Helianthemum nummularium*), Fairy Flax (*Linum catharticum*), Thyme (*Thymus praecox*) and Northern Bedstraw (*Galium boreale*) which suggested more basic conditions, no doubt due to the influence of the ultrabasic or serpentinite rocks prevalent in the area. The dolerite dyke immediately above the site was too dry to support much vegetation, but this also showed signs of higher base status in the presence of occasional plants of Bloody Crane's-bill (*Geranium sanguineum*) and the grass *Avenula pratensis*.

*Filipendula vulgaris* is rare and very local as a native species in Scotland, and previous to the present discovery was known only from the eastern counties from Berwick to Angus. Its best known localities are on Arthur's Seat, Edinburgh and the basalt hills on the Fife side of the Firth of Forth, the only places where it can still reliably be found. The present find therefore constitutes an interesting extension of range and a new record for Ayrshire.

***Cordyceps capitata* (Fries) at Balmaha**

R. HUNTER and  
I. McCALLUM

On 29 October 1989 this local and rather rare fungus was recorded by the authors near the public car park at Balmaha, Loch Lomond (V.C86). The location was adjacent to the West Highland Way path at NS 421911 in an area of mature Scots Pine which has been over-planted with spruce.

*Cordyceps* species are parasitic. In the case of *C. capitata* the host is a subterranean species of the fungus genus *Elaphomyces*, although this was not determined in the case of the Balmaha find.

*Cordyceps capitata* is capitate, the head being black tinged

with olive on a tough stipe about 100mm high and 6mm diameter.

We are grateful to Dr B. Coppins of the Royal Botanic Garden, Edinburgh, who confirmed the identification.

## **Mammals**

### **Additional record of Sika Deer (*Cervus nippon*) on Loch Lomond-side M. TRUBRIDGE\***

Further to the report of a single Sika Deer stag being observed on the west side of Loch Lomond in 1983 and 1984 (J. Mitchell, 1985 *Glasg. Nat.* 21: 115), a sighting on the east side of the loch can now be reported. During the first week of October 1987 a stag was present in the grounds of Inversnaid Lodge (per A. Goulancourt, Inversnaid Photography Centre). It was photographed by Frances McKim who was staying at the Lodge at the time.

This is further evidence of the spread of Sika Deer from their original point of introduction at Carradale, Kintyre, at the end of last century. No doubt this spread has been assisted by large scale afforestation in Argyll, although the extension to the east of Loch Lomond is interesting. There is no forestry at the northern end in the vicinity of Inversnaid, only a narrow strip of deciduous woodland. Assuming that the deer in question originated from land to the west, it probably came round the north end of Loch Lomond, the southern route being considerably longer and much more heavily populated.

\* Mike Trubridge is RSPB Warden at Inversnaid.

## **Entomological**

### **Aquatic Coleoptera on Little Cumbrae Island G. N. FOSTER and N. SINCLAIR**

There do not appear to be any published records of aquatic Coleoptera from Little Cumbrae. Professor F. Balfour-Browne's card index (currently on loan from the Royal Scottish Museum) has

not even any unpublished records. This is in contrast to the relatively well recorded status of Arran, Bute and Great Cumbrae, the larger islands of the Clyde Isles (V.C.100). It is therefore desirable to record the results of visits that we have made on 20 May and 22 June 1989.

Little Cumbrae lies in the Firth of Clyde within National Grid 10km square NS15. The aquatic habitats are pools in or beside bogs (such as Tom's Loch (NS 149513) and Finnie's Bog (NS 148521), dam ponds (usually with *Potamogeton polygonifolius*) on peat, some brackish and freshwater pools on the flatter parts of the east of the island, and a few streams and trickles. The best stream would appear to be one not marked on the 1:25000 map, issuing ESE towards the Broad Islands from the Finnie's Bog area. A single male of *Hydroporus longulus* was found here in 1989 and *Laccobius atrocephalus* was abundant in the soft mud at its edge. Although most of the habitats are peaty and basalt substratum, maritime influence and gull colony all contribute to base-enrichment of most water bodies.

With forty-one species found in two brief visits the fauna of the island is clearly rich. There are obvious gaps in the list, some of which are not necessarily explained by the impoverishment of the island habitats. For example *Ochthebius lejolisii* Mulsant & Rey is abundant just over a kilometre away in rock pools around Millport on Great Cumbrae. *Agabus guttatus* (Paykull), supposedly a flightless species, has been found on the smaller island of Ailsa Craig (V.C.75) by GNF on 5 July 1984 (and again by E. G. Hancock on 28 August 1986) and *Coelambus confluens* (F.) has been found in tidal pools on the even smaller Lady Isle, V.C.75, (G. N. Foster, 1983, *Entomologist's Mon. Mag.*, 119: 228).

### Check List of Species

<i>Haliphus fulvus</i> (Fab.)	<i>Agabus melanocornis</i> Zimmerman
<i>H. ruficollis</i> (De Geer)	<i>A. sturmii</i> (Gyllenhal)
<i>Hygrotus inaequalis</i> (Fab.)	<i>Ilybius fuliginosus</i> (Fab.)
<i>Hydroporus angustatus</i> Sturm	<i>Rhantus exsoletus</i> (Forster)
<i>H. erythrocephalus</i> (L.)	<i>Colymbetes fuscus</i> (L.)
<i>H. gyllenhalii</i> Schiodte	<i>Gyrinus substriatus</i> Stephens
<i>H. incognitus</i> Sharp	<i>Helophorus aequalis</i> Thomson
<i>H. longulus</i> Mulsant	<i>H. brevipalpis</i> Bedel
<i>H. memnonius</i> Nicolai	<i>H. grandis</i> Illiger
<i>H. nigrita</i> (Fab.)	<i>H. flavipes</i> Fab
<i>H. obscurus</i> Sturm	<i>Coelostoma orbiculare</i> (Fab.)
<i>H. palustris</i> (L.)	<i>Cercyon marinus</i> Thomson

<i>H. planus</i> (Fab.)	<i>C. ustulatus</i> (Preyssler)
<i>H. pubescens</i> (Gyllenhal)	<i>Hydrobius fuscipes</i> (L.)
<i>H. striola</i> Gyllenhal	<i>Anacaena globulus</i> (Paykull)
<i>H. tessellatus</i> Drapiez	<i>A. lutescens</i> (Stephens)
<i>H. tristis</i> (Paykull)	<i>Laccobius atrocephalus</i> Reitter
<i>H. umbrosus</i> (Gyllenhal)	<i>Enochrus coarctatus</i> (Gredler)
<i>Agabus affinis</i> (Paykull)	<i>E. fuscipennis</i> (Thomson)
<i>A. bipustulatus</i> (L.)	<i>Limnebius truncatellus</i> (Thunberg)
	<i>Dryops luridus</i> (Erichson)

We are grateful to the island's proprietor, Mr Peter Kaye, for permission to visit Little Cumbrae.

### Red Admiral Butterflies breeding on Ailsa Craig

B. ZONFRILLO

The Red Admiral (*Vanessa atalanta* Linn.) frequently occurs as a migrant on Ailsa Craig, Ayrshire (V.C.75) particularly in warm summers. The mild winter of 1988/89 probably caused some Red Admirals to successfully overwinter in the adult state since the first seen in 1989 was on 15 April, much earlier than the normal June-July period. I frequently observed rather worn Red Admirals during April and May of 1989 but was surprised to find caterpillars of this, usually migrant, southern European species on Ailsa around mid-June. Probably the overwintering butterflies had mated and laid eggs on the island. Proven cases of overwintering Red Admirals in the British Isles are very rare.

In mid-July I could not locate any caterpillars on the nettle bed at the south of the island where they had been feeding, but I did find some distinctive gold-studded chrysalises attached to small rock crevices in the Ailsa Craig granite. Two of these were removed and later hatched in the Kelvingrove Museum.

A short visit to Ailsa in early August found some freshly emerged specimens on the wing. These had probably hatched on the island.

Mr I. C. Christie informs me that he had seen pupae of this butterfly on Ailsa Craig in September 1982, which also followed a mild winter. However, the late date of pupation implies that these were bred from immigrant stock which arrived on Ailsa earlier that summer.

**Grayling Butterflies in Glasgow**

R. SUTCLIFFE

On 19 July 1989, while photographing plants at the site of the former Dalmarnock Power Station in the east end of Glasgow (NS 6162), Norman Tait noticed several examples of the Grayling butterfly (*Hipparchia semele* (L.)) flying around and settling on the ground. Realising the species was not normally seen in Glasgow, he informed the author who visited the site on the following day. The Grayling was present in good numbers, apparently forming a strong colony of several dozen individuals, suggesting that the butterfly has been present there for some time. The butterflies were commonest beside the brick walls surrounding the site, on which they spent much of their time basking in the sun.

The Grayling is essentially a coastal species in Scotland, and is only recorded from a few inland localities in the south of Scotland. The nearest known site to Glasgow is on the Ayrshire coast; its apparent sudden appearance in the city is therefore something of a mystery. GNHS member David Shenton is fairly sure he saw Graylings beside the steelworks at Motherwell about ten years ago, so it is possible that there are isolated colonies along the Clyde which have so far been overlooked. Confirmation of the Motherwell record and any other site would be welcomed.

This first record of the Grayling for Glasgow increases to fifteen the total of butterfly species recorded from the city.

**A House Cricket (*Acheta domestica* (Linn.)),  
(Orthoptera; Gryllidae), in Ayrshire E. GEOFFREY HANCOCK**

A live male House Cricket was brought to Glasgow Museum and Art Gallery on 29 September 1989 from Saltcoats, Ayrshire (V.C.75).

Whereas in the past, as seen by reference King's account of the Orthoptera in the area (1901, Elliot et. al. *Fauna, Flora and Geology of the Clyde Area*, British Association, Glasgow) this insect was fairly common in various parts of the city, chiefly in bakehouses, and was also known from Paisley and Kilbarchan, it is now worthy of comment. A recently published book by Marshall and Haes (1988, *Grasshoppers and allied Insects of Great Britain and Ireland*,

Harley Books, Colchester) can only quote one post-1960 record for the whole of Scotland, namely Stirling in 1977. One more can be added on the basis of a specimen from Fauldhouse, West Lothian, acquired in August 1976 by the Royal Museum of Scotland.

The cricket was once part of urban life but modern hygiene and new methods of compacting, incinerating and burying refuse has seen a decline in its ability to survive. It is not a native of Europe and cannot survive winters unprotected. The heat produced by fermenting rubbish can provide it with an out of doors habitat, and in years when the weather is warm enough they can spread into surrounding areas and become known to residents by their chirping. This sometimes becomes irritating to the modern ear, a great change from old traditions of keeping them caged, being symbolic of the hearth and home life.

This particular insect did disturb the sleep of the house owner and was eventually caught behind the refrigerator. The owners had recently had an extension built onto the house and wondered whether this individual might have been imported with materials from further south. Alternatively, crickets are kept and sold as pets or fed to larger captive animals as food. They are also fairly popular in schools and colleges for teaching purposes. Notwithstanding these other possible factors, although appropriate points of escape are not known to exist locally, the hot summer would have been conducive to a temporary spread from a nearby but unsuspected established colony.

(Compiler's note: A colony of House Crickets was established in a boiler house at a factory in Kirkcudbright until at least the mid-1960s when the building was demolished.)

## **Two new beetle records from Ailsa Craig**

**E. GEOFFREY HANCOCK**

Two species of beetles brought into Glasgow Museum and Art Gallery during 1989 by Bernard Zonfrillo from Ailsa Craig proved to be previously unrecorded from the island. They are both unmistakable species and their habits are sufficiently interesting to allow conjecture on their status as long or short term residents.

The first of these is the large ground beetle *Cychrus caraboides* subsp. *rostratus* (L.), one example being found on 21 July 1989. This species is generally common in Scotland and feeds principally on snails. As it is incapable of flight yet a prominent insect hitherto unobserved by the numerous entomologists who have visited Ailsa Craig, several of them coleopterists, it could be asked how long has it been resident on the island? (Another beetle from there of similar habits, the silphid *Silpha atrata* (L.), is one of the most frequently recorded insects.) Whereas a small population may have existed on Ailsa Craig for millenia it is also possible that it has been recently introduced. There has been an increase recently in traffic to and from the mainland in association with the automation of the lighthouse and extraction of stone for repairing curling stones. In the years to come a change in this beetle's status might give a clue as to the situation. A sudden rise in population could demonstrate a new coloniser whereas no future records could produce the same conclusion — the only one to reach the island was caught and transferred to Kelvingrove before it had a chance!

The other new beetle record is that of a weevil, *Euophryum* (?) *confine* (Broun) (Fig. 1), a tiny wood borer associated with timber affected by wet rot fungus. I have learned recently that there are now two species in this genus but have not the information to distinguish between them. This does not substantially alter the interest or conjecture associated with the record. Its history in the British Isles is quite short. A native of New Zealand, it was first recorded in London in 1937 and was found in Glasgow in 1946. It is now firmly established in the west of Scotland and I have seen it in Port Bannatyne, Bute and in Girvan, Ayrshire during the year. Zonfrillo found several examples on 20 April, 1989 inside the small building and has seen others since. It would seem likely that this synanthropic pest has been imported with timber although



Fig. 1 *Euophryum confine* (Broun); by Courtesy of the Natural History Museum, London. (Scale line 1 mm.)

it is quite capable of flight.

The list of terrestrial invertebrates from Ailsa Craig which is maintained in the museum now totals 508 species of which 132 are beetles.

**Additional Spiders from the Isle of Muck,**

**V.C. 104, N. Ebudes**

**RONALD M. DOBSON**

The following may be added to the list of species given by Dobson (1986, *Glasg. Nat.*, 21: 173). Nomenclature follows that of M. J. Roberts, 1987, *The Spiders of Great Britain and Ireland*, 2, Harley Books.

(C,R,OH) indicates species has been recorded from Canna, Rum and Outer Hebrides respectively; 37,47,48 = 10km Grid Squares (NM).

**OONOPIDAE**

*Oonops pulcher* Templeton 37,47; one in heather, mid-Muck; one in moss N.W. Muck; (C).

**LYCOSIDAE**

*Pardosa palustris* (Linnaeus) 48; one in N. Muck, few in Lamb Island; (OH).

**LINYPHIIDAE**

*Pocadcnemis pumila* (Blackwall) 37; one near W. coast; (C,OH).

*Oedothorax gibbosus* (Blackwall) 47; one near S. coast.

*Centromerus prudens* (O. P. Cambridge) 37; one near W. coast; (R,OH).

*Tapinoma longidens* (Wider) 47; one in plantation; (R).

## Proceedings 1988

The chairman, place\* and number present, lecturer's name, title of lecture and note of any exhibits are given for each meeting.

\*GMK: Glasgow Museum and Art Gallery, Kelvingrove  
UGBD: University of Glasgow, Botany Department

- 12 JANUARY.** Dr J. H. Dickson, UGBD, 64.  
Mr Duncan I. McEwan: Nature Section of 19th Paisley International Colour Slide Exhibition.
- 9 FEBRUARY.** Dr J. H. Dickson, UGBD, 43. 58th A.G.M.  
Reports on activities during 1987 were read, elections were held (see page 624), and appointments made by Council were announced. The Report of Council stated that there were 296 members (256 Ordinary, 24 Family, 6 Junior, 3 School and 7 Honorary members). 36 excursions were organised during 1987 (16 Botanical of which 11 concerned the *Flora of Glasgow* and one had general interest; 7 Zoological of which one was Photographic; 6 General of which one was Photographic, one combined with Edinburgh Natural History Society and one with Hamilton Natural History Society; 4 Ornithological and 3 Geological of which one was with general interest).  
A film of the Society's excursion to Dumbrook Loch was shown by Mr R. Sutcliffe, followed by two talks—  
Mr N. Tait: Fauna of Papua New Guinea.  
Mr K. Watson: Orchids of Papua New Guinea.  
Exhibit: Overwintering buds of Bladderwort (Mr I. C. Christie).
- 23 FEBRUARY.** Mr Ian McCallum, UGBD, 28.  
Mr I. C. Christie: Burnets in the West of Scotland.  
Mr G. Hancock: Where do flies go in winter?  
Exhibits: Pipistrelle bat and bat publications (Mr I. McCallum; early flowering primrose (Mr J. Lyth); mosses (Mr R. Hunter).
- 8 MARCH.** Dr J. H. Dickson, UGBD, 48.  
Mr M. Davidson: Glasgow Urban Spaces Initiative.  
Exhibits: Amphibian Survey request (Mr R. Sutcliffe); Oak galls (Mr J. Lyth); *Flora of Glasgow* display boards (Dr J. H. Dickson).
- 12 APRIL.** Dr J. H. Dickson, UGBD, 40.  
Members' Photographic Night: 11 contributors.  
Plant and cake sale in aid of funds.
- 10 MAY.** Dr J. H. Dickson, UGBD, 27.  
Mr G. Hancock: Natural History of Flies.  
Exhibit: *Dracunculus vulgaris* from Crete (Dr J. H. Dickson).

- 30 SEPTEMBER.** GMK, 30-40.  
*Annual Exhibition Meeting and Cheese and Wine.*  
 Exhibits: The MacKechnie Collection (J. Summers and others); Legumes at home and abroad (J. Lyth); Hyndland Highlife (N. R. Grist); Hybrid orchids at Dumbrock Loch (C. Dickson & N. Tait); Recent records for *Flora of Glasgow*, including *youngriana* and *E. leptochila* var. *dunensis* (J. H. Dickson); Orchids of Glasgow (W. Parks); Recent "Flora of Glasgow" plants (K. Watson); Photographs (M.S.C. Community Programme); Scottish fossils (GMK); Bottlenosed whale and Sperm whale (GMK); Natural dyes (N. & P. Tait); Rocks and fossils (A. Farmer); Fungi (D. Hentie, E. Stewart, A. Walker); Skulls (K. Cohen); Insects (GMK); Living stone (R. Sutcliffe); *Senecio crucifolius* (A. McG. Stirling); Plant chart (A. Walker); Shells (F. Woodward); Petrified wood (J. Jocelyn); Slide show (GNHS Photography Section); Galls (BRISC); Recent Flora of Glasgow/Lanarkshire records (P. Macpherson).
- 11 OCTOBER.** Dr J. H. Dickson, UGBD, 55.  
 Dr R. M. and Mrs Ruth Dobson; The Natural History of the Isle of Muck.  
 Exhibits: Panoramic photograph of Glasgow Rectangle; plants from Gran Canaria grown from seed at Port Logan (Dr J. H. Dickson); specimens of woodcock and thrush (Mr I. C. Christie)
- 8 NOVEMBER.** Dr J. H. Dickson, UGBD, 43.  
 Mr N. Tait and Members: Photographic Slide Night (N. R. Grist, W. Parks, I. Christie, R. Sutcliffe, I. McCallum, P. Macpherson, J. Lyth, R. Burn, J. Knowler, K. Cohen).  
 Exhibits: Clyde Bird Report 1987 (B. Zonfrillo); Seabirds (J. Jocelyn).
- 22 NOVEMBER.** Dr J. H. Dickson, UGBD, 32.  
 Dr J. H. Dickson: Flora of Glasgow – Final Report.
- 13 DECEMBER.** Dr J. H. Dickson, Dean Park Hotel, Renfrew, 48.  
 Annual Dinner.  
 Dr J. T. Knowler: Peru (illustrated presentation).

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# The Glasgow Naturalist

The Journal of the  
Glasgow Natural History Society

## Volume XXI

Edited by R. M. Dobson

ISSN 0373-241X  
GLASGOW, SCOTLAND



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(The editor is grateful to R. H. Dobson, A. McG. Stirling and I. C. Wilkie for help in compiling and checking this index)

### Dates of publication of *The Glasgow Naturalist*

Since 1978, when publication of *The Glasgow Naturalist* was re-established on a regular annual basis, consecutive issues have been dated for November, October or December although the actual distribution of the journal usually took place early in the following year. It has been pointed out that this practice leads to confusion in dating new species where priorities are particularly important. Henceforward, starting with the present issue, publication dates given will be those of distribution. The editor apologises for any inconvenience caused in the past.

The corrected publication dates of the parts of Volume 21 are:

- Part 1 (1985) : February 1986
- Part 2 (1986) : February 1987
- Part 3 (1987) : February 1988
- Part 4 (1988) : February 1989
- Part 5 : February 1990

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