THE WESTERN NATURALIST

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Published by The Renfrewshire Natural History Society
Department of Biology, Paisley College of Technology, Paisley

The Western Naturalist

Volume Three 1974

Annual Subscription £2.00

A Journal of Scottish Natural History

THE WESTERN NATURALIST

A Journal of Scottish Natural History

DEPARTMENT OF BIOLOGY, PAISLEY COLLEGE OF TECHNOLOGY,
HIGH STREET, PAISLEY

The *Western Naturalist* is an independent journal, published by the RENFREWSHIRE NATURAL HISTORY SOCIETY, devoted to the study of Scottish natural history, particularly, but not exclusively, to the natural history of the Western area. Although its main interests probably centre on fauna and flora it is prepared to publish articles on the many aspects embraced by its title including Zoology, Botany, History, Environment, Geology, Archaeology, Geography etc.

All articles and notes for publication, books for review etc, should be sent to the Editors at the DEPARTMENT OF BIOLOGY, PAISLEY COLLEGE OF TECHNOLOGY, HIGH STREET, PAISLEY.

Contributions should be clearly written; whenever possible they should be typed, double-spaced, on one side of the paper, with adequate margins, and should try to conform to the general style and arrangement of articles and notes in the current number of the journal. Maps, diagrams and graphs should be drawn in black ink on white unlined paper. Photographs should be on glossy paper. Proofs of all articles will be sent to authors and should be returned without delay.

Authors of articles, but not of short notes, will receive thirty reprints in covers free of charge. Additional copies may be ordered, at cost, when the proofs are returned.

It is hoped to publish the *Western Naturalist* at least twice a year and more often as required. The annual subscription is two pounds, which should be sent to the Editors at FOREMOUNT HOUSE, KILBARCHAN, RENFREWSHIRE. Members of the Renfrewshire Natural History Society receive the journal free of charge. Members of other recognised natural history organisations may receive the *Western Naturalist* at a greatly reduced subscription; for details apply to the Editors at the subscription address.

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All items for publication should be sent to the Editors at
Department of Biology, Paisley College of Technology,
High Street, Paisley

Published by

THE RENFREWSHIRE NATURAL HISTORY SOCIETY

(Founded 1847)

EDITORIAL

The Editors regret that Volume Three of the *Western Naturalist* is issued once again with an apology, for our decision to publish two parts of the journal during 1974 had to be shelved. The system has not yet recovered from the strains and stresses which affected publication of the last volume, but we are encouraged that much of the lost time has been made up. We now have every hope that when Volume Four appears publication will have been restored to a more regular time-table, and that twice-yearly publication can be commenced thereafter.

It is no unusual matter for the publication of papers on natural history to fall out of phase with the acquisition of knowledge. What is more alarming is that publication may be outpaced by changes in the natural scene which it is designed to record. The changing patterns now being imposed, for example, on the natural history of the Clyde area by rapid industrial development, threaten to pass us by unchronicled and ill-understood for lack of timely observations and records before the train of events commenced. Do we, for example, know enough about the shore fauna at Hunterston, or the coastal vegetation at Portavadie to judge adequately the effects of changes already under way? Do we know enough of the restricted fauna and flora of the upper Clyde estuary to tell what biological effects may have followed the sewage workers' strike? Too often the naturalist or biologist working in an area of industrial development longs for better knowledge of the "base-line" situation, which has already vanished. Too often he is asked to judge the consequences of a proposed development, rapidly enough to meet the demands of planners and developers but with insufficient time to assemble information, which may be incomplete without the experience of several annual cycles of growth and activity.

The task of assembling adequate information on such matters in advance of change is an enormous one which can never be fully achieved, but it is one in which the local resident and the amateur observer can play a vital role. Likewise a journal such as this can make its contribution by recording studies of local importance. Useful data, relating especially to less "popular" groups of organisms, are all too often allowed to slip away unrecorded, and it is surprising how often information which a local naturalist may, in his modesty, classify as common knowledge is not available in print when it is urgently required. If we can contribute to this need for better recording of our local natural environment we shall be continuing to do a worthwhile job, and we invite our readers to think again about their own fields of expertise, and to send us such papers or short notes as may help to achieve this aim.

This volume of the journal consists almost entirely of papers, some of which have been in the Editors' hands for a considerable time, and the other usual sections on Short Notes, Society News, Requests for Information, etc., have had to be excluded. This is unfortunate, but we have an obligation to our contributors to see that their work is published in a reasonable time. We are particularly sorry to exclude the section on Short Notes, but these will certainly be included, as usual, in Volume Four, which is scheduled for publication in late Summer 1975. We already have many papers and notes in hand but are very much open to receive additional contributions, which for inclusion in Volume Four should be sent to the Editors as soon as possible, and not later than the end of June 1975.

Paisley December 1974

RENFREWSHIRE IN PREHISTORY: THE STONE AGES

By FRANK NEWALL
County Archaeological Recorder,
Renfrewshire Natural History Society

On the retreat of the last great glacial incubus, about 8000 BC, Scotland lay barren, a land of sands, gravels, and clays, to be sculptured by meltwaters born of the ice which was to crown the higher peaks for yet a thousand years.

During this period vegetation gradually spread over the lower tracts, supporting insect, bird, and animal life; while fish penetrated to the lochs. Then came the larger animals, and the predators, culminating in man.

He arrived in small hunting, fishing, and food collecting bands, equipped with an assemblage of flint, bone, and antler tools and weapons best adapted to his way of life, that of the Middle Stone Age, or Mesolithic. Sites inhabited by such bands have been dated from c.5400 BC to c.3000 BC, *(Note 1)*, and to c.4000 BC *(Note 2)*.

It is customary to differentiate an inland type from a coastal. *(Note 3)* The former used microliths, tiny flint points of triangular, trapezoidal, crescentic, and rod form, which could be fitted as barbs to wooden or bone shafts to form lances or harpoons. The coastal mesolithic is distinguished by various 'type' tools which predominate; nevertheless microliths are present, especially in the Islay Mesolithic.

The Islay sites *(Note 4)*, those in North Jura *(Note 5)*, the coastal string of some eight sites from Ballantrae to West Kilbride, recently located by Malcolm Macneill *(Note 6)* and the sites at Campbeltown *(Note 7)* have all affinities with sites in North-east Ireland which gave rise to the term Larnian. While varying facies may reflect temporal rather than cultural difference, essentially a Clyde-Antrim sub-Larnian Littoral has been established on our western fringe, and a related site lies at Woodend Loch, near Coatbridge *(Note 8)*.

Of the inland groups, several sites lie in the upper reaches of the Clyde, and there is evidence of penetration to the Ayrshire Coast *(Note 9)*.

As yet no definite traces have been found in Renfrewshire, and such tools as have been found treated in Mesolithic fashion are probably from 'Secondary Neolithic' sources. The Mesolithic will inevitably emerge. It should be sought in the rock shelters

round our coast from Gourock to Wemyss Bay, and at Langbank, and on the raised beach behind.

Between 4000 and 3000 BC *(Note 10)*, the first farmers reached Scotland, bringing an entirely new way of life, the New Stone Age, or Neolithic. Although they still hunted and collected food, as at an Autumn camp on Whitemoss Farm, Bishopton, they relied more on farming. This involved settlement, in place of seasonal occupation, and the evidence of a more stable economy is provided by large flat quern stones, pounders and rubbers for grinding corn, a variety of hand made round bottomed pottery, and a range of stone implements, saws, knives, awls, borers, gravers, and scrapers to treat skins or wood. Axes appear, at first of flint flaked to shape, then of polished flint, and finally of polished selected stone.

The farming cycle and the food capital could allow seasonal and perhaps full time release from the food quest, of specialists to work in flint mines, and latterly at quarry faces, to secure the raw material and fashion the rough outlines of axes which were traded throughout Neolithic Britain. In Renfrewshire, axes have been recovered which originated in Cumberland, in Northern Ireland, and perhaps in the Southern Uplands of Scotland.

It is possible that the trade was carried out by descendents of the indigenous fishing, hunting communities, who had a mental map of the country. They may have borrowed the use of pottery from the Neolithic peoples. Certain wares fashioned clumsily and decorated in particularised patterns have led to recognition of several 'Secondary Neolithic' groups. Flint tools, too, were imitated, but the typical Mesolithic techniques in trimming the edges, and in forming microliths, tend to persist. 'Secondary' settlement related still to a hunting food gathering economy, turning towards plot cultivation, and may have reacted on the 'Primary' way of life. At Knapps, Houston, however, the dwellers in an advanced 'Primary' homestead appear to have concentrated on agriculture. The round bottomed pottery had largely given way to a flat bottomed bucket-shaped vessel but without decoration. From this may have sprung certain of the later Bronze Age urns.

In the final stages c.2000 BC, in our area possibly c.1800 BC, a new people arrived from the Low Countries. These were the Beaker people, named from their typical small neatly formed vessels of ogival profile and decorated with zones of 'cog-tooth' or 'comb', i.e. small rectangular pit impressions. In Renfrewshire they associate with the slightly later continuous-cord decorated beakers.

While they knew the use of bronze, a result of European

contacts, they do not appear to have initially manufactured it, but brought with them copper bronze daggers. They also used barbed and tanged flint arrowheads *(Note 11)* and, later, the perforated battle axe. They tend to associate in settlement areas with 'Secondary Neolithic' groups, but beakers are also found as late interments in megalithic tombs. Their association may relate in part to the investigation and exploitation of the British copper and tin lodes.

With the primary Neolithic settlement came evidence of community involvement in the construction of house and palisade enclosure. Common spiritual beliefs may be deduced from the construction of their megalithic tombs. The earliest were trapezoidal shaped mounds of earth or stone, covering a long 'gallery' entered from the centre of the broad end, and divided by 'septals', or cross-placed slabs, into chambers. While the remains of such tombs lie at Hailey House, Largs *(Note 12)* and Whitehill Farm, Largs *(Note 13)* close to the site of a destroyed tomb under Camphill Reservoir, there are no undoubted examples in Renfrewshire. Three possible sites are listed.

A later Neolithic concept was the Passage Grave where, under a great round cairn, a long passage led to a central burial chamber which in some cases gave access to lateral chambers. None exists locally. A blend of traditions, however, led to hybrid tombs, such as the Druids' Graves at Cuff Hill, Beith, where a passage is flanked on either side by long stone cists *(Note 14)*.

Beaker folks were normally interred in a contracted position, arms folded, knees drawn up, and head thrust forward, in small stone cists each covered with a stone lid. These might be set in the ground without surface indication, or under a round cairn. It is possible that some of the round cairns in our area cover beaker burials, but these cairns for convenience will be listed under the Bronze Age.

Further evidence of communal involvement is provided by henges, circular ritual areas, each surrounded by a wide ditch with upcast outer bank. These may have one entrance, or two opposed entrances, and it is thought that the former type are Neolithic, especially 'Secondary Neolithic'. In Beaker times the standing stone circle appears. With this we may consider raised circular platforms which may have standing stones round the edge, or a mere low bank, but show no surface indication of a ditch. Such lie at Kirklee Green, Beith *(Note 15)*; North of Glentane Hill, Fairlie *(Note 16)*; and on the Gleniffer Braes, Paisley. We have classified them as Disc Henges. These are not closely dated, and may indeed be of the Bronze Age.

A possible disturbed standing stone circle, the Covenanters' Stones, lies on Moyne Moor *(Note 17)*.

Finally, while the strictly rectangular house of the early Neolithic is foreign to our area, an apsed version of it occurs at Knapps. By Beaker times it would appear that these were giving way to small round huts.

RENFREWSHIRE - Neolithic Sites (Fig. 1) *(Note 18)*

A. TOMBS - LONG CAIRNS. Possible sites only

1. Auchenfoyle Farm, Kilmacolm, NS311713 (F).

A long low stoney mound with broad end, slightly concave, facing east and with traces of low built kerbing along the south side. Similar kerbing in heavy blocks was blasted from the north side some years ago. The site has been for long used as a clearance cairn.

In 1954 a failure of turnip crop due to persicaria in a shallow hollow round the west, most of the south, and the north west of the site was investigated in two sections. In (a) 200° from an arbitrary centre of the cairn at 75 ft. to 102 ft. by 2ft. wide, a shallow depression 9 ft. wide and only 4 inches deep fell to a trench 1 ft. 4 inches wide and 1 ft. 7 inches deep. This contained dark earth with wood traces. Similar traces rose between the stones of a layer which commenced just within the outer edge of the depression, passed over it, and continued as a tightly cobbled level towards the cairn. In (b) 275° from centre at 88 ft. to 104 ft. a depression 5 ft. 6 inches wide by 10 inches deep was similarly overlaid with stones which passed towards the cairn and contained similar black earth, perhaps more suggestive of vegetation than wood, but unfortunately disturbed at centre by two field drain trenches. No finds were made. An enclosure at least 154 ft. by 158 ft. internally is indicated.

In the autumn of 1955, in oats, a dark crop mark round the north and north-east, on sloping ground, confirmed the presence of the depression (indicated by W.O. Black). Permission to trial trench by Mr. John Black of Auchenfoyle Farm.

2. Knockbartnock Farm, Lochwinnoch, NS358606

A low trapezoidal mound with broad end facing north is clearly marked at the corners by large stones. Centrally in the broad end a depression, 9 ft. 6 inches wide extends 12 ft. into the mound. This is flanked by large stones and disturbed stones lie within. No slabs can be detected.

The mound measures 53 ft. from north to south and tapers from 38 ft. to 31 ft. in width (located by Mr Lew Anderson, Warlock Gates, Lochwinnoch).

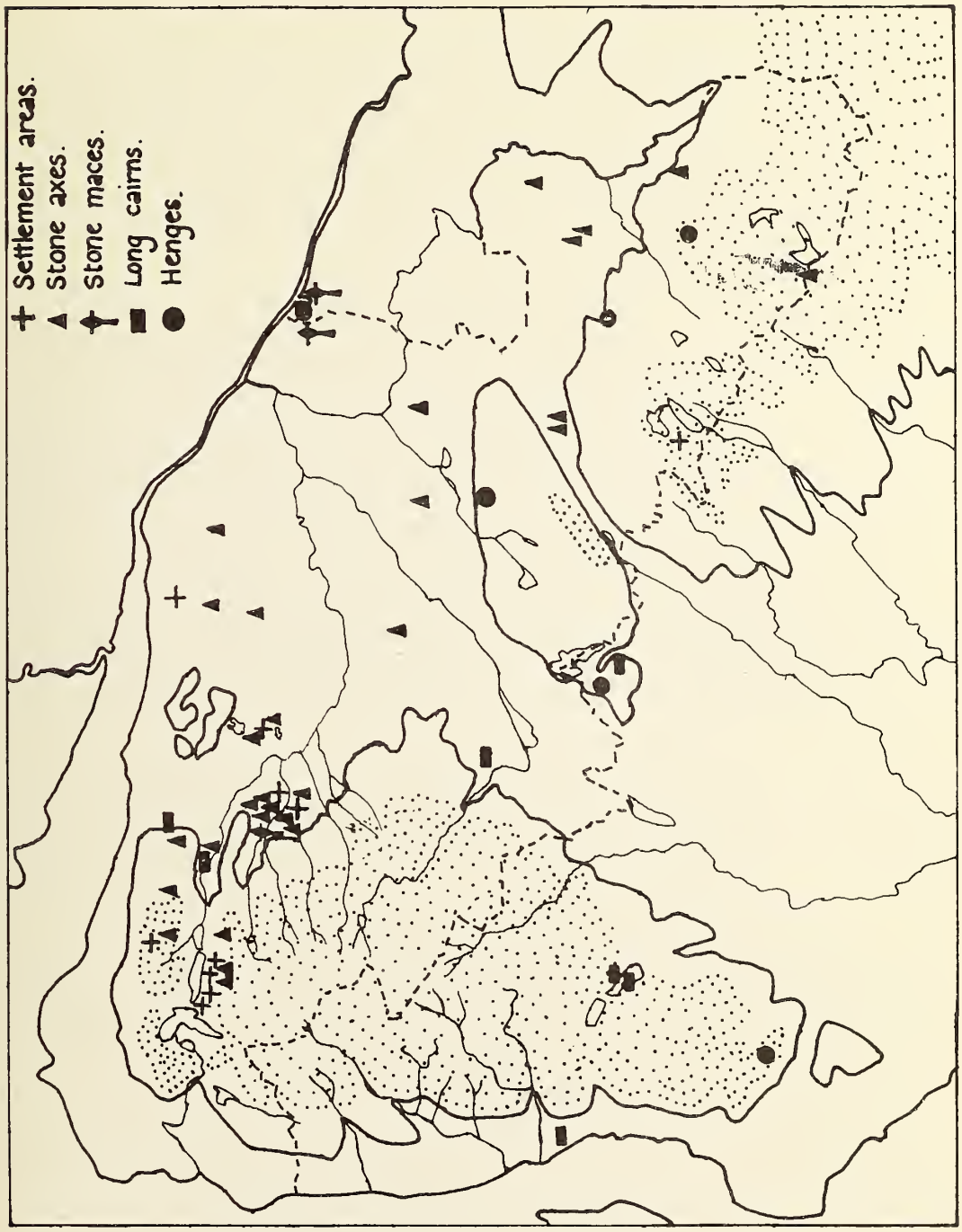

Fig. 1. NEOLITHIC RENFREWSHIRE

500 ft. contour indicated.

Land over 750 ft. stippled.

3. Cunston, Kilmacolm, NS33057262

Semple's continuation of Crawford's 'History of Renfrewshire', Weir, Paisley, 1782, p. 70. "In one of his lordship's (i.e. Glencairn's) farms called Cunstoun near the Auchinleks stands a cairn of stones. This present year, when the farmer was removing part of the same, he found a subterraneous cave, in form of a grave, in which were lying some bones amongst the mould, covered with a large stone". It is possible, despite the word 'cave' that this refers to a stone cist, under a round cairn. A large clearance cairn, at NS33057262 appears to overlie an earlier structure. There is a present tradition at Cunstoun of 'treasure' found in the past, but no details have survived.

B. LONG TUMULI

Earthen mounds. These are inserted here for convenience, on account of their outline. They are undated. All are in Kilmacolm Parish.

1. Quarry Road, Bridge of Weir Road junction NS364679

An earthen tumulus lying north-south downslope. Broad end facing south, and 25 ft. wide. Mound length 57 ft. The material has been scooped from a shallow quarry hollow cut into detritus at the foot of the scarp to the north (F. Newall).

2. South Newton, NS33806738

Earth with large stones, with broad end facing north-west. Length 52 ft. by 32 ft. at broad end. May be natural (W.O. Black).

3. Craiglenscheoch, NS32356927

Tumulus, largely of gravel beside stream. May be natural alluvium but has a built appearance. 49 ft. by 28 ft. with broad end facing west (W.O. Black) DES, 1965, 33.

C. HENGES

1. Shiels Farm, Govan, NS523667

DES, 1957, p. 18. DES, 1973, 66-7. At present being excavated by J.G. Scott.

2. Long Wood, Bonnyton Moor, Eaglesham, NS544522

A possible henge indicated by Thomas C. Welsh. DES, 1971, p. 38; 1973, p. 45.

Disc Henge

3. Gleniffer Braes, NS44956043, Paisley

Some 50 ft. due south of the Trig. Pt. 717 ft. a low circular platform 1-2 ft. high and 67 ft. in diameter with suggestions of a low spread peripheral mound, and with three megalithic blocks lying together half way south of centre on the north-south diameter. Some 50 ft. west of the Trig. Pt. is a low cairn, 20 ft. in diameter, with slight flattening of the north side, flanked on the north-east by a large block. Cf Kirklee Green and Glentane Hill (*Notes 15 and 16*). Located by W. Lonie.

D. SETTLEMENT SITES

1. Whitemoss Farm, Bishopton, NS418721

A summer camp. From hearth pits were recovered hazel shells and fragments of pottery including a thin grey carinated vessel with small everted wedge rim; round globular pots with plain, markedly out-turned, or fully rolled over rims; at least one vessel in black ware with lug handles; and one vessel of reddish ware, finger tip rippled over the surface of a convex everted rim. In one pit a round bottomed pot had been placed almost immediately on top of the round bottom of a broken vessel, with but a thin spread of dark earth between. Stake holes to the south-east of the site, and to the west, beneath the superimposed Roman principia might indicate contemporary structures. (DES, 1957, p.25-26) Permission to excavate by Mr David Baird, Whitemoss Farm.

2. Knapps Homestead, Houston, NS36936885 (27)

A middle Neolithic farm house. See *Excavation of Prehistoric and Mediaeval Homesteads at Knapps, Renfrewshire*; Paisley Museum, 1965.

3. Gryfe Reservoir Late Neolithic-Beaker Settlement (1)

Extensive occupation of both banks of the Reservoir has been recorded. A main village comprised 15 small round huts, two having attached chambers. To the south are three outlying huts, and to the west one with annexe. Farther west is a croft where three huts are contained within an enclosure. West again, are three huts, associated with small enclosed fields fronted by a terrace which has produced numerous beaker sherds. The area also contains 12 open sites, at least 3 round cairns, and a megalithic chamber. To the north is another round house with annexed chamber, while at the south-west corner of the reservoir is a single larger house. The largest unit is a homestead comprising an oval house within its round enclosure wall. On the north bank of the Gryfe is a group of 4 round huts, while an outlier is located on Burnhead Moor NS30007258. PSAS, XCV, 1961-62, p. 161. *The Western Naturalist,* Vol. 1, 1972 p. 42-58.

4. Coplie Burn, NS309655

A single type hut (1c).

5. Moyne Moor, Neilston, NS477532, NS476532

The presence of flints and Late Neolithic sherds suggests the possibility of settlement of the Gryfe Reservoir type (M. MacNeil; W. Lonie; F. Newall; DES 1963 p. 41; 1964 p. 45; 1965 p. 14).

6. Lurg Moor

Knapping sites, mainly west and south of the Roman fortlet, NS295736/7, with at least 2 Gryfe A huts to the south NS296733. *The Western Naturalist*, Vol. 1, p.50. (Located initially by F. Newall jnr and James Martin).

7. Green Water.

Extensive occupation of both banks in Neolithic-Bronze Age periods indicated by numerous flint and stone artefacts. Ibid. p. 50-51.

8. The South Mound, Houston, NS40106649

During present excavations Daniel Stables has recovered Neolithic sherds from a primary occupation surface beneath the Bronze Age mound.

SMALL FINDS (Fig. 1)

Axes (Note 19) - Unsectioned and Unclassified

1. 'Water of Ayr Stone'. Holehouse, Neilston, NS472570. Pride, David. *A History of the Parish of Neilston*, 1910, p. 101 (Paisley).

2. Soft grey stone - later used as a whetstone. Kilmacolm parish. DES, 1958, p. 31. (Paisley - donated by W.O. Black).

3. Formakin, Erskine, NS410710 (Paisley).

4. 'Jade or Ragstone'. Peat Moss near Bishopton. PSAS.11, 1854-57, p. 308 (N.M.A.).

5. 'Porphyritic'. 'Near Paisley' PSAS.XX, 1885-86, p. 320. (N.M.A.).

6. 'Greenstone' Elderslie. Ibid. (N.M.A.).

7. 'Porphyritic', Renfrewshire, Ibid. (N.M.A.).

8. 'Roughly chipped greenstone'. 'Said to have been found in Renfrewshire but possibly North American'. Ibid. (N.M.A.).

9. 'Sandstone'. Kilbarchan. PSAS. XXIII, 188-89, p. 8 (N.M.A.).

10. Giffnock Quarries. PSAS. XXII, 1887-88, p.349 (Hunterian).

11. 'Volcanic Mugearite'. Newton Mearns. DES, 1960, p. 35.

12. Dark Grey stone. Netherplace, Newton Mearns (Kelvingrove).

13. Grey stone. South Newton. NS33686735 DES, 1963, p. 47. (McLean Museum, Greenock - donation by W.O. Black).

14. Grey stone. Burnhead Moor, NS30507263. DES, 1968, p. 40. Retained by W.O. Black.

15. Greenish-grey stone (Class VI) East Green, NS33956890. DES, 1965, p. 40. Retained by W.O. Black.

16. Gritty green stone. East Green, NS33536865. Retained by W.O. Black.

17. Stumpy white axe-hammer with faint girth zone. East Green, NS33956890. Retained by W.O. Black.

18. Porphyry axe-hammer. North Brae, Barochan. PSAS.LV.. 1920-21, p. 24 (N.M.A.).

19. Mid section of grey stone axe, reused as anvil. Lurg Moor, NS295737. PSAS. XCV, 1961-62, p. 169-70. (Paisley). Donation by F. Newall.

20. Light grey silicious stone. Gryfe Reservoir, OS 5, NS282-37112. *The Western Naturalist*, Vol. 1, 1972, p. 48; p. 51, Fig. 3, 1. (Hunterian).

21. Similar to No. 20, and of the same stone. Mansefield Farm, NS296708. Retained by Miss Kerr, 71 Forsyth Street, Greenock. Ibid. p. 55.

22. Fragment, possibly from a similar axe, reused as a scraper. Gryfe Reservoir, OS 11, NS28167140. Ibid, p. 49 (Hunterian).

23. Fragment of green stone. Possibly from the butt of an axe. Knapps Homestead, NS36936885. (Paisley).

24. Flint flaked axe. Cloak House, Kilmacolm, NS35257200. DES, 1960, p. 33. Retained by F. Newall for demonstration.

25. Similar axe, but with splayed cutting edge. Duchal Moor, South of Newton, NS333676. PSAS. XCV, 1961-62, p. 170 (untraced) *Note 20.*

26. Dark Grey Stone. Auchentiber, Kilmacolm, NS310720 (Paisley).

27. Green Stone. Butt abraded. Re-used as anvil. East Green, Kilmacolm, NS33756875. DES. 1969, p.44. Retained by W.O. Black.

28. Epidotised ash. Picket Law, Todhills, Paisley. (Paisley).

29. Grey white stone. East Green NS339689. Retained by Robin Orr, Finder, of Gateside Farm.

Axes - Sectioned or Classified

(a) Great Langdale Volcanic Ash, Cumberland.

30. From near Eaglesham. (Kelvingrove).

31. Auchencloich, Kilbarchan. PSAS. XCV, 1961-62, p. 170. (Paisley donated by A. McIntyre via F. Newall).

(b) Stake Pass Volcanic Ash, Cumberland.

32. East Green, Kilmacolm, NS337689. PSAS.LXXXIV, 1949-50, p. 229 (N.M.A. - donated by W.O. Black).

(c) Tievebulliagh - Rathlin Island porcellanite. North-east Ireland.

33-35. Jope. E.M. 'Porcellanite axes from Factories in North-east Ireland; Tievebulliagh and Rathlin, 'Ulster A.J. XV, p. 31-60. Refers to three Renfrewshire axes. A second axe from Neilston is of Tievebulliagh stone.

(d) Greywracke. Southern Uplands.

36. An unfinished axe. Sectioned by the Hunterian Museum and classed as 'Certainly greywracke, probably from the Southern Uplands of Scotland'. (Cf. PSAS.CXII, p.68). Ren.1, (Hunterian). A micaceous greywracke, not group XV - presumed local. Auchen-foyle Farm, Kilmacolm, NS312710 (McLean Museum, Greenock- donated by W.O. Black). Note - greywracke occurs in glacial drift in the parishes of Lochwinnoch and Erskine.

(e) Andesite.

37. Lawpark, Kilmacolm, NS344679. 'Excavation of Prehistoric and Mediaeval Homesteads at Knapps, Renfrewshire, 1965, p. 41, pl. 9. (Paisley).

(f) Basalt.

38. Adze. Knapps Homestead, Houston, NS36936885. Ibid. p. 41, Fig. 4,36, (Paisley).

Maces. Possibly Mesolithic - 'Secondary Neolithic'.

1. Renfrew Golf Course, NS517666. DES. 1958, p. 30 (Kelvin-grove).

2. 'Perforated Mace' Found during the excavation of the King George V Dock, Renfrew, NS528665. Said to have been in the possession of Councillor J.S. Clarke in 1955. Information from Mr. William Deans.

3. Serpentine pestle mace. NS335687. Duchal Castle, 1887. PSAS.XXII, 1887-8. p. 407. 3⅞ x 1¾ maximum diameter. (Paisley).

Footnotes

1. Cnoc Sligeach, Oronsay. DES, 1970, 7; 1972, 8; 1973, 9.

2. Barsalloch, Wigtownshire. DES, 1968, 46.

3. Scott, J.G., South West Scotland, 1966, p. 11-15.

4. DES, 1959, 12; 1960, 15-16; 1961, 16-17; 1962, 12-13; 1963, 18; 1970, 6; 1971, 4; 1972, 6.

5. PSAS, 100, 1967-68, pp. 1-46; 102, 1969-70, pp. 1-30.

6. DES, 1973, 14-15, Mr. Macneill allowed me to inspect his collection.

7. PSAS. LXXV, 1940-41, pp. 55-92.

8. PSAS. LXXXIII, 1948-49, pp. 77-98.

9. PSAS. LXIV, 1929-30, pp. 34-48.

10. DES, 1963, 25. Radio carbon datings for Monamore chambered cairn, Lamlash, Arran, indicate use from c.3160 to c.2240 BC. and possibly earlier. DES, 1971, 15. Similarly the cairn at Glenvoidean, Bute is dated from c.2910 to c.2300 BC.

11. In addition to those from Lochwinnoch, Lurg Moor, Scroggie Bank, and Loch Thom (*The Western Naturalist*, Vol. 1, 1972, pp.50-51, Fig. 3), b&t arrowheads have been found at Formakin (Paisley Museum), and High Mathernock, NS317714. DES, 1955, 25: PSAS.XCV, 1961-2, p.170.

12. Boyd of Skelmorlie. Guide Book to Wemyss Bay, Skelmorlie, Inverkip, Largs, and Surrounding Districts, 1789, p.65.

13. NS267562. DES, 1966, 18.

14. PSAS. XI 1874-76, pp. 272-97.

15. NS38235559. About 70 feet in diameter. Smith, J. *Prehistoric Man in Ayrshire*, p. 79.

16. NS21485158. DES, 1965, 15. A flat circular mound, 60-65 feet in diameter with one standing stone, and a second, fallen, on the preiphery.

17. NS47755323. DES, 1963, 45.

18. As the maps are intended to give a comprehensive view of the periods under consideration, all sites, including those now erased, are inserted. The current situation is indicated in the text. Numbers or letters in brackets give the site reference

as reported in PSAS.XCV, 1961-62, or in the *Western Naturalist*, Vol. 1.

19. This list is not comprehensive, and the writer would be grateful for any information about unnoted axes, either recorded by museums or institutes, or retained by private individuals. It is hoped that a complete record may be eventually achieved.

20. A small core flint axe found at Lochgoin may be from the Renfrewshire or Ayrshire side of the county boundary.

Mr. Frank Newall, Craigmont, 84 Bawhirley Road, Greenock.

THE MUIRSHIEL MINE

By DAVID W.A. LAURENCE
Renfrewshire Natural History Society

Situated in a bleak moorland area high in the Renfrewshire Heights, about two and a half miles beyond the car park of the Muirshiel Regional Park, there is the site of the former Muirshiel barytes mine.

Barytes is barium sulphate, a high density mineral with varied uses. Large quantities are incorporated in oil drilling muds which are pumped down the drill pipe to lubricate the bit and carry the rock chippings up to the surface in the return circulation. The density of the column of drilling mud assists in controlling any high pressure pockets of oil or gas that may be struck. Barytes is also used in the paint and paper industries and is the substance given in a barium meal since it is opaque to X-rays.

HISTORY AND DEVELOPMENT:

As far as can be ascertained, the mine was worked nearly continuously for over two hundred years from just after the middle of the 18th century until 5th September 1969. About 1918 the lessees were the Muirshiels Mineral Co. of Lochwinnoch. There was a break in production between 1920 and 1942 in which year the mine was reopened by Messrs Keir and Cawder Ltd. and Messrs James Millar Son and Co. Ltd. In 1947 the Muirshiel Barytes Co. was formed whose operations were taken over by Anglo Austral Mines Ltd. in 1960, to be in turn followed by Rio Tinto Zinc in 1962.

It is probable that annual production during the early years was small and that all exploitation was by opencast working. Gradually three gully-like features were excavated into the hillside, one above the other along the line of the Main Vein which, although variable, is generally aligned N.N.E. to S.S.W. and follows a fault-crush zone. These excavations were known as the Lowest Opencast, Intermediate Opencast and Highest Opencast and the two former are now striking features. Subsequently at least four adits were driven southwards from the ends of the opencasts, two being from the Intermediate Opencast. Older workings also included two shafts or winzes sunk from the adits at the head of the Intermediate Opencast and one from the floor of the Lowest Opencast. By 1946 it was obvious that further development of the mine would be worth while, and in August 1947 No. 4

shaft was started in the Intermediate Opencast and reached the 210 feet level in 1948 and ultimately the 410 feet level. Levels at 110 feet and 310 feet were also worked from this shaft which was not vertical but steeply inclined to the west at about 85° to the horizontal, following the general dip of the Main Vein. The shaft contained skip winding gear to bring up the barytes and a ladderway compartment for the miners. In April 1951 a second vein was discovered, crossing the Main Vein about 730 feet north of No. 4 shaft, and was named the East-West Vein. The barytes it contained was of poorer quality than that in the Main Vein. By 1958 all levels were considerably extended to the north of No. 4 shaft and as yet no mechanisation had been introduced underground, the tubs of barytes being pushed along the rails by hand. Since future reserves were obviously going to be in the area where the Main and East-West veins intersected, a decision was made to sink a new shaft near the intersection and No. 5 shaft was started in February 1958 and sunk to the 510 feet level, later being extended to 600 feet. From this shaft the 210, 310, 410, 510, 600 and 660 feet levels were worked in the East-West Vein, the depths being measured from the Intermediate Opencast. The Main Vein was not exploited below the 510 feet level. Large reinforced concrete slabs mark the positions of Nos. 4 and 5 shafts, the latter near the entrance to the Lowest Opencast. No. 5 shaft was vertical and contained a cage for the miners, counterbalance weight, skip compartment and ladderway. Electric winding was installed in 1960. The construction of this shaft made possible the introduction of battery locomotives and mechanical loaders in the underground workings.

PRODUCTION:

Production statistics are not available before 1895. Between then and 1913 annual production fluctuated between 520 and 1120 long tons, the latter figure being achieved in 1911. Thereafter output gradually declined to 91 tons in 1920 just before closure. The total tonnage during the period 1859 to 1920 was 17,678. At this time dressing of the barytes was carried out at a local grinding mill which now stands as a ruin near the bridge across the River Calder upstream from the Muirshiel car park.

After being reopened in 1942 annual production rose steadily to 1580 tons in 1944, 5970 tons in 1946 and 12,002 tons in 1949. The highest tonnage produced in any one year was 16,987 tons in 1964. The most productive period in the life of the mine followed the construction of No. 5 shaft in 1958, annual output thereafter being maintained above 10,000 tons until 1969. Total production from 1943 to 1969 was 274,024 tons and the grand total of recorded production at the mine was 291,702 tons. When production was resumed in 1942 the barytes was sent to a dressing

plant at Dalintober Street, Glasgow, owned by the Arran Barytes Company, and later some of the output went to Orr's Zinc White in Widness. No processing of the mineral at the mine site was necessary since the barytes obtained from the North-South Vein was of high quality. Since the production from the East-West Vein was of distinctly poorer quality a dressing plant was erected at the mine in 1960.

The number of men employed at the mine fluctuated with the production but in the early 1960s was generally forty-three to forty-eight. Of these about eleven would be skilled miners and each would have an underground assistant. The rest of the employees either attended to underground maintenance or worked on the surface. After 1965 the number employed dropped to thirty-two. One miner at least had worked at the mine for twenty-eight years. Transport to the mine from Lochwinnoch was provided by the Company.

ROCKS AND MINERALS:

The area of the mine offers much of interest to the amateur geologist. The rocks are generally igneous in origin, those in the vicinity of the mine being trachytes and rhyolites with tuffs, agglomerate and breccia, surrounded by olivine basalts. Both the worked veins appear to be in faults and this may be confirmed for the North-South Vein by examining the wall rocks of the Lowest Opencast in which an andesitic sill occurs. Displacement indicates downthrow to the west by about twenty-five to thirty feet. The East-West Vein also lies in a fault crush zone, in this case with downthrow and dip to the north but there is no surface evidence of this visible for inspection.

The tip heaps of the Muirshiel Mine have been productive hunting grounds for the mineral collector, particularly when the mine was working, but even yet interesting specimens may be unearthed. Barytes is plentiful as massive pink and white banded specimens and less frequently as the "cockscomb" variety. Quartz may be massive, crystalline or in the form of "sugar" quartz which contains such a high proportion of interstices as to make the specimen unusually light in weight. Calcite is the commonest gangue mineral and is normally found as white or mauve tinted cleavage rhombs although good specimens of "dog-tooth" calcite have come from the mine. Strontianite occurs in three varieties, radiating aggregates of fibrous crystals with a botryoidal form, small clusters of acicular crystals of distinctly spiky appearance, and a pale green fibrous form. Pyrolusite, a manganese oxide, is present at Muirshiel as a thin coating in fissures in the barytes forming the attractive patterns of manganese dendrites. A black powdery material occurs in cavities and may also

be pyrolusite, but should more properly be called psilomelane if it contains barium. Other minerals which have been found at Muirshiel include iron pyrites, chlorite, and traces of galena and magnetite.

When the mine closed in 1969 it was because known workable reserves were exhausted. There had also been severe competition from imported barytes of higher quality. This was the last barytes mine in Scotland.

Whilst every effort has been made to make the mine site safe, those visiting it should use discretion. Subsidence is always possible and any obviously recent declevities in the ground should be avoided.

Acknowledgements:

The author wishes to acknowledge his indebtedness to the following for information on which this article is based:

HODGSON, E.V., former Mine Manager.

MacGREGOR, MacGREGOR and ROBERTSON. (1944). *Barytes in Central Scotland*. Geological Survey Publication.

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Mr. David W.A. Laurence, 16 Burnside Avenue, BROOKFIELD, Renfrewshire.

NOTES ON RAPTORIAL BIRDS ON ISLAY IN 1974

By J. GRAEME ROBERTSON
Edinburgh

Islay, one of the four islands making up the most southerly of the Hebrides, and noted for its distinctive malt whiskies, has amongst its other attractions a rich and varied collection of breeding birds, afforded by the diversity of habitat available. It is not surprising, therefore, to find an attendant bird of prey fauna present.

Earlier this year, whilst carrying out a survey specifically to find the status of the Merlin, I had the opportunity of locating other species of raptor present. This took me to every corner of the Island, and the following notes are intended purely to place on record what the population was in 1974, and to give some indication as to what it was like previously.

I hope it will also serve to spur visiting bird watchers to the Island in future to forget the spectacle of the geese and their cars for a few days, and explore the lesser known areas of the Island in search of new sites and other species.

GOLDEN EAGLE *Aquila chrysaetos*

The Golden Eagle has had a precarious foothold on Islay, and of the dozen or so eyries known, only one is presently occupied. The two adult birds have been seen frequently in the southern parts of the Island, in company with a young bird this year. Several other sightings of immature birds have been made by myself and others throughout the Island. These could easily be birds from previous years, or individuals coming across from Jura, where they enjoy a greater success, and not nearly such a high disturbance factor. Assuming that between four and six pairs may be found per 100 square miles of suitable terrain, it is not unreasonable to suppose that Islay would comfortably support at least four pairs.

Without doubt the main reason for decline is persecution by 'keepers, and if one takes the trouble to talk discreetly with the 'keepers, past and present, you soon learn the method employed was simply to shoot the birds in the nest. After all, they have a job to do like everyone else, and to some extent one can appreciate their point of view. Any bird with a hooked beak which they imagine threatens their game birds, and in turn affects their security, must be dealt with accordingly. However, with the evidence now available that eagles' liking for game

birds, lambs, etc., is the exception rather than the rule, one can only hope that by enlightening the 'keepers on the facts, their attitude will change.

BUZZARD *Buteo buteo*

This bird is not enjoying the same recovery success as on the mainland in recent years, despite the plentiful numbers of Rabbits on the Island. I only had two or three sightings in the areas where all the other reports are concentrated, these being in the south and east of the Island, where there are probably three pairs breeding in the scattered woodlands. It is somewhat surprising that they do not breed on the cliffs, although there are strong indications that a pair is on the western seaboard of the Rhinns.

SPARROWHAWK *Accipter nisus*

Owing to the lack of woodland on Islay, this species makes the best of it with around a dozen suspected nests, which could well be more if one spent time checking every plantation. The nest sites are fairly accessible, the mixed woodland not dictating much choice as to where they can be established. This being so, a gin trap is easily placed in the centre of the nest and a considerable number of pairs are killed off in this way by the 'keepers. Previous naturalists, like Baxter and Rintoul (*Birds of Scotland,* 1953), recorded that the Sparrowhawk was formerly not uncommon on Islay.

HEN HARRIER *Circus cyaneus*

I spent many hours in April watching the gliding flight of two pairs of harriers as they quartered over ground which was obviously their territory. From other personal sightings and past records it would seem highly likely that there were three other pairs breeding on the Island. This is somewhat gratifying because this bird was heavily persecuted in the past and deserted many of its old haunts. Their numbers are augmented in August and September by migrating birds, and as R. Scot-Skirving, a past naturalist living on the Island, correctly states "the males arrive first followed some ten days later by their dark feathered dames" (*Proc. Roy. Phys. Soc. Ed.,* 5: 40; 1878).

PEREGRINE *Falco peregrinus*

The Peregrine seems to have braved the height of the pesticide problem in the past years, and now has seven traditional sites in coastal areas, neatly spread over the highest cliffs on the Island, all holding birds. All the sites are fairly

inaccessible, and this factor has probably helped to maintain the population at a stable number. Of the sites personally visited, the birds appeared to have a preference for coastal prey. On two occasions the male brought a Redshank to his mate, and remains of Dunlin and Ringed Plover were found scattered about the vicinity. A good number of previous reports of prey indicate that Redshank, Ringed Plover and pigeons are predominant prey items.

MERLIN *Falco columbarius*

The Merlin population, as is usually the case, appears to have a very strong preference for a particular type of nest site. All seven sites found were on a steep heathery clad hill, with an open outlook at least down one valley. On three of the sites the 'keepers informed me that they had shot birds in the same places, in two cases fifteen years ago, and in the other seven years ago. Merlins were disliked because they took the young Pheasants released in great batches each year for the shooting interests. No-one would dispute this fact, but one cannot blame the Merlin for taking advantage of the situation and catching the occasional young bird if faced with a large enclosure of potential prey.

At the several plucking posts examined there were considerable wing remains of Reed Buntings (a common species on the moor), wings of the Oak Eggar moth, and Common Lizards with their heads removed. Again the numbers of Merlins are augmented in the autumn by migrant birds most probably going to Ireland from the mainland. A Merlin was observed waiting to catch any unsuspecting migrant as it arrived at, or departed from, Rhinns point, the most westerly promontory on Islay.

KESTREL *Falco tinnunculus*

As stated in past records, this is still one of the most abundant nesting hawks. There are nine definite sites, more than half situated on cliffs - sometimes in close company with Hooded Crows - with a good number still to be located. These are to be found on the fringe of the moorland adjoining the agricultural land. Kestrels were seen nearly every day hunting over the fields, or perched in or around the farm steadings. Identification of nest sites can be done by noting if the nest contains pellets (usually liberally coated with the shiny black cases of beetles), because the Merlin ejects its pellets away from the nest.

BARN OWL *Tyto alba*

Islay has its compliment of Barn Owls, although the four

nest sites known do not stick to the traditional farm house setting; one nest was found under a tree root, and there were reports of a nest being found in a cave. Islay is one of the very few Scottish islands still supporting this bird, and it has a long history of occupation.

TAWNY OWL *Strix aluco*

If the reports from the foresters are true that there is a plague of voles in the young plantations, then it is not surprising that this owl is now an established breeding species in at least four actual localities.

SHORT-EARED OWL *Asio flammeus*

Short-Eared Owls were disturbed several times in various marshy areas of ground throughout the Island, where their frequent appearance tends to suggest at least four pairs are breeding.

Acknowledgements:

I would like to thank the World Wildlife Fund for a grant which enabled me to visit Islay as part of the national survey on Merlins, and also Mr. Gordon Booth of Islay for giving me access to his records.

Mr. J. Graeme Robertson, 21 Lauderdale Street, EDINBURGH EH9 IDF.

NOTES ON THE MAMMALS OF THE CUMBRAE ISLANDS

By J.A. GIBSON
Chairman, Clyde Area Branch, Scottish Wildlife Trust

and R.O. SHILLAKER
University Marine Biological Station, Millport

To the best of our knowledge no separate account of the mammals of the Great and Little Cumbrae islands has ever been published, and although they are included to a greater or lesser degree in the major surveys of the mammals of the Clyde area (Alston, 1880; Boyd Watt, 1905; Gibson, 1954) we feel that these notes on the mammals of the Cumbrae islands may be of some interest.

To a certain extent our personal notes cover two separate periods of trapping and observation, a generation apart, mainly from 1945 to 1955 and from 1973 to 1974, and we have also taken account of the records obtained by Mr. R.W. Sheppard, the collector employed by Messrs Barrett-Hamilton, Hinton and Ogilvie-Grant for the British Museum mammal survey of small West of Scotland islands in 1912. The Rev. J.M. McWilliam, of *Birds of the Firth of Clyde* (1936) fame, was also very interested in the distribution of Clyde mammals, particularly on the islands, and just after the last war he wrote to his old friend Mr. Richard Elmhirst, then Director of the Scottish Marine Biological Station at Millport, for information about the Cumbraes; we are glad to be able to incorporate some important information from these letters (1946). We are also grateful to many members of the staff of the Marine Biological Station for many interesting details over the years.

The Cumbrae islands are so well-known to all West of Scotland naturalists as to require no further description, but some brief notes may be useful for others further afield. The Great Cumbrae measures some three miles north-south by nearly two miles west-east, and covers over 5,000 acres. The south bay contains the little town and popular holiday resort of Millport, with the well-known Marine Biological Station, established towards the end of last century, at Keppel two miles away to the east. The island rises to a maximum height of 415 feet and most of the island is farmed. There is a road on the raised beach right round the island, and a frequent daily vehicular ferry service to Millport from the mainland. The Little Cumbrae, lying some half mile to the south, is roughly triangular in shape, measures some 1¾ miles by ¾ mile, covers 723 acres, and rises to

a height of 409 feet; it is uninhabited apart from the lighthouse (soon to become automatic) on the west and the owner's house on the east. Most of the island is covered with rough moorland vegetation of bracken and heather. The two islands lie in the Firth of Clyde with the Great Cumbrae some one and a half miles from the north Ayrshire coast, and the Little Cumbrae the same distance from the south end of the island of Bute.

On the Cumbraes, to the best of our knowledge, there have never been any Moles (a recent report of 'mole-hills' would seem to require confirmation), true Wild Cats (although feral cats are common), Stoats (but see below), Weasels, Martens, true Polecats, Badgers, or Mountain Hares. Over the years occasional reports of Foxes and Roe Deer have reached us, and although these may possibly be true we have no firm evidence of any kind so exclude them in the meantime. According to official returns no Mink are kept on Cumbrae, and we believe this to be true. Rabbits and Brown Hares were introduced long ago, and Hedgehogs were first introduced in the 1920s; although the Hare now seems to be extinct, the Hedgehog and the Rabbit are fairly well known on the Great Cumbrae, and the Rabbit also on Little Cumbrae. The only vole seems to be the Short-tailed (Field) Vole, and the occurrence of the Water-Vole is very doubtful. There may be bats other than the Pipistrelle, the only one commonly recorded. The Black Rat may have existed at Cumbrae harbour before the arrival of the Brown Rat in the early 19th century. These notes do not include the cetaceans, which are being treated in a separate account of the Clyde sea area (Gibson, in press). We are therefore able to give firm notes on nineteen species, as undernoted.

In the following systematic list the arrangement and nomenclature largely follows the *Checklist of Palaearctic and Indian Mammals* by J.R. Ellerman and T.C.S. Morrison-Scott, (second edition, 1966), published by the British Museum (Natural History).

Order INSECTIVORA

HEDGEHOG *Erinaceus europaeus* Linnaeus, 1758

Not apparently indigenous to the Cumbraes, but a few were introduced to Great Cumbrae some time after the first world war, probably in the early 1920s, and fresh stock was introduced about ten years ago. Now seen relatively infrequently and may well be decreasing.

PYGMY SHREW *Sorex minutus* Linnaeus, 1766

Common and well distributed on both islands; many specimens trapped.

COMMON SHREW *Sorex araneus* Linnaeus, 1758

Common on the Great Cumbrae, especially on the higher ground, but a long series of live trapping results have produced no records for Little Cumbrae. This is in keeping with the known distribution of shrews on the Clyde islands (see *Trans. Paisley Nat. Soc.*, 6: 5; or *Western Nat.*, 2: 107).

WATER SHREW *Neomys fodiens* (Pennant, 1771)

The late Richard Elmhirst, formerly Director of the Scottish Marine Biological Station, told the Rev. J.M. McWilliam (*in litt.*, 1946) that he had trapped the Water Shrew on the Great Cumbrae, but that it was "very uncommon". We have no personal record for either island.

Order CHIROPTERA

PIPISTRELLE *Pipistrellus pipistrellus* (Schreber, 1774)

Fairly common on both islands. 'Bats, presumably the common ones', are occasionally seen at the light on the Little Cumbrae, and have been killed there (Gibson, 1969).

LONG-EARED BAT *Plecotus auritus* (Linnaeus, 1758)

Richard Elmhirst told McWilliam (*in litt.*, 1946) that all "the bats we have about [the Marine station] are Pipistrelles, but a Long-eared Bat killed in Millport was brought here for identification in early May 1945. This is the only one I have seen". We know of no other record.

Order CARNIVORA

STOAT *Mustela erminea* Linnaeus, 1758

An adult male stoat was trapped on the Great Cumbrae on 2nd April 1953 (*Scot. Nat.*, 1953: 197). It was presumably an accidental importation, as was suggested at the time, and to the best of our knowledge no other records have come to light. It has long been known that Stoats and Weasels occur only on Bute among the Clyde islands.

FERRET *Mustela putorius furo* Linnaeus, 1758

Although there have never been any true Polecats on the Cumbraes, at present there are a few escaped Ferrets on the Great Cumbrae; we have no knowledge of any feral breeding.

OTTER *Lutra lutra* (Linnaeus, 1758)

At one time the Otter was common around the wilder parts of the shores of the Cumbraes, and a number of Otter 'seats' were well-known in traditional places on both islands. Mr. Richard Elmhirst did considerable work on the winter feeding habits of the Otters on Cumbrae; he gave a summary of the results in the Annual Report of the Scottish Marine Biological association for 1936-37, and ultimately published an informative paper on the subject (Elmhirst, 1938). Although still fairly well-known on the Little Cumbrae, recent records for the Great Cumbrae are very few.

Order PINNIPEDIA

COMMON SEAL *Phoca vitulina* Linnaeus, 1758

Used to be fairly well-known around the shores at most seasons of the year. Pups have occasionally been seen on the east skerries of the Little Cumbrae, but not every year. Nowadays the Grey Seal is probably seen more often than the Common.

GREY SEAL *Halichoerus grypus* (Fabricus, 1791)

The first record of a Grey Seal from the Cumbraes appears to have been one seen off the Little Cumbrae on 8th September 1900 (Gray, 1900), but Grey Seals are now seen around the shores of the Cumbraes fairly frequently, which is not surprising in view of the large gathering of both Grey and Common Seals between Toward Point and Innellan on the Cowal shore (see Gibson, 1954). Grey Seals fairly often come ashore on the Little Cumbrae, and from the Little Cumbrae comes the first breeding record of the Grey Seal in the Clyde area - "Mr. R. MacCuish found a 'cream coloured calf' born on Little Cumbrae, Bute in mid-November [1958] and another, probably the same animal, was seen there by the skipper of F.R.V. *Calanus* during that month" (Boyd, 1962).

Order ARTIODACTYLA

FALLOW DEER *Dama dama* (Linnaeus, 1758)

There are ancient references to deer on the Little Cumbrae. Paterson (1866) said that in 1453 the Little Cumbrae was a deer forest "well stocked with deer and rabbits" (*History of the Counties of Ayr and Wigtown*, Vol. 3: 338). Donald Monro, High Dean of the Isles, (1549) speaks of "Cumbray of the Dais, because there is many Dayis intill it". There is no indication as to what species of deer is meant, but the Fallow is the most likely, and indeed John Monipennie, writing around 1597 in the *Abridgement or Summarie of the Scots Chronicles* (reprinted: Glasgow,

1820), is quite clear "Little Cumra, fertill of Fallow deere". When they disappeared from the island is not clear, but there is no mention of deer on the Little Cumbrae in either the *Old* or the *New Statistical Accounts*.

RED DEER *Cervus elaphus* Linnaeus, 1758

Whitehead (1964) wrote as follows "In November of that year [1960], however, a three-year-old stag appeared on the tiny rock-girt island of Little Cumbrae having swam there, apparently, from the island of Arran - a distance of about eight miles". Its fate is unknown. Some eight years ago a Red Deer stag was found dead on the shore of Great Cumbrae. It had been shot through the stomach.

Order LAGOMORPHA

BROWN HARE *Lepus europaeus* Pallas, 1778

Alston (1880) said that the Hare "does not appear to be indigenous in any of the Islands, but has been very generally introduced". According to the *New Statistical Account* (1845) the Hare, at one time common on the Great Cumbrae, had died out. It this was true then it must have been reintroduced, since Boyd Watt (1905) said that a few were "now again on this island", and it was fairly well known by the early 1940s. Since then it seems to have declined, for only a few were seen in 1963 and at present the Hare appears to have died out once again.

RABBIT *Oryctolagus cuniculus* (Linnaeus, 1758)

Introduced to both islands centuries ago. Paterson (1866) said that the Rabbit was known on the Little Cumbrae by 1453 and on the Great Cumbrae by 1612. Nowadays Rabbits are extremely common on both islands. The *New Statistical Account* (1845) said of the Little Cumbrae "For a long time past, this rocky islet has been principally occupied as a rabbit-warren, - about 450 dozen being taken annually", and Mr. Ian Parker, a former owner, said that before myxomatosis up to 4,000 Rabbits had been killed on the Little Cumbrae in a year (*Third Statistical Account,* Renfrew and Bute, p. 536). Myxomatosis reached the Cumbrae islands in 1955 (Gibson, 1957) and produced the expected havoc, but the Rabbits never got exterminated and have since made a substantial recovery in numbers on both islands. An interesting point is the presence on both islands of some completely black Rabbits. These have been well known for at least fifty years, and although their numbers seem to be decreasing some are still present. On the adjoining mainland black Rabbits also occur on several estates in mid and north Ayrshire.

Order RODENTIA

WOOD MOUSE or FIELD MOUSE *Apodemus sylvaticus* (Linnaeus, 1758)

None on the Little Cumbrae, but common and widely distributed on the Great Cumbrae, especially on the low ground.

An interesting history attaches to the Field Mice on the Great Cumbrae. In the years immediately preceding the first world war a group of workers from the British Museum (Natural History) led by G.E.H. Barrett-Hamilton, M.A.C. Hinton (later to become Keeper of Zoology in the Museum) and W.R. Ogilvie-Grant, arranged for extensive collections of small mammals to be made from many islands in the West of Scotland, including the Clyde. The purpose of this work was to describe local races and the conclusions arrived at were published in a series of papers (e.g. Barrett-Hamilton and Hinton, 1913; and Hinton 1914), and were later incorporated in the uncompleted *History of British Mammals* by Barrett-Hamilton and Hinton (1910-1921). These studies received some criticism from the editors of the *Scottish Naturalist* in 1914, who pointed out that the "differences between the various forms of field mice are so slight, being based mainly on intricate cranial measurements, that we are afraid that they can only be appreciated by specialists after prolonged study. One result of this wholesale splitting of species will be, we fear, to deter the ordinary naturalist from the study of our smaller British Mammals". The Field Mice from Great Cumbrae were given sub-specific rank, as follows:

Cumbrae FIELD MOUSE *Apodemus sylvaticus cumbrae* Hinton, 1914.

On this subject we cannot do better than quote Gibson (1954), as follows:

> "Despite the careful descriptions given by Hinton in his 1914 paper let no one imagine for one moment that these races of mice can be separated in the field. I have kept live Field Mice from Arran, Bute and Cumbrae in cages at the same time and neither I nor any other zoologist who saw them could detect the slightest difference. In this respect it is worth noting that when Barrett-Hamilton and Hinton first examined these Clyde island mice they came to the conclusion, in their 1913 paper, that they were "unable to distinquish the specimens from the islands from *A. sylvaticus sylvaticus* of the mainland". It was only in the later 1914 paper, after pages of intricate cranial measurements, that separation was made. I have not seen this fact of earlier 'lumping' referred to previously, but to me it seems significant, and it is also interesting to note that Harrison Matthews in his recent book on British Mammals

(1952) entirely omits these Clyde Island races from his systematic list".

BROWN RAT *Rattus norvegicus* (Berkenhout, 1769)

Common and widely distributed on both islands, and regularly seen foraging on the shore. According to Alston (1880) and Boyd Watt (1905) the Brown Rat arrived in the West of Scotland in the early part of the 19th century.

HOUSE MOUSE *Mus musculus* Linnaeus, 1758

Common and widely distributed on Great Cumbrae. Not confined to habitation, and House-Mice have often been trapped far out in the fields. No records from Little Cumbrae.

WATER-VOLE *Arvicola terrestris* (Linnaeus, 1758)

We have no records of Water-Voles from the Cumbraes. One hears rumours of its occurrence on Great Cumbrae, but we have never been able to confirm these and suspect that they have their origin in the usual confusion between 'water-vole' and 'water-rat' (Brown Rat). From the excreta of Otters on Great Cumbrae Elmhirst (1938) recorded the bones of 'voles', without giving further details, and unfortunately the correspondence between Elmhirst and McWilliam gives no further information.

As Dr. Gibson wrote (1973) "The situation, therefore, is not without some doubt, and accurate information is urgently required, but in the absence of any such confirmation it must be assumed in the meantime that Water-Voles do not occur on Great Cumbrae".

SHORT-TAILED (FIELD) VOLE *Microtus agrestis* (Linnaeus, 1761)

Well known on the Great Cumbrae since the beginning of the century. Boyd Watt in the B.A. *Handbook* of 1901 said "common; also in islands"; Dr. Charles Cairnie, examining the catches made by farm cats in the 1920s, said the Field Vole was quite common; it was "well known" to Richard Elmhirst in the 1930s; the bones of 'voles' from the excreta of Otters recorded by Elmhirst (1938) are presumed to be those of the Field Vole, since we have no evidence that Bank or Water-Voles have ever occurred on Cumbrae; Dr. Gibson handled at least ten specimens in the late 1940s and early 1950s, but on his last trapping (a week-end in April 1963) only trapped one, and Shillaker has caught none so far. This recent evidence of poor trapping results may point towards a possible decline in the Field Vole population, and investigations will continue. We have no records of Field Voles from the Little Cumbrae.

This, then, is a summary of our existing information on the mammals of the Cumbraes. Needless to say, we shall be extremely grateful to anyone who can supply any additional information.

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Dr. J.A. Gibson, Foremount House, KILBARCHAN, Renfrewshire.
Mr. R.O. Shillaker, University Marine Biological Station, MILLPORT, Great Cumbrae.

THE DISPERSAL OF STREAM INVERTEBRATES

By W.O. YOUNG
Department of Biology, Paisley College of Technology

This paper is a review of some of the literature pertaining to the concept of a colonisation cycle (Muller 1954, 1963, 1965, 1966) in running water habitats and contains some possible explanations of the mechanisms involved in the cycle. Some of the explanations included are derived from the results of personal observations.

In the lotic environment, current is the dominant physical force exerted on the organisms present and the evolutionary process has led to many morphological and behavioural adaptations to resist displacement by a unidirectional force. However, animals inhabiting running water are confronted with a wide range of flow conditions and in many species there is inevitably a downstream movement, either voluntary or involuntary, which has to be counteracted by voluntary movements upstream if the upper reaches are not to become devoid of the species.

Dispersal

All organisms have a capacity for dispersal at some stage in their life history and it is only by dispersal that natural populations alter both qualitatively and quantitatively over the available habitat. The benthic animals of streams select their habitats on the basis of factor combinations rather than on isolated factors (Ulfstrand, 1967) and tend to aggregate in areas with the most suitable combination of factors. The classical work of Beauchamp (1933, 1935, 1937) showed that the flatworm *Crenobia alpina* moves upstream when the water becomes warm and/or the worm becomes sexually mature, and moves downstream when hungry and/or sexually spent thus ensuring that it remains in cold water, breeds in the headwaters and feeds downstream where the ratio of population to space is lower and there is correspondingly more food. Thus by investigating life histories of aquatic invertebrates it is possible to determine direction of movement, reasons for movements and at what stage in the life cycle tendencies to move are most pronounced.

In general the eggs of aquatic invertebrates are provided with some means of attachment to the substrate and are laid either singly or in batches resulting in a fairly dense distribution of eggs in areas providing for the developmental needs of the egg and young stages. This is especially so in flying insects whose habit of collecting in swarms prior to oviposition

tends to produce a superabundance of young stages in a relatively small area of river (Muller, 1954). For any species the widest dispersal over the inhabitable part of the river ensures the maximum chance of success in competition for resources. It is important, therefore, that dispersal from this area of high density is achieved before the growing organisms make too great a demand on the limited resources of the area.

This dispersal is achieved in a number of ways by stream invertebrates, notably by downstream and upstream movements, but also by migrations to the edges of the stream and vertically into the stream bed.

Downstream Movements

The most important method of downstream movement by stream invertebrates is passively by the current, known as "drift". Waters (1965) divided total observed drift into three classes:

1 catastrophic drift - due to an unusually severe physical disturbance of the environment.

11 constant drift - due to accidental dislodgement of the organisms.

111 behavioural drift - due to an active response by the individual organism.

Constant drift can also have a behavioural component, for instance dislodgement may occur when an organism moves into an area of faster current or when there are collisions between organisms. Thus constant drift and behavioural drift can be combined under the heading of non-catastrophic drift. In non-catastrophic drift dispersal is passively via the current but the movement of animals into the current is probably by endogenous behaviour patterns initiated by exogenous factors. Whether this movement into the current is by active vertical swimming or merely by an increase in general activity is not known. Indeed the behavioural component is possibly not present to the same extent in all species. For instance Anderson (1966) has been unable to detect any considerable diel variation in drift of Chironomid larvae. However investigations by various authors (Waters, 1961; Muller 1963, 1965) have proved the diel periodicity of downstream drift of most aquatic invertebrates. They also showed this to be in direct response to lowered light intensity at sunset and that moonlight, by suppressing activity, had a depressant effect on drift rate of the later instars of aquatic insects. Feeding behaviour and some other activity patterns may have evolved an association with lowered light intensity as a protective or avoidance mechanism to escape those predators which seek their prey visually. Hughes (1966) found

under laboratory conditions that disorientation could be caused by removal of an overhead light source and suggested that this might be a contributory factor to the night peak in drift. Quantitative measurements over a 24 hour period show differences in the periodicity of activity for different animals. Bishop and Hynes (1969a) found that a few organisms (notably *Helicopsyche* and *Hydracarina*) were day active, while the majority studied were night active e.g. all Ephemeroptera, Plecoptera and most Trichoptera. These peaks in the drift are largely the result of changes in the organism's behaviour tending to increase the chance of detachment and recruitment to the drift. Many night-active genera show negative phototaxis and all drift species so far studied have been shown to be thigmotactically positive in a lotic situation. However, Elliott (1967a) reported that species of Ephemeroptera, Trichoptera and Plecoptera in an experimental tank exhibited strong positive thigmotaxis until the current ceased when this taxis was reversed and the animals moved about the tank freely. These two taxes would tend to maintain the benthos in an attached state in regions of low light intensity during the day and at night there would be a movement onto the tops of stones. Chaston (1968) proposed that with the natural regime of illumination, variations in drift were due to both external and internal influences on activity and that during the first few hours of darkness the endogenous activity patterns were masked by the increase in activity due to reduction in light intensity. However the overall increase of activity causes the amplification of endogenous patterns which are reflected as subsequent peaks in the drift. Chaston's proposition is supported by Holt and Waters (1967) who found that there was some possibility of an extremely weak endogenous rhythm existing, although greatly influenced by external light conditions.

The relationship between benthic density and magnitude of drift has been investigated by various authors. Muller (1954) suggested that the main cause of non-catastrophic drift was competition between individuals and was a means of population regulation. Pearson and Franklin (1968) found that illumination and population density were the two most important factors related to drift with temperature change having a relatively slight effect. Waters (1966) concluded that drift was a mechanism for removing excess population and drift rate could be used as an index of the production rate of the benthos. Dimond (1967) suggested that drift becomes a significant process only after benthic populations reach their "carrying" capacity and that some of the possible mechanisms increasing the tendency for organisms to drift were:

I reduced food or other resource leading individuals to increased search behaviour.

II increased hunger or excessive contact with other individuals causing a reversal of the normal phototactic and thigmotactic reactions resulting in active launching into the current.

III territorial behaviour leading to individuals without territories entering drift.

IV high population densities causing movement into marginal microhabits which are prematurely vacated.

During preliminary work for a series of experiments on the effect of varying light and current on the behaviour of *Baetis rhodani* nymphs (Young, 1971) it was found that when the nymphs were moving over the surface of a stone in the current contact with another individual usually resulted in one or both of the nymphs releasing their hold and launching into the current. The more nymphs on the surface of the stone then the greater the probability of accidental contacts and thus there is an optimum density of nymphs per unit area of stone surface. This density is governed by the incidence of collisions and in these experiments the optimum was 11 nymphs for a stone surface of 112 sq. cms. It is possible that this reversal of thigmotaxis originally evolved as a defence mechanism against predators such as large insects or fish and that the population regulatory function is a secondary effect, although a very important one. These theories are supported in part by Minshall and Winger (1968) who found an increase in drift in response to a decrease in stream flow. Decrease in depth producing a reduction in available living space and the resultant crowding seems responsible for an increase in activity and greater tendency to enter the current. Where a river is having its flow artificially controlled, it might be possible to increase fish production by reducing the flow, and thus inducing more invertebrates to drift at times when the fish are feeding.

Consideration must also be given to seasonal variations in the drift due to alterations in activity patterns of organisms as they progress through their life cycles. There have been very few detailed reports on differences in drift patterns at different stages in the life cycle of organisms. (Muller, 1966) showed the highest drift activity of Baetidae occurred just before emergence and for Simuliidae shortly before pupation. Elliott (1967b) found that larger instars of Ephemeroptera and Plecoptera predominated in drift with a correlation between periods of fast growth and appearance in the drift. An interpretation of reasons for differences in sizes of individuals in the drift

would require detailed knowledge of life cycles, behaviour, microhabitat preferences, and of the exact effect of physical factors on each species under consideration.

Quantitative and qualitative analyses of drift show that certain groups of animals notably Hydracarina, Coleoptera, Mollusca, which form a large proportion of normal benthic populations, are present in very small proportions in non-catastrophic drift. Muller (1954) stated that this was probably due to the mode of life of these organisms which are usually found in dense plant growth on stones, largely avoiding severe mechanical influences due to the current.

Upstream Movements

As drift occurs throughout the year the upstream portions of bodies of running water would become depleted of fauna, unless some mechanism ensuring upstream movements of drift organisms is in operation. This occurs in two main ways:

1 active upstream movements of larval or adult aquatic forms.

11 active or passive upstream movement of adult flying forms before oviposition.

Various authors have described upstream movements of invertebrates. Neave (1930), Nielson (1950) and Muller (1966) all postulated that the rheotactic orientation of insects in a head-upstream position would result in all random movements being directed against the current, tending to carry them upstream. Bishop and Hynes (1969b) state that upstream movements are primarily positive rheotactic responses made by all aquatic insects. Skototactic responses by which insects are attracted to black areas or regions of low light intensity have been demonstrated by Hughes (1966). Assuming that continuous upstream movement is occurring, such insects would be passing through alternate regions of light and dark. On entering regions of low light intensity their activity would be considerably reduced resulting in aggregations of nymphs in dark areas during the day. At night upstream movements would occur rheotactically and the negatively phototactic fauna would respond to returning light with orthokinetic reactions directed to finding cryptic habitats. Thus there is a gradual movement upstream which may partially account for the upstream colonisation of denuded areas. This is supported by Moon (1940) who found that the greatest recolonisation of lake shores occurred at night.

Amphipoda form a large part of the drift in running water and Macan and Mackereth (1957), Waters (1962), Minkley (1964), Muller (1966) and Hultin (1968) found that this was counteracted,

at least in part, by Amphipoda moving upstream close to the bank areas, often in very large numbers. The greatest distances were covered at the lowest light intensities and the Amphipoda exhibited positive rheotaxis when they encountered small trickles of water entering the main stream.

The movement of aquatic forms upstream may not be constant but vary with larval size or stage in the life cycle. Traver (1925) and Neave (1930) observed upstream migration of the Ephemeropteran *Leptophlebia (Blasturus) cupida* prior to maturation. Macan (1957) showed that in various mayflies upstream movements occurred in the final instar. Very little is known about the initiation and timing of these upstream movements - in some cases it might be accidental or timed by an innate behaviour pattern and possibly initiated by a physiological or ecological factor. Harker (1953) proposed that unstable substrates might cause the initiation of upstream movement in Trichoptera, Plecoptera and Ephemeroptera.

Some stream organisms have morphological or physiological characteristics which make upstream movements limited or impossible - *Simulium* larvae lack the organs of locomotion which would allow migration against a current. For these forms, the only natural means by which upstream reaches can be re-colonised is by upstream movements of flying adults. Roos (1957) found that flight was predominantly upstream among the Ephemeroptera, Plecoptera, Trichoptera and *Simulium* females, and that this was especially true of individuals about to oviposit.

Other Movements

The pattern of dispersal is further complicated in that some of the fauna are capable of moving down into interstitial spaces created by the removal of silt and detritus by flooding and only return to the surface as the detritus and microflora are replenished, which may take 6-8 weeks. Bishop and Hynes (1969a) suggested that this might be a factor in the rapid recolonisation of drought-denuded areas since this interstitial fauna would aid in repopulation of the stream after the water level rose. There can also be movements by stream invertebrates to the sides or middle of the stream at various stages in their life history. Holland (1972) has found pupae of the Elminthidae only within 10-15 cm. of the water's edge.

Acknowledgements

Much of this review was prepared during the tenure of a Research Assistantship at Paisley College of Technology. Mr. J.D. Hamilton kindly read the manuscript and suggested some changes in the presentation.

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Mr. W.O. Young, Craig Goch Research Team, Severn-Trent Water Authority, Milbourne Lodge, GREAT MALVERN, Worcs.

FRESHWATER BIOLOGY OF RENFREWSHIRE RIVERS 1968-1973

By PETER G. LIVINGSTONE and BARBARA WRIGHT
Assistant Biologists, Clyde River Purification Board

Biological surveys of the major rivers in Renfrewshire were initiated in June 1968. Sampling is carried out once every six months as part of the Clyde River Purification Board's bio-assay programme. The surveys are used in conjunction with chemical surveys to monitor stream conditions. The chemical surveys indicate the quality of the water at the instant in time when the sample was taken, whereas biological surveys reflect both water quality and the condition of the stream bed over a period of time, since communities of animals are not established overnight. The basis of biological monitoring is the macro-invertebrate fauna found in the stream bed, consisting mainly of insect larvae which will eventually emerge as adult flies. Each species of macro-invertebrate has a different tolerance of pollution; some such as stoneflies and non-baetid mayflies require clean well-oxygenated waters and will very quickly disappear from a stream community upon the advent of even slight pollution. The composition of the stream community can, therefore, be made use of in determining a stream's condition relative to pollution. The results of biological surveys can also be used to express stream productivity in terms of bottom fauna and flora and therefore to determine how much feeding is available for fish.

Rivers included in this survey are:- White Cart Water, Black Cart Water, River Gryfe and Levern Water. Samples of the bottom fauna are taken at various 'stations' on each river, the number and locations of which are given in Table 1.

Sampling is carried out using a 24 mesh/cm. pond net for a three-minute period at each station. This timed method of sampling enables a large area of substrate to be covered as compensation for the patchy distribution of the bottom fauna. The samples are obtained by kicking the substrate, thus dislodging the animals, which are then washed into the net by the current. To collect animals which cling to the substrate, such as snails and leeches, a quantity of stones are washed into the net with each sample. Where possible, two distinct habitats are sampled: a shallow riffle which, because of local aeration, should contain the optimum conditions of the river at that point, and a pool, thus ensuring that a representative qualitative sample of the animals present in the area of the river is obtained.

Table I River Sampling Stations

River	Station			O.S. Reference	
White Cart Water:	W.C.	2.5	Greenbank	608	508
	W.C.	7.5	Stoneside Ford	581	535
	W.C.	14.0	Stamperland	583	578
	W.C.	18.5	Battlefield	578	612
	W.C.	21.5	Knowehead	548	618
	W.C.	26.0	Levern Confluence	523	629
Black Cart Water:	B.C.	17	Howwood Bridge	395	607
	B.C.	20	Kilbarchan Bridge	414	625
	B.C.	24	Linwood Bridge	444	644
Levern Water:	L.	2.5	Aboon the Brae	462	551
	L.	5.5	Neilston Mill	477	576
	L.	9.5	Barrhead Bridge	507	594
	L.	14.75	Priesthill Bridge	518	608
	L.	16.5	White Cart Confluence	523	628
River Gryfe:	G.	5.5	High Mathernock	323	710
	G.	12.5	Hattrick	361	673
	G.	15.5	Bridge of Weir	383	659
	G.	22.0	Fulwood Bridge	439	669

The animals from each sample are initially sorted into broad groups and then identified to the levels shown below:

PLATYHELMINTHES - To species level.
OLIGOCHAETA - Tubificidae are the only group separated.
HIRUDINEA - To species level.
MOLLUSCA - " " "
CRUSTACEA - " " "
PLECOPTERA - " " "
EPHEMEROPTERA - " " "
TRICHOPTERA - To family level.
NEUROPTERA - To species level.
DIPTERA - Family Chironomidae.
Genus *Simulium*.
Cenus *Dicranota*.
Others to Genus.
COLEOPTERA - Each family.
HYDRACARINA - No further identification.

To facilitate the presentation of the large amounts of data obtained from each survey, the results are expressed in a classified form. The classification system developed by the Trent River Authority has been adopted and is reproduced in Table 2.

PLANT LIFE

No detailed survey of fresh water plants is made, but recording of the amount of plant life at each sampling station is made during each survey and the common macrophytes present identified.

BENTHIC FAUNA

White Cart Water

Although only the upstream reaches and the tidal area of the White Cart lie within the county of Renfrew, the condition of the whole river is described below:

Since biological surveys began in June 1968, there has been a steady improvement in the condition of the White Cart. The improvement has been most noticeable from station W.C. 18.5 (Battlefield) downstream to station W.C. 26 (Levern confluence) and is due to improvements in the quality of effluents discharged to the stream.

The two most upstream stations, Greenbank and Stoneside Ford, support varied communities of invertebrates, including several different species of stoneflies and mayflies, such as *Amphinemura sulcicollis, Leuctra geniculata, Leuctra inermis, Chloroperla torrentium, Ephemerella ignita, Ecdyonurus venosus, Baetis rhodani,* etc. These two stations are in excellent biological condition and support a healthy Trout population. The four downstream stations, Stamperland, Battlefield, Knowehead and Levern confluence, support a more restricted population of organisms consisting of the mayflies *Baetis rhodani,* a few caddis larvae, leeches, midge larvae, oligochaetes, shrimps and snails. This change in the composition of the fauna is reflected in the biotic indices of 5 and 6 as compared to 7 and 8 for the two upstream stations. The lower reaches of the White Cart still supports populations of Trout throughout most of its length, although these populations are not as high as in the upper reaches. Some coarse fish are also found. Comparison of biological conditions from 1968 to 1973 are shown below.

Biotic Indices in the White Cart

Station	Place Name	O.S.Ref.	Habitat	'68	'69	'70	'71	'72	'73
W.C. 2.5	Greenbank	608 508	riffle	7	7	7	7	8	8
			pool	7	7	7	7	8	7

Table 2

Classification of Biological Samples

			Total Number of Groups Present				
Clean			0-1	2-5	6-10	11-15	16+
			Biotic Index				
Organisms in order of tendency to disappear as degree of pollution increases.	Plecoptera nymphs present	More than 1 species	---	VII	VIII	IX	X
		One species only	---	VI	VII	VIII	IX
	Ephemeroptera nymphs present	More than 1 species*	---	VI	VII	VIII	IX
		One species only*	---	V	VI	VII	VIII
	Trichoptera larvae present	More than 1 species¢	---	V	VI	VII	VIII
		One species only¢	IV	IV	V	VI	VII
	Gammarus present	All above species absent	III	IV	V	VI	VII
	Asellus present	All above species absent	II	III	IV	V	VI
	Tubificid worms and/or red chironomid larvae present	All above species absent	I	II	III	IV	---
Polluted	All above types absent	Some organisma such as *Eristalis tenax* not requiring dissolved oxygen may be present	0	I	II	---	---

*Baetis rhodani excluded. ¢Baetis rhodani (Ephem) is counted in this section for the purpose of classification.

Station	Place Name	O.S.Ref.	Habitat	'68	'69	'70	'71	'72	'73
W.C. 7.5	Stoneside Ford	581 535	riffle	7	6	7	7	7	7
			pool	6	5	5	6	6	6
W.C.14.0	Stamperland	583 578	riffle	6	5	6	7	6	6
			pool	-	-	-	-	-	-
W.C.18.5	Battlefield	578 612	riffle	3	2	4	6	5	6
			pool	3	3	3	5	6	5
W.C.21.5	Knowehead	548 618	riffle	-	-	-	-	-	-
			pool	2	3	3	2	3	5
W.C.26.0	Levern	523 629	riffle	5	3	5	6	5	6
			pool	3	3	4	3	5	5

Black Cart Water

The Black Cart has shown a slight improvement in the already good biological conditions found at the top two stations, Howwood Bridge and Kilbarchan Bridge. This is shown in the biotic indices improving from 7 and 8 to 8 and 9. Such indices reflect a diverse fauna, the greater part of which consists of stoneflies, mayflies, caddis larvae, shrimps, snails and beetles. The Black Cart from its source to slightly downstream of Kilbarchan Bridge supports a healthy population of Trout which find good feeding in the abundance of food such as caddis larvae and shrimps found there. The last station on the Black Cart, Linwood Bridge, is in very poor biological condition, with the bottom fauna restricted to oligochaetes, chironomid larvae and the fresh water louse. This station, of course, supports no fish population, though the biotic index rose one point in 1973, from a 2 to a 3, and this raises hopes that further improvements may be possible. The results of biological surveys over the past five years are given below.

Biotic Indices in the Black Cart

Station	Place Name	O.S.Ref.	Habitat	'68	'69	'70	'71	'72	'73
B.C.17	Howwood Bridge	395 607	riffle	7	8	8	8	9	9
			pool	7	7	7	8	8	8
B.C.20	Kilbarchan Bridge	414 625	riffle	7	7	7	8	8	8
			pool	8	8	8	6	8	8
B.C.24	Linwood Bridge	444 644	riffle	-	-	-	-	-	-
			pool	2	1	3	1	2	3

Levern Water

Stations L. 2.5 (Aboon the Brae) and L. 5.5 (Neilston Mill)

are in excellent condition with biotic indices ranging from 7 to 9 and populations consisting largely of stoneflies, mayflies, caddis larvae, beetle larvae, snails and shrimps. These conditions are very suitable for a good game fishery in these upper reaches. The condition of the river below Neilston deteriorates quite markedly under the influence of Neilston Sewage Works discharge, which lowers the biotic index to a 2, and the fauna consists only of oligochaetes and chironomid larvae. River conditions from this station downstream to the confluence with the White Cart do not improve. The biotic index remains at 2 under the influence of a further discharge from Barrhead Sewage Works. Comparison of biological conditions over the past five years are given below.

Biotic Indices in the Levern Water

Station	Place Name	O.S.Ref.	Habitat	'68	'69	'70	'71	'72	'73
L. 2.5	Aboon the Brae	462 551	riffle	8	9	8	8	9	9
			pool	7	6	7	7	7	7
L. 5.5	Neilston Mill	477 576	riffle	7	6	5	5	6	8
			pool	5	4	5	2	7	7
L. 9.5	Barrhead Bridge	507 594	riffle	2	2	4	2	2	2
			pool	2	-	-	-	-	-
L.14.75	Priesthill Bridge	518 608	riffle	2	2	2	2	2	2
			pool	2	2	2	2	2	2
L.16.5	White Cart Confluence	522 628	riffle	2	3	3	3	3	3
			pool	3	3	3	3	3	3

River Gryfe

The River Gryfe, since it was first sampled in June 1968, has shown a steady improvement in biological conditions throughout its entire length and to date is the most improved river in the Clyde River Purification Board's area. The changes have been most marked at stations G. 15.5 (Bridge of Weir), G.18 (Crosslee Bridge) and G.22 (Fulwood Bridge). These improvements have been brought about by pressure from C.R.P.B. officials resulting in effluents being discharged to sewers instead of to the river. This has allowed an improvement in the biotic index at these stations from 2 - 5 in 1968 to the present 7 - 8. The Gryfe now supports populations of stoneflies, non-baetid mayflies, caddis larvae, snails, beetle larvae, shrimps, oligochaetes and chironomid larvae throughout its length and this is in fact reflected by the excellent game fishery found in the Gryfe. Comparisons of biological conditions for the previous five years are given below.

Biotic Indices in the River Gryfe

Station	Place Name	O.S.Ref.	Habitat	'68	'69	'70	'71	'72	'73
G. 5.5	High Mathernock	323 710	riffle	7	9	8	9	9	9
			pool	7	8	7	8	10	9
G. 12.5	Hattrick	361 673	riffle	7	7	8	9	10	9
			pool	7	7	7	8	8	9
G. 15.5	Bridge of Weir	383 659	riffle	-	-	-	-	-	-
			pool	5	7	7	7	10	8
G. 18.0	Crosslee Bridge	412 658	riffle	2	6	6	7	8	8
			pool	3	6	7	7	7	7
G. 22.0	Fulwood Bridge	439 669	riffle	4	6	3	6	6	8
			pool	3	6	1	6	6	8

FISHERIES

White Cart Water

Various stretches of the river were fished using an electric stunning apparatus in the summer of 1970, in order to determine the number and species of fish present. Fishing was carried out in 50-yard stretches of river, which were sealed off at both ends using nets. The majority of the fish trapped in these stretches were stunned and removed. After their removal, the fish were counted and species such as Minnows, Sticklebacks and Stoneloaches weighed in bulk. Trout were weighed and measured individually and scales were taken from some fish to ascertain growth rate before being returned to the stream.

Stretch Examined	Fish Present
Holehouse Ford, Eaglesham (W.C.13)	Minnow (very common), Stoneloach (common), Three-spined Stickleback (common), Trout (sparse).
Stamperland (W.C.15)	Stoneloach (very common), Stickleback (common), Miller's Thumb (sparse), Minnow (common), Trout (sparse).

The distribution of fish appears to follow the distribution of bottom fauna quite closely; as the species of bottom fauna are restricted so are the numbers and species of fish.

Although none of the other rivers have been examined in detail using the electric fishing apparatus, information has been gathered from other sources, as follows:

Table 3 Species List

Species		Occurrence		
Oligochaeta	All stations			
Gammarus pulex (L.)	L.2.5,5/5	G.5.5,12.5,15.5,18,22.	B.C.17,20.	W.C.2.5,7.5,14
Asellus aquaticus (L.)	L.16.5	G.5.5,12.5,15.5,18,22.	B.C.17,20.	W.C.7.5,14,18.5, 21.5,26
Polycelis nigra (Muller)			B.C.17.	
Nematoda		G.12.5,18.		
Helobdella stagnalis (L.)	L.2.5	G.22.	B.C.17.	W.C.2.5,7.5.
Erpobella octoculata (L.)		G.12.5,15.5,18,22.	B.C.17,20,24.	W.C.2.5,14,18.5
Trocheta subviridis Sutrochet	L.16.5.	G.18		W.C.7.5,14,21.5 26
Batracobdella paludosa (Carena)				
Glossiphonia complanata		G.22	B.C.17.	
Ancylus fluviatilis (Muller)	L.2.5,5.5.	G.5.5,12.5,15.5,18,22.	B.C.17,20	W.C.2.5,7.5,14
Limnaea pereger (Muller)	L.16.5,5.5		B.C.20.	W.C.7.5,14,18.5, 21.5,26
Hydrobia jenkinsi (Smith)	L.2.5			
Pisidium sp.	L.2.5,5.5	G.5.5,15.5,22.	B.C.17,20,24.	W.C.2.5

Species	Occurrence			
Amphinemura sulcicollis (Stephens)	L.2.5,5.5.	G.5.5,12.5,18.22.	B.C.17,20	W.C.2.5,7.5
Nemoura cambrica (Stephens)			B.C.17	
Nemurella picteti (Klapalek)		G.15.5		W.C.2.5
Leuctra inermis (Kempny)	L.2.5,5.5.	G.5.5,12.5	B.C.17,20	W.C.2.5.
L. fusca (L.)		G.5.5,12.5,15.5,18,22	B.C.17	W.C.2.5
L. geniculata (Stephens)	L.2.5,5.5.	G.5.5,12.5,15.5.	B.C.17,20.	W.C.2.5
Capnia bifrons (Newman)		G.12.5		W.C.2.5,7.5.
Isoperla grammatica (Poda)	L.2.5	G.5.5,12.5,18.	B.C.17.	W.C.2.5
Perla bipunctata (Pictet)				
Chloroperla torrentium (Pictet)	L.2.5.	G.5.5,12.5	B.C.17	W.C.2.5,7.5,14.
C. tripunctata				W.C.7.5
Protonemura meyeri	L.2.5,5.5.	G.5.5,12.5	B.C.20	
Brachyptera risi		G.12.5		
Perlodes microcephala			B.C.17	
Caenis moesta (Bengtis)				W.C.7.5
Caenis rivulorum		G.12.5,15.5,18.		W.C.7.5

Species	Occurrence			
Ephemerella ignita (Poda)	L.2.5,5.5	G.5.5,12.5,15.5.18,22.	B.C.17.20.	W.C.2.5,7.5.
Ecdyonurus insignis (Eaton)				
E. torrentis (Kimmins)	L.2.5,5.5.	G.5.5.		W.C.2.5.
E. venosus (Fabricuis)		G.5.5,12.5,15.5.	B.C.20	W.C.2.5.
Rhithrogena semicolorata (Curtis)	L.2.5,5.5.	G.5.5,12.5	B.C.17,20.	W.C.2.5,7.5.
Heptagenia sulphurea (Muller)			B.C.20.	
Habrophlebia fusca (Curt)	L.2.5	G.5.5,12.5	B.C.20.	W.C.2.5,7.5,14.
Centroptilum luteolum		G.5.5.		
Baetis pumilus (Burmeister)		G.5.5,12.5	B.C.17.	W.C.2.5.
B. buoculatus/scambus (L.Etn.)	L.2.5,5.5.	G.5.5,12.5,15.5,18,22.	B.C.20.	W.C.2.5,7.5,14.
B. rhodani (Pictet)	L.2.5,5.5, 16.5.	G.5.5,12.5,15.5,18,22.	B.C.17,20.	W.C.2.5,7.5,14. 18.5,26
B. vernus/tenax (Curt/Etn.)				W.C.2.5,7.5.
Leptophlebia marginata		G.5.5.		
Hydrophilidae		G.12.5,18,22.	B.C.17,20	

Species	Occurrence			
Haliplidae				
Helmidae	L.2.5,5.5.	G.5.5,12.5,18,22.	B.C.17,20.	W.C.2.5,7.5,14.
Dytiscidae	L.2.5,5.5.	G.12.5,15.5,18.		W.C.2.5,14.
Polycentropidae	L.2.5,5.5.	G.5.5,12.5,15.5.18.	B.C.17,20.	W.C.2.5,7.5.
Hydroptylidae				
Sericostomatidae	L.2.5.			
Limnephilidae	L.2.5,5.5.		B.C.17,20.	W.C.14.
Hydropsyche spp.	L.2.5,5.5.	G.5.5,12.5,15.5.	B.C.17,20.	W.C.2.5,7.5.
Rhyacophila spp.	L.2.5,5.5.	G.5.5,12.5,15.5.	B.C.17,20.	W.C.2.5,7.5.
Tipulidae	L.2.5,5.5.	G.5.5,12.5,15.5,18,22.	B.C.17.	W.C.2.5,7.5.14.
Chironomus spp.	All stations			
Simulium spp.	L.2.5,5.5,14. 75,16.5.	G.5.5,12.5,15.5,18,22.	B.C.20.	W.C.2.5,7.5.
Ceratopogonidae		G.5.5,12.5.		
Hydracarina	L.5.5.	G.5.5,12.5,15.5,18.	B.C.17,20.	W.C.2.5,7.5,14.
Megaloptera				
Sialis spp.	L.2.5,5.5.			W.C.2.5

Black Cart Water

The Black Cart was fishless below Johnstone Sewage Disposal Works to its confluence with the White Cart, but with the improvement in the effluent it is possible that some parts now support fish life, although not below Limwood Bridge, where further discharges continue to make the river unsuitable for fish.

Levern Water

The Levern Water is fishless below Barrhead but above Neilston there is a thriving Brown Trout population.

River Gryfe

The Gryfe supports Trout throughout its length, as was shown by the large fish kill in 1968, when nearly 1,000 Trout were killed in the stretch below Bridge of Weir. Other fish found were Grayling, Eels and a few Roach. Restocking and movement of fish from tributaries and the upper reaches probably ensures that a similar population now exists.

Acknowledgements:

The authors are grateful for the help given by Mr. J. Ian Waddington and Mr. D.W. Mackay towards the compilation of this article.

Mr. Peter G. Livingstone, C.R.P.B., Rivers House, Murray Road, East Kilbride, Glasgow G75 OLA.
Mrs. Barbara Wright, C.R.P.B., Rivers House, Murray Road, East Kilbride, Glasgow G75 OLA.

SOME ASPECTS OF KILBIRNIE, BARR AND CASTLE SEMPLE LOCHS

By M. PATRICIA HENTON
Hydrogeologist, Clyde River Purification Board

and PETER G. LIVINGSTONE
Assistant Biologist, Clyde River Purification Board

The three lochs of Kilbirnie, Barr and Castle Semple form one of the largest tracts of water on the Renfrewshire/Ayrshire border and in many ways can be regarded as a geographical entity, yet little scientific work has been published concerning their natural history and physical structure. In view of their proximity to large centres of population, their importance in providing recreational facilities and the inclusion of Castle Semple Loch in the Clyde-Muirshiel Regional Park, this is a surprising situation. The Clyde River Purification Board briefly investigated the three lochs over a period of eight weeks in the autumn of 1973 to determine their physical, chemical and biological properties.

The lochs lie in a glacial trough between two sections of the Clyde plateau lavas, the trough being formed by the ice exploiting a zone of weakness in the earth's crust. The post-glacial history of the trough is a subject of current debate amongst geologists, with two theories being prevalent. The first is that the trough formed a drainage channel or spillway which allowed the escape of water impounded in the Clyde valley by Loch Lomond ice, which had blocked the Clyde near Dumbarton. The second theory suggests that the trough was a tidal strait which provided a connection between the large marine area covering Paisley, Renfrew and Glasgow and the open sea near Dalry. This was when the sea level stood approximately 100 ft. above the present Ordnance Datum, in the so-called 100 ft. raised beach times. The strait would have been very shallow and constricted, containing brackish or even fresh water, perhaps only carrying salt water at times of the spring tides. The most probable post-glacial history of the trough is a combination of the two theories.

Whatever the history of the Kilbirnie hollow in immediate post-glacial times, at present it is gradually building up its floor with alluvial and lacustrine deposits. An interesting watershed situation has arisen in that the River Garnock has formed an extensive delta where it flows from the moors onto the flat floor of the trough. This delta has diverted its

parent river to the west, thus forming a delta-watershed or "corrom". Unfortunately, much of the detail of the corrom is obscured by Glengarnock Steel Works. The Maich Burn delta separates Kilbirnie Loch from Barr Loch and the Calder delta splits Barr from Castle Semple Loch.

If the *New Statistical Account* of 1836 is to be believed, the three lochs "were sometimes, during a great fall of rain in winter, united, and formed an extensive sheet of water, stretching several miles along this beautiful valley". This apparently had not happened for some time even then, and so one can assume that Kilbirnie Loch has been a separate entity for two or three hundred years past. Barr Loch and Castle Semple were finally separated in the early 19th century when construction of a causeway replaced the ferry to Lochwinnoch (Adam, 1828). There are still periodic inundations when Barr and Castle Semple Lochs stand as one.

In geomorphological terms, Kilbirnie Loch is in late maturity or early old age, whilst the other two are in old age, the Barr Loch being more advanced than Castle Semple. The physical definition of old age is a shallow, weedy lake bordered by a bank of swamp or reeds whilst biologically, old age is characterised by high rates of production of new plant and animal material, which provide organic remains in increasing quantities to fill the deeper basins of the lake. Eventually the shoreline becomes smooth and regular and is taken over by swamp.

The alluvial deposits and the lochs overlie sedimentary rock of the Limestone Coal Group of the Carboniferous Series. The hills on either side of the trough are olivine basalt lavas of the Clyde plateau lava series. Blackband ironstone and coals have been worked in some parts between Kilbirnie and Lochwinnoch.

The volumes and shapes of the three water bodies are very different. Kilbirnie Loch is four times as big as the other two, with a total volume of approximately 2,900 million litres. The western side of the loch is shallower than the east and more than half the loch has less than 3.5 m. of water. However, a depression running parallel to the shore on the eastern side contains the two deepest parts, 7 m. and 9 m. respectively. The surface water height of the loch during the bathymetric survey in 1906 was 31 m. O.D. Castle Semple and Barr Lochs are much shallower with mean depths of 0.8 m. and 0.6 m. respectively. The surface water height of Castle Semple was 26 m. O.D. in 1906.

Circulation patterns were established for Castle Semple Loch and an attempt was made to do the same for Kilbirnie Loch. The results of this are illustrated in Fig. 1. There are two dist-

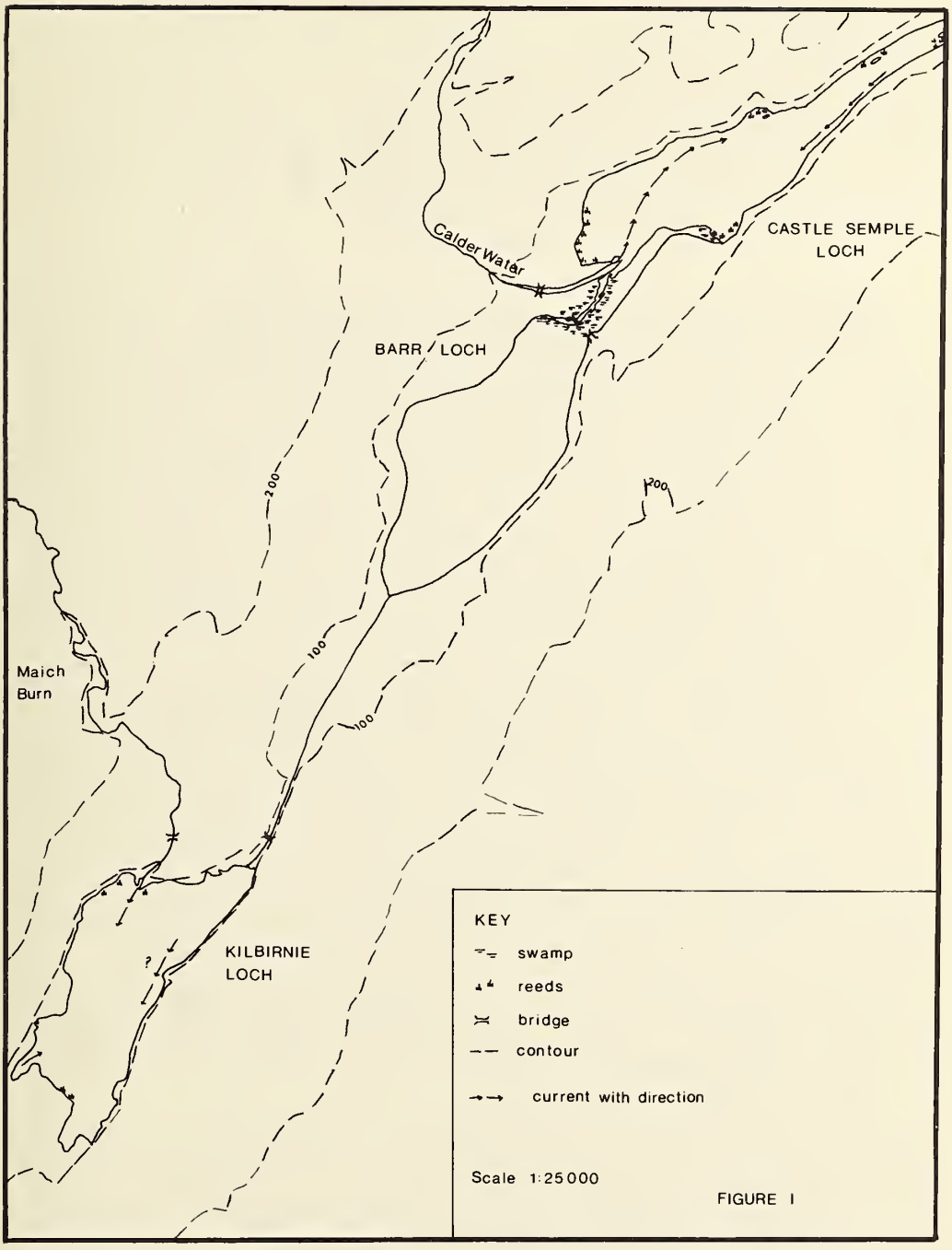

Fig. 1

Circulation patterns for

Castle Semple Loch and Kilbirnie Loch

inct currents in Castle Semple, one originating from the Calder Water inflow and petering out against the far shore, and the other acting as a return current up the east side of the loch. The whole of the loch is affected by wind direction, especially when a strong north-easterly is blowing. This sets up a weak surface current from the Calder Water mouth, up-loch, into the sheltered bay in the south-western corner of the loch. The influence of the Black Cart only stretches a few metres into the loch from the start of the river proper.

The results were not so clear in Kilbirnie Loch and no obvious pattern of flow emerged. A slight current results from the Maich Burn flowing into the loch but it appears to be easily deflected by the wind and peters out about 150 m. into the loch. Dye was released at the steel works inlet and it moved about 100 m. down-loch in 30 minutes under the influence of a strong following wind. The circulation pattern in Kilbirnie is probably more complex than Castle Semple because of the greater depth and the position of the major influent and outflowing streams, but again the wind is the dominant factor in deciding surface currents. This applies to all three lochs because of their exposed situation and the alignment of the trough along the prevailing wind direction.

The chemical survey consisted of sampling the three lochs for water quality and measuring the dissolved oxygen content and temperature over a grid pattern on each loch. The analyses show that no serious pollution of the loch is occurring. The dissolved oxygen readings in Castle Semple Loch were slightly higher than those in Kilbirnie Loch with an average value of 87% in the former and 80% in the latter. The Barr Loch was not sampled in such detail but averaged about 85%. A major exception to these average figures occurred in the south-western inlet in Kilbirnie Loch, beside the steel works outfall. Here the surface saturation was 115% but at 2 m. depth only 35% was recorded. The warm water from the steel works outfall has encouraged a prolific growth of *Potamogeton crispus*, which accounts for these localised conditions.

The temperature of the water in the lochs reflected weather conditions at the time of measurement, and the seasonal changes that occur in standing bodies of water. There was complete vertical mixing of the water in Castle Semple and Barr Lochs, but a minimal fall in temperature with depth was recorded in Kilbirnie Loch. The heating effect of the steel works effluent was localised and died out a few metres away from the inlet.

The biological samples were taken from the loch using a Freshwater Biological Association Automatic Mud Sampler, which takes a mud core of 53 mm. in diameter and to 50 cm. long. The

corer was augmented by the use of a 24 mesh/cm. hand net in the shallower areas of the lochs and also where bottom deposits were consolidated to such an extent as to prevent a core being taken. Samples of the plankton found in the lochs were obtained by towing a Freshwater Biological Association 71 meshes/cm/ Phytoplankton net for one hundred metre stretches in each of the lochs. The three lochs are best dealt with individually.

CASTLE SEMPLE LOCH:

Castle Semple Loch is a very shallow muddy bottomed loch containing large quantities of undecomposed plant material, such as leaves of trees and grasses. The nutrient content of the loch, i.e. nitrates and phosphates, which are necessary to support plant growth, is very low. The reason for this deficiency is a lack of calcium in the water which is necessary for the rapid break-down of plant material into its constituent parts. Lochs such as Castle Semple, which are rich in undecomposed organic matter due to a lack of calcium, are known as dystrophic. Dystrophic waters are often stained brown, as is the case with this loch, and extreme examples may resemble dark beet. The lack of nutrients is reflected in the sparse plant life found in the loch. The dominant submerged vegetation found in the loch would appear to be *Elodea canadensis* (Canadian pond weed) which covers the larger part of the loch. Also found are yellow water-lilies *Nuphar lutea*. Other plant life found round the periphery of the loch consists of water milfoil *Myriophyllum alterniflorum*, mare's-tail *Hippuris vulgaris* and shore-weed *Littorella uniflora*.

The bottom fauna found in the loch consists of platyhelminthes (flat worms), oligochaetes, snails, the freshwater louse *Asellus aquaticus*, leeches, beetles, chironomids (midge larvae) and hydracarina (water-mites). This type of fauna is compatible with a loch which has little water movement, a muddy bottom and which is subject to conditions of low dissolved oxygen content. The majority of the above fauna are detritus feeders, i.e. they feed on dead plant or animal material found on the bottom of the loch. All are poor swimmers, hence are mostly found in conditions of little water movement and all are tolerant of low dissolved oxygen conditions. The loch was found to have a very sparse plankton dominated by the diatom *Asterionella formosa* with *Oscillatoria* and also the green algae *Tribonema sp.* and *Eudorina sp.* Fish life in the loch is restricted to coarse fish which can stand conditions of low dissolved oxygen. The most common fish in the loch are Roach, Perch and Pike.

Castle Semple Loch is used as a wintering area by large flocks of wildfowl such as Mallard, Wigeon, Pochard and Tufted Duck, with smaller numbers of Teal, Shoveler and Goldeneye.

KILBIRNIE LOCH:

This loch, the largest of the three, has a diverse macro-invertebrate fauna consisting of oligochaetes, snails, *Asellus aquaticus* (freshwater louse), leeches, mayflies, such as *Ecdyonurus dispar* and *Paraleptophlebia submarginata*, caddis larvae, beetles and chironomid larvae. The fauna found in most parts of the loch except the south-west corner indicates good conditions with a high dissolved oxygen content throughout the loch. The south-west corner supports a fauna consisting only of oligochaetes and chironomid larvae, reflecting the very low dissolved oxygen levels found on the loch bed at this point. The reasons for this poor area are almost certainly the increase in temperature from the cooling waters discharge from Glengarnock Steel Works and an oil spill some time previously. The oil has been absorbed onto the bottom mud, so preventing animals inhabiting this area of the loch bed. No investigations into the fish life of the loch could be undertaken during this survey. However, there is reputedly a good coarse fishery on the loch consisting of Pike, Perch and Roach. The flora of the loch consists mainly of *Elodea canadensis* which covers the greater part of the loch bed, along with *Potamogeton crispus* (shining pond weed) and *Ranunculus aquatilis* (water crowfoot). The loch has a fairly sparse plankton dominated by *Fragilaria capucina* (filamentous diatom), a few *Asterionella sp.* and blue-green algae, some copepods (*Diaptomus* and *Cyclops*) and a few rotifers.

The loch is very different from Castle Semple and Barr Lochs in that it contains much less undigested plant material and is also a lot deeper. Most of the loch bed consists of a consolidated clay-gravel mixture with few areas of soft mud. This consolidated substrate may explain the almost complete absence of emergent water plants such as water lilies, which are quite common in the other two lochs.

BARR LOCH:

Barr Loch is very similar to Castle Semple Loch, having shallow, peaty-coloured water and containing large amounts of undigested plant material. The bottom fauna found in the loch consists of platyhelminthes, oligochaetes, leeches, *Asellus aquaticus* (freshwater louse), mayflies such as *Caenis horaria*, Coleoptera (beetles), Trichoptera (caddis larvae), dragonfly larvae, chironomids (midge larvae) and gastropods (snails). The great diversity of the above fauna indicates good biological conditions within the loch.

Of the three lochs Barr Loch is the richest in plant growth both in the loch and around its margins. The dominant flora in the loch is *Elodea canadensis*, which is found along with *Potam-*

ogeton crispus, Callitriche hermaphroditica, Chara sp., Lemna trisulca and some *Cladophora.*

Fish populations in the loch are uncertain though two young Perch and a Roach were caught during sampling. This would suggest a reasonable fish population similar to that found in Castle Semple Loch.

Wildfowl abound on Barr Loch, large flocks of Wigeon, Teal and Mallard having been recorded there. The wildfowl are doubtless attracted by the excellent feeding available in the loch.

The sparse plankton populations found in the loch are dominated by the diatom *Asterionella formosa* along with a few blue-green algae such as *Aphanizomenon flos-aquae* and *Oscillatoria,* some *Fragilaria capucina* (filamentous diatom) and a few copepods (*Diaptomus* and *Cyclops*) and rotifers.

The eight week study produced much interesting information concerning the natural history of these three lochs and it is to be hoped that other studies will be able to cover in greater detail some of the aspects that have been touched upon by the authors.

Acknowledgements:

The authors wish to thank Mr. D. Hammerton, Acting Director, Clyde River Purification Board, for his encouragement and permission to publish this paper. The views expressed are those of the authors and do not necessarily reflect those of the Clyde River Purification Board.

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Mrs. M. Patricia Henton, C.R.P.B., Rivers House, Murray Road, East Kilbride, Glasgow.
Mr. Peter G. Livingstone, C.R.P.B., Rivers House, Murray Road, East Kilbride, Glasgow.

FURTHER RECORDS OF *Asellus* IN WEST SCOTLAND

By J.D. HAMILTON
Department of Biology, Paisley College of Technology

Two further localities for *Asellus meridianus* Racovitza have been recorded since the previous report (Hamilton, 1972) on the distribution of water-hoglice in west Scotland. Identifications were confirmed by the author using the key prepared by Hynes, Macan and Williams (1960).

Localities:

1. A sandy/stony shore on the west side of Loch Fad, Bute (NS 069605). The specimens were taken in July 1973 by Mr. George McNae of Rothesay Academy, and further specimens were taken later from other shores on Loch Fad. *A. aquaticus* was not found at the loch.

2. The River Sorn, Islay (NR 365645). Mr. D.W. Mackay of Clyde River Purification Board collected specimens from the stony river-bed on 3rd July 1974 and again *A. aquaticus* was not found.

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Mr. J.D. Hamilton, 65 Main Road, ELDERSLIE, Renfrewshire

THE BREEDING BIRDS OF CASTLE SEMPLE AND BARR LOCHS, RENFREWSHIRE

By J.A. GIBSON
Renfrewshire Representative,
Royal Society for the Protection of Birds

At the beginning of 1974 the Royal Society for the Protection of Birds opened its Renfrewshire reserve at Barr Loch/ Castle Semple, Lochwinnoch, and this represented the quiet triumph of the persistence and good-will of many committed people over at times seemingly insurmountable difficulties. Well over ten years had passed since I called the original Lochwinnoch meeting at which Mr. George Waterston, then Scottish Director of the Royal Society for the Protection of Birds, spoke to local interested people to sound out support for a proposed reserve. That initial meeting, of members of the Renfrewshire Natural History Society, other local members of the R.S.P.B., and enthusiastic local residents, gave unqualified support for the scheme, but the subsequent negotiations were to prove long and tortuous. Ultimately, however, agreement was reached with the MacDowall family, owners of the Barr area, and with Renfrewshire County Council, who had incorporated Castle Semple loch as an extension to the Clyde-Muirshiel Regional Park, and the reserve was opened, with a warden, Mr. Peter Bowyer, appointed, in January 1974. The area of the R.S.P.B. reserve includes the Barr Meadows, now flooded and usually called Barr Loch, and on the other side of the main road the Castle Semple marsh, locally called Aird Meadows. From the ornithological point of view, however, Barr and Castle Semple form a single unit, so this paper deals with the breeding birds of the entire area, i.e. Castle Semple loch, Aird Meadows, Barr Loch, and the immediately surrounding territory.

Castle Semple has been well known as a loch and a centre for wildfowl for over two hundred years, but Barr has had a somewhat chequered career.

Until just over 150 years ago Barr was very much a permanent loch. In the *New Statistical Account* for the parish of Lochwinnoch (1836) the Rev. Robert Smith wrote "In the long and expansive valley which passes through Lochwinnoch, there were originally three large lochs, - Kilbirnie, Barr, and Castle-Semple lochs, the two last of which are within this parish. At an earlier period, when the land was not so well drained and cultivated as it is at present, these three lochs were sometimes, during a great fall of rain in winter, united, and formed an extensive sheet of water, stretching several miles along this beautiful valley. This never happens now". An elaborate and inventive scheme for draining

Barr loch was thought out by Mr. James Adam, who purchased the loch in 1813, apparently for the express purpose of putting his ideas into operation (Adam, 1828). The marsh was drained in 1814, with immediate success, so that by 1836 the *New Statistical Account* continued the description of the area as follows:"Castle-Semple and Kilbirnie lochs always contain a considerable expanse of water; but they are now far separated by cultivated land; and Barr Loch, which lies between them, and near the former, is so well drained, that it has the appearance of a loch only during a heavy fall of rain in winter. In summer, it waves with the most luxuriant crops of oats and hay, which would not disgrace a more genial clime and southern latitude".

This remained the position until about the turn of the century, but by the time of the first world war a slow deterioration in the agricultural quality of the land had commenced, and this was possibly hastened by the difficulty of obtaining agricultural workers during the war. The drainage quickly deteriorated further and the area of Barr Meadows steadily became an extensive marsh, but seldom, unless in prolonged and heavy winter rains, anything like an open loch, since the main flow of water still followed the artificial embankment around the meadows by way of the altered course of the Dubbs burn.

This enormous marsh measured about a mile long, by some half mile wide at its widest part, and was certainly far and away the largest marsh in the West of Scotland. With its size it provided a unique habitat for water and marsh birds, and was well known as a stronghold of interesting species such as the Water-Rail, Grasshopper-Warbler and, ultimately, the rare Black-necked Grebe. This happy state of affairs for the bird-watcher continued until the mid-1950s, when the retaining bank between the Meadows and the Dubbs burn at the south end of the loch got breached, so that water began to flow directly from the burn into the south end of the Meadows, instead of along the course of the burn, which hitherto had by-passed the Barr Meadows and flowed under the road into Castle Semple loch. This meant that the course of water flow had returned to roughly what it had been 150 years previously, before the drainage scheme of 1814.

Strenuous efforts were made by Mr. J.P. Ritchie and myself to repair the breach in the embankment, but this was very difficult, not least owing to the inaccessibility of the site of the breach to heavy vehicles for transporting material, and the temporary repair we did achieve, successful for a time in stemming much of the inflow, was clearly deliberately destroyed. This made me believe that the original breach had been deliberately created by some people for their own private purposes. The inflow of water through the breach became uncontrollable, the Dubbs burn almost entirely dried up, and certainly by 1960 the area of the Meadows had again become merely a loch. Since then the breach

has steadily widened and deepened, so that it will now be a substantial engineering undertaking to repair the gap.

For the bird watcher, of course, all this was disastrous. Large lochs and reservoirs abound in the West of Scotland, but marshes of this size were simply non-existent, so somehow or other the marsh had to be recreated for the benefit of the birds. At this stage I contacted the R.S.P.B. for help, and my old friend Mr. George Waterston immediately took up the idea with all his characteristic tremendous drive and energy, which over the years steadily overcame quite remarkable technical, administrative and legal problems. Our aims were to get the breach repaired, to get the water level lowered (if possible, fully controlled), and to get the marsh restored. If some stretches of open water could be left, as lagoons amongst large areas of reeds and marshes, so much the better, since this would be attractive to water birds, would make observation easier for the general public, and by easing access to the areas of marsh would enable monitoring of the breeding birds to be carried out. Unfortunately the delay in setting up the reserve, in no way the fault of the R.S.P.B., made the problem of restoration even more difficult, and very costly, so funds are now urgently needed to set the reserve properly in order.

It is hoped, therefore, that all who are interested in Renfrewshire birds, and indeed all who are interested in the birds of our country - for this will be a reserve of national importance - will feel able to contribute something to the project. Cheques, etc., should be made payable to the R.S.P.B. and should be sent to the Reserve Warden, Mr. Peter Bowyer (address below), R.S.P.B. Scottish Headquarters (Scottish Director, Mr. Frank Hamilton), 17 Regent Terrace, Edinburgh EH7 5BN, or to myself. All contributions, large or small, will be most gratefully acknowledged.

This account of the breeding birds of the Castle Semple/ Barr Loch area, therefore, will establish a base-line of what is already known about the breeding birds of the reserve, so that we can record any changes over the years. It is based on my own notes, as County Bird Recorder for the past thirty years, and on the Renfrewshire Natural History Society's cumulative county records, which for this area are largely based on the massive contributions made by three men - the late Thomas Malloch, the late T. Thornton MacKeith, and Mr. John P. Ritchie (happily still with us). These three naturalists each spent most of a life-time working at the birds of the Lochwinnoch lochs and marshes, and their combined experience stretches back to the 1880s and totals well over 150 years; I am extremely grateful to them all. Needless to say, I shall be very glad to hear of any additional

information, and it is hoped that the industry and enthusiasm of Renfrewshire bird-watchers will rapidly make this account out of date.

GREAT CRESTED GREBE *Podiceps cristatus*

The Great Crested Grebe has long been known to nest at Castle Semple, but not in large numbers; before the flooding few ever nested at Barr Meadows. This was one species which benefited from the flooding at Barr; when large stretches of open water appeared amongst extensive areas of marsh the population of Great Crested Grebes quickly increased. There were certainly four pairs nesting at Barr in 1960 (Gibson, 1960a) and numbers increased steadily after that. This increased population has been maintained, with a corresponding increase at Castle Semple and Aird Meadows. Numbers vary a bit, of course, but at present Barr usually supports a population of up to half-a-dozen pairs, with three or four pairs at Castle Semple and Aird Meadows. Numbers can sometimes be higher than this, and Ritchie's best count was actually thirteen nests over the whole area. This is certainly now the largest colony of Great Crested Grebes in the West of Scotland.

SLAVONIAN GREBE *Podiceps auritus*

In the mid-1950s some eggs of the Slavonian Grebe, obtained from one of their breeding sites in Inverness-shire, were placed in Dabchicks' nests in the Barr Meadows, Lochwinnoch. This experiment was repeated for several years in succession. The eggs certainly hatched and young birds were successfully reared, but unfortunately the experiment seems to have been overtaken by the flooding at the Barr Meadows, and the hoped-for colony of Slavonian Grebes did not materialise (Gibson, 1960b). I was given these details in confidence on the understanding that the perpetrator of this affair did not have his name revealed, and for my part I obtained an assurance that such an experiment would not be repeated. To the best of my knowledge this was not repeated, and without commenting on the ethics of the matter this experiment was certainly enterprising and worth recording.

BLACK-NECKED GREBE *Podiceps nigricollis*

In summer 1938 Mr. T. Thornton MacKeith identified a pair of Black-necked Grebes at the Barr Meadows, which was probably the first authentic record for the county of Renfrewshire. Birds were seen each year thereafter and breeding was ultimately proved by MacKeith (and later by J.P. Ritchie) in 1942 by finding a nest and later seeing adults with young (*Trans. Paisley Nat. Soc.*, 6: 62). Observations continued and breeding was proved

several times by MacKeith, Ritchie and myself in subsequent years. Ritchie reckoned at least four pairs in 1951 and there may well have been many more, but this enormous marsh was so difficult to work that any attempt at an assessment of population was little more than guesswork. In 1953 I saw a pair with young in the Aird Meadows part of Castle Semple; hitherto all records had been from Barr.

Apart from the Rev. J.M. McWilliam, author of the *Birds of the Firth of Clyde*, and a few council members of the Renfrewshire Society, we told no-one, and all mention of the Black-necked Grebe was deliberately omitted from the 1955 account of Renfrewshire breeding birds (Gibson, 1955). Altogether the information was kept carefully secret for some fifteen years.

In 1956, however, Mr. H. Mayer-Gross independently discovered a pair of Black-necked Grebes with two young at Lochwinnoch, and this was reported as a loch "in the Clyde area" (*Scot. Birds*, 1: 5). Unfortunately the Barr Meadows became progressively more flooded from 1957 onwards and in a few years had become merely a loch, so that nearly all the desirable breeding habitat was lost. In view of this, and the fact that by this time the presence of Black-necked Grebes had become more or less an open secret, it was considered safe to release the details, and a short account was published in the Renfrewshire breeding birds supplement (Gibson, 1960b). For a few years some Black-necked Grebes were seen in the Aird Meadows and I proved breeding there at least once, in 1964, but it must be admitted that Black-necked Grebes have largely left the area, and I know of no proved breeding record for the past ten years.

I am glad to say, however, that Black-necked Grebes have been seen in summer at another Renfrewshire loch and may well be nesting, so that if Barr can be effectively drained again the Black-necked Grebes may yet return.

LITTLE GREBE *Tachybaptus ruficollis*

Very common, although numbers considerably diminished since the flooding of Barr, as one would expect.

HERON *Ardea cinerea*

The Heron is well known at all seasons in the year. The nearest heronry is at Brownmuir Wood, just over the boundary into Ayrshire, but there have frequently been single nests in the woods surrounding Castle Semple. During the past thirty years these have usually been on the east side of the loch.

BITTERN *Botaurus stellaris*

It seems fairly clear that the Bittern nested at Castle Semple in former times. Writing in the *Old Statistical Account* the Rev. Mr. James Steven, minister of Lochwinnoch parish (1795), said that Castle Semple loch "abounds with swans, geese, ducks, teals, bitterns and other kinds of wild fowl". Records of Bitterns are turning up with increasing frequency in the West of Scotland, so that if Barr Loch were restored to an enormous marsh the Bittern might well return as a nesting species.

MALLARD *Anas platyrhynchos*

Very common.

TEAL *Anas crecca*

Fairly common.

WIGEON *Anas penelope*

Extremely common as a winter visitor, but records of birds summering are relatively few. In 1947 Mr. J.P. Ritchie found a Wigeon's nest in the Castle Semple marsh and in 1971 I saw a duck with five young. These are the only positive nesting records known to me, although it is quite likely that some of the summering birds are nesting, and further information would be very valuable.

PINTAIL *Anas acuta*

Most of the older county naturalists will remember Lord Maclay's former colony of wildfowl at Duchal, Kilmacolm. This was briefly mentioned by McWilliam in his *Birds of the Firth of Clyde* (1936). The collection came to an end in 1939 at the outbreak of the second world war, when foodstuffs became scarce, and Lord Maclay told me that the birds were simply left to their own devices (Gibson, 1960b). Many remained for a year or two, but all eventually disappeared. The Pintails which nested at the Glen Moss, Kilmacolm, in 1941 and 1942 and at Castle Semple in 1943 and 1944 (and possibly earlier) almost certainly came from Lord Maclay's collection. I know of no later records.

SHOVELER *Anas clypeata*

Nests in small numbers; known to nest since at least 1912, but relatively little increase in population noted.

TUFTED DUCK *Aythya fuligula*

Common. Known to be nesting in Renfrewshire since about 1885 (*Ann. Scot. Nat. Hist.*, 1894: 257), and at the Lochwinnoch lochs by 1898; since then a very steady increase.

POCHARD *Aythya ferina*

Certainly the best Renfrewshire nesting site, with many pairs nesting, mostly in the area of Aird Meadows. Known to nest since 1926 when "one duck with a brood of five" was seen (*Scot. Nat.*, 1926: 131; and E. Richmond Paton, *in litt.*), and many subsequently found by MacKeith, Ritchie and myself.

RED-BREASTED MERGANSER *Mergus serrator*

A nest with ten eggs found in 1925 by Mr. J.P. Ritchie would appear to be the first proved nesting record for Renfrewshire (*Scot. Nat.*, 1926: 61), and on 27th May 1931 Ritchie and Thomas Malloch found another nest, also with ten eggs, on the large island in Castle Semple. Several pairs known to nest along the Dubbs burn since the early 1940s, but not since the burn dried up after the breach in the river/loch bank. A few still nest on the loch, but not common.

GOOSANDER *Mergus merganser*

On 2nd May 1926 Mr. J.P. Ritchie found a Goosander's nest with ten eggs at the north end of Castle Semple where the River Cart leaves the loch, and a pair nested there for three years. In 1958 another nest was found very close to the same place (*Trans. Paisley Nat. Soc.*, 6: 63). In 1969 and 1971 Goosanders were known to nest at another site near the lochs.

SHELDUCK *Tadorna tadorna*

During the late 1940s and early 1950s a pair of Shelducks nested occasionally on the Castle Semple islands, but the nest was usually robbed. Birds occasionally seen nowadays, but no recent proved nesting known to me.

CANADA GOOSE *Branta canadensis*

For about one hundred years the Canada Goose was undoubtedly the bird which typified Castle Semple for several generations of Renfrewshire naturalists. Indeed the huge colony of Canada Geese was very well known throughout the county, and was a popular attraction until the time of the first world war. Many elderly naturalists can still remember being taken as small children by their parents to Castle Semple "to feed the geese". A great many of the geese did become very tame and a trip to see and feed the geese was apparently a popular Sunday outing for many Renfrewshire families; popular, that is, with the families, but not equally so with the proprietor of the estate, and it was partly this which led to the extermination of the Canada Geese round about the start of the first world war.

The Canada Goose was introduced to the Castle Semple estate

around the beginning of the 19th century. It may have been a little earlier than this for the *Old Statistical Account* of 1795 mentions "geese", but is not specific. By the time of the *New Statistical Account* of 1836, however, there were "swans, Cape and Canadian geese in vast numbers". The fact that the Canada Goose was not regarded by some writers as a wild bird presumably accounted for its omission from some standard local natural history works of the time; contemporary descriptions of the colony are therefore few, but according to the Renfrewshire Society's records the colony must at one time have numbered several hundred breeding pairs. The geese apparently bred all over the place, on the islands, around the loch shore, in the marshes, and even well into the woods. According to Mr. J.P. Ritchie the proprietor had all the geese destroyed around 1914/15, and this date is confirmed elsewhere. Apparently the geese were attracting too many unauthorised visitors to a private estate, and it has also been suggested that food shortages at the outbreak of war created feeding difficulties, and also led to an increase in undesirable poachers.

At any rate the entire colony was destroyed around that time, and from then on there seem to have been no more county nesting records until 1947, when Canada Geese were again seen at Castle Semple Loch and a pair nested on the large island and successfully reared three young (Gibson, 1958). I know of no subsequent nesting records, but with the great increase in the Roebank colony it is quite likely that Canada Geese may again nest at Castle Semple or Barr in the not too distant future.

MUTE SWAN *Cygnus olor*

Old established; one or two pairs known to nest since at least the turn of the century.

SPARROWHAWK *Accipiter nisus*

Formerly common in the surrounding woodland, but decreased markedly; now returning.

KESTREL *Falco tinnunculus*

Fairly common in neighbourhood.

RED GROUSE *Lagopus lagopus*

Nests on surrounding hills, on fringe of the area.

BLACK GROUSE *Lyrurus tetrix*

Marked decrease during the past thirty years; formerly nested on surrounding hills, on fringe of our area.

RED-LEGGED PARTRIDGE *Alectoris rufa*

Introduced to the area in the mid-1920s, but did not succeed.

PARTRIDGE *Perdix perdix*

Formerly common in the area; a marked decrease, but still a few about.

PHEASANT *Phasianus colchicus*

Common.

WATER RAIL *Rallas aquaticus*

The Water Rail used to nest extensively throughout the enormous marsh of the Barr Meadows. Attempts to estimate the population were little more than guesswork, but numbers were certainly extremely large and the 'colony' was undoubtedly the largest in the West of Scotland and possibly in the country. Thornton MacKeith had a great flair for finding Water Rails' nests and in the ten years from 1936 to 1946 he certainly found up to a dozen nests each year. I have found many nests myself, and have had many more shown to me by MacKeith. After the flooding the available habitat enormously decreased, with a corresponding drop in population, as one would expect, but many still nest, mostly in the marsh of Aird Meadows.

CORNCRAKE *Crex crex*

A few in the surrounding fields; returning after a decrease in past years.

MOORHEN *Gallinula chloropus*

Very common.

COOT *Fulica atra*

Common.

OYSTERCATCHER *Haematopus ostralegus*

Very occasional summer records over the years, and a pair was proved to nest in 1966; may be other nesting records, not reported.

LAPWING *Vanellus vanellus*

Common in surrounding area; has nested in Aird Meadows.

RINGED PLOVER *Charadrius hiaticula*

Occasional pairs have nested in the past, but no record known to me during the past twenty-five years.

SNIPE *Gallinago gallinago*

Common in area; a few usually nest around the Aird Meadows.

WOODCOCK *Scolopax rusticola*

Some decrease, but still fairly well known in neighbourhood; has nested on Castle Semple island.

CURLEW *Numenius arquata*

Fairly common in neighbourhood.

COMMON SANDPIPER *Tringa hypoleucos*

Fairly common.

REDSHANK *Tringa totanus*

Fairly common in surrounding area, but some decrease within past twenty years.

DUNLIN *Calidris alpina*

Occasional pairs nesting on surrounding hills, but none known to me within recent years.

LESSER BLACK-BACKED GULL *Larus fuscus*

One or two pairs nested at the south end of the Black-headed gullery on Barr Meadows in the late 1940s and early 1950s (Gibson, 1960b); no later record known to me.

COMMON GULL *Larus canus*

There used to be a small and variable colony of Common Gulls at the south end of Barr. The numbers were difficult to estimate amongst the Black-headed Gulls, but were never large. As with the other gulls, this colony disappeared after the flooding of Barr. Since then a few have nested intermittently in the Aird Meadows marsh of Castle Semple, but not apparently within recent years.

BLACK-HEADED GULL *Larus ridibundus*

The history of the Black-headed Gull at Lochwinnoch is a tale of astonishing increase and decrease. Until the end of the second world war very few Black-headed Gulls nested at the Loch-

winnoch lochs, then a small colony got established at the south end of the Barr Meadows. This steadily increased over the years, with virtually unbelievable increases in 1956 and 1957, so that by 1957 the colony had become simply gigantic and was densely packed over a mile-long stretch of marsh. At that time I privately believed that this was possibly the largest Black-Headed gullery in Great Britain, and it certainly rivalled the famous colony at Ravenglass. From late 1957, however, the flooding at Barr Meadows commenced in earnest, with an almost immediate substantial decline in the numbers of gulls, so that a projected plan by the Renfrewshire Society for a detailed census was overtaken by events; the gulls very rapidly declined and had virtually gone by the early 1960s. Since then a small and very variable colony has nested in the Aird Meadows.

COMMON TERN *Sterna hirundo*

A few pairs of Common Terns nested intermittently at the south end of Barr before the flooding.

STOCK DOVE *Columba oenas*

A few pairs nest in the neighbourhood.

WOOD PIGEON *Columba palumbus*

Common in all surrounding woods.

COLLARED DOVE *Streptopelia decaocto*

Nesting in the area since the mid-1960s; will presumably steadily increase.

CUCKOO *Cuculus canorus*

Common in the area.

BARN OWL *Tyto alba*

Formerly several pairs in the area and still some traditional sites; nest taken in old Peel tower in 1894 and has probably nested there since then. Some decrease within recent years.

TAWNY OWL *Strix aluco*

Fairly common in surrounding area.

LONG-EARED OWL *Asio otus*

One or two pairs nest in surrounding woods; known to nest since at least 1873.

NIGHTJAR *Caprimulgus europaeus*

Formerly nested not uncommonly on surrounding hills; still present but very marked decrease. Has been seen hunting the marsh, but no direct evidence of having nested there.

SWIFT *Apus apus*

Common in summer and nests in neighbourhood.

KINGFISHER *Alcedo atthis*

Formerly nested along Dubbs burn until late 1940s, but no later records known to me. Since Kingfishers are now beginning to nest again in Renfrewshire after an absence of some years, however, they would probably return here if the loch were drained and the speed of the burn restored.

GREAT SPOTTED WOODPECKER *Dendrocopus major*

Has nested in surrounding woodland since about 1940. Some decrease within recent years, possibly temporary.

CROW *Corvus corone*

Nests fairly commonly in the area, and often in the trees and scrub on the marshes. Most Crows are Carrion; Hooded and hybrids do occur but are not nearly so common.

ROOK *Corvus frugilegus*

Common in the neighbourhood.

JACKDAW *Corvus monedula*

Common in the neighbourhood.

MAGPIE *Pica pica*

Nests commonly all round the area, and also in the trees and scrub on the marshes.

DIPPER *Cinclus cinclus*

Fairly well known on surrounding streams.

SMALL PASSERINES:

The usual collection of small birds nest in the area - swallows, martins, larks, pipits, wagtails, starlings, wrens, warblers, sparrows, goldcrests, flycatchers, chats, thrushes, tits, treecreepers, finches, buntings, etc., but it is not proposed to deal with these individually. Their detailed dis-

tribution is given in the Renfrewshire *Atlas* (1970), and elsewhere. A few call for special mention, however, as follows:

GRASSHOPPER WARBLER *Locustella naevia*

For generations one of the great joys of the Lochwinnoch marshes was the colony of Grasshopper Warblers. The late T. Thornton MacKeith had a flair for finding birds' nests which amounted to simple genius, and the area of Castle Semple and Barr was his happy hunting ground for the Water Rail and the Grasshopper Warbler. Mention has been made of this under Water Rail (above) and in nearly half a century's work at Lochwinnoch MacKeith certainly found over a hundred nests of the Grasshopper Warbler. I was one of the party present when he found no less than four nests (with eggs, not young) of this most difficult of all warblers in the Barr Meadows in a single morning in May 1943, and he privately showed me three other nests later the same month.

The Grasshopper Warbler still occurs in the area; singing birds are regularly heard and J.P. Ritchie and myself have seen several nests within the past ten years, but there is no doubt that we have nothing like the numbers we used to have. Whether this is entirely due to the flooding I doubt. The flooding certainly removed an enormous amount of the suitable feeding and nesting habitat, but I do not think this is the whole story. As McWilliam wrote in his *Birds of the Firth of Clyde* (1936) "In Renfrewshire it is widely distributed. I have heard it in several recent years at Lochwinnoch, half a dozen birds sometimes singing at the same time" and "The Grasshopper-Warbler is very particular in its choice of breeding-ground, and frequently changes, probably because the place has become too much overgrown to suit its requirements". I have equally little doubt, however, that re-drainage would substantially increase the population.

YELLOW WAGTAIL *Motacilla flava*

Formerly very common, nesting extensively in the marshes and meadows, until about the late 1930s and early 1940s, but virtually disappeared within a year or two. No nesting records known to me for a quarter of a century, although a few birds seen from time to time.

CORN BUNTING *Emberiza calandra*

The marshes and meadows of Lochwinnoch were at one time the best areas for Corn Buntings in the whole of Renfrewshire and north Ayrshire. Although some birds are still seen, and presumably nest, I have been unable to prove breeding for twenty-five years.

The Warden appointed to the R.S.P.B. reserve at Lochwinnoch is Mr. Peter Bowyer, who has already made a considerable impact on the area. All bird-watchers in Renfrewshire are glad to extend a warm welcome to Peter, and to his wife Dr. Hilary Bowyer, and if anyone makes any interesting observations in the area of the R.S.P.B. reserve I hope they will report these as quickly as possible to Mr. Bowyer at 44 Calderpark Street, Lochwinnoch (Telephone: Lochwinnoch 842682).

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Dr. J.A. Gibson, Foremount House, KILBARCHAN, Renfrewshire.

INTERTIDAL ALGAE OF THE ESTUARY OF THE RIVER ADD, ARGYLLSHIRE

By MARTIN WILKINSON and CHRISTINE ROBERTS
Department of Biology, Paisley College of Technology

Introduction

One of the authors has previously published preliminary species lists of two large and highly polluted estuaries in industrialised areas of the British coast, namely the Rivers Clyde and Wear (Wilkinson, 1973a & 1973b). These estuaries had a number of features in common in the pattern of distribution of intertidal attached algae, most notably the abundance of the filamentous diatom *Melosira nummuloides* (Dillw.)C. Ag. on the lower portion of the intertidal zone in the upper sections of the estuaries. The purpose of the present paper is to place on record the distribution of the intertidal algae in an unpolluted West Highland estuary, that of the River Add, as a first stage in attempting to determine the range of patterns of distribution of algae to be found in British estuaries. The River Add differs from the Clyde and Wear in a number of features other than polluting load and it is not proposed that differences in flora between the estuaries can be accounted for solely on the grounds of pollution.

The Sampling Sites

Samples of intertidal attached algae were collected on 9th March 1974 from an open shore site at Crinan Harbour (site 1) near the mouth of the estuary and from six other sites (sites 2-7) spaced at intervals along the estuary itself. The locations of the sites are shown in Fig. 1.

Sites 1 and 2 represented Fucoid-dominated shores; the former consisted of a muddy shore with boulders backed by a stone wall about high-water neap-tide level and sheltered by an offshore island; the latter consisted of a steep sheltered shore composed of boulders forming the retaining wall of the Crinan Canal.

Sites 3 - 7 were more typically upper estuarine, lacking extensive Fucoid cover. Sites 3 and 4 consisted of a small area of mud and sand flat backed by a tidal salt marsh. Algae from the stone walls of Islandadd Bridge were also included in site 3. Sites 5 - 7 consisted mainly of mud with small stones and boulders. Salt marsh development was poor or absent at these sites.

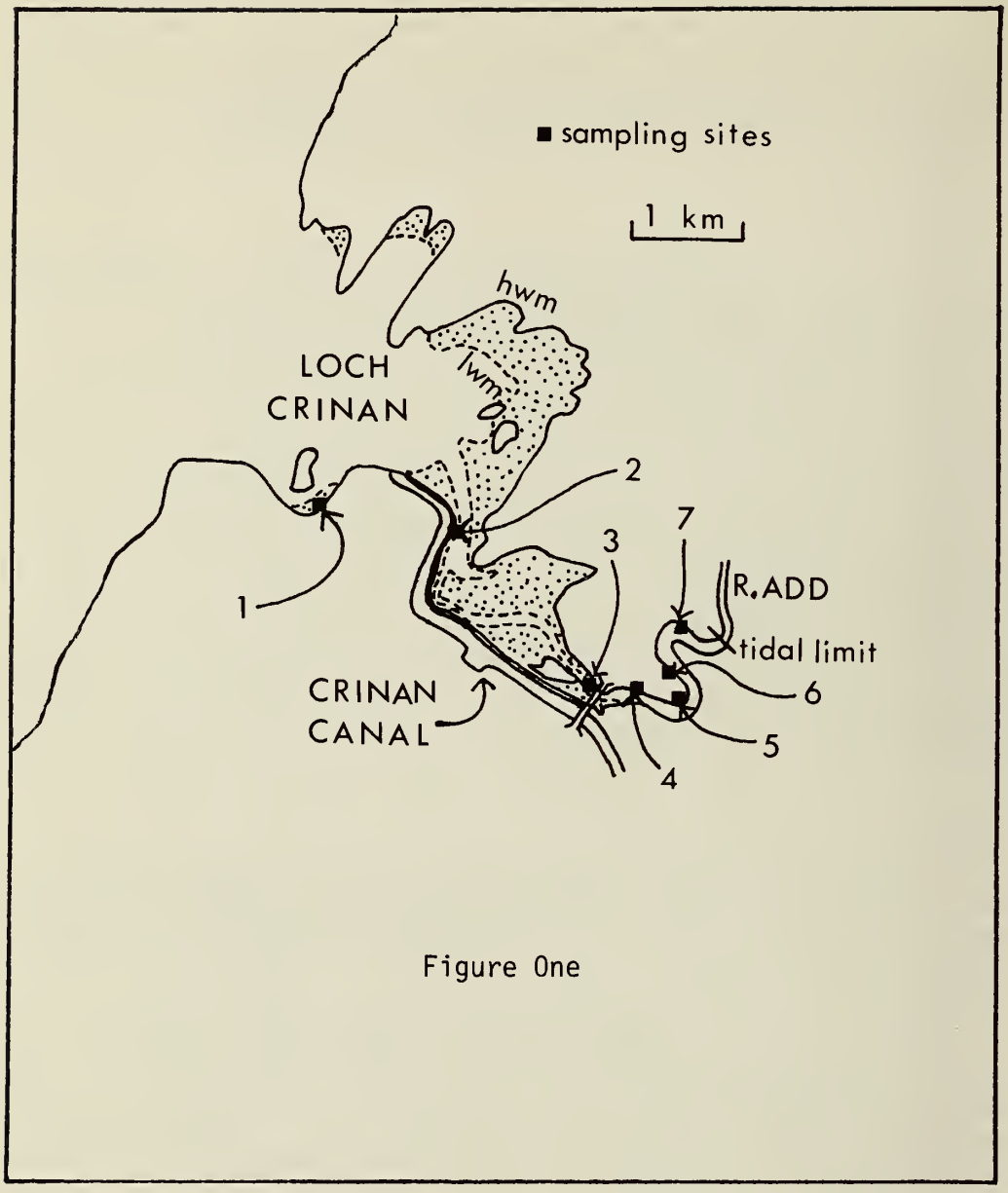

Figure One

Map of Add estuary
to show algal sampling sites

Table 1: Full systematic list of algal species showing presence or absence at each sampling site.

\+ perforating mollusc shells
x growing on hydroids

Species	Site No.						
	1	2	3	4	5	6	7
CHLOROPHYTA							
Capsosiphon fulvescens (C.Ag.) Setch. et Gard.		X					
Cladophora rupestris (L.) Kütz.	X	X					
+*Codiolum* - phases	X	X					
Enteromorpha flexuosa (Wulf ex Roth) J.Ag.	X	X					
E. intestinalis (L.) Link	X	X					
E. torta (Mert. in Jurg.) Reinb.		X					
+*Entocladia perforans* (Huber) Levr.	X	X					
x*Epicladia flustrae* Reinke	X						
+*Eugomontia sacculata* Kornm.	X	X		X	X		
Monostroma grevillei (Thur.) Wittr.	X						

Species	1	2	3	4	5	6	7
M. oxyspermum (Kütz.) Doty					X		
+*Ostreobium queketti* Born. et Flah.	X						
Percursaria percursa (C.Ag.) Rosenv.		X	X				
Rhizoclonium implexum (Dillw.) Kutz.		X	X		X	X	
R. riparium (Roth) Harv.	X		X	X	X		
Spongomorpha aeruginosa (L.) Hoek	X						
+*Tellamia intricata* Batt.	X	X					
+*T. contorta* Batt.	X						
Ulothrix flacca (Dillw.) Thur. in Le Jol.	X	X	X				
U. pseudoflacca Wille	X						
U. subflaccida Wille		X	X	X			
Ulva lactuca L.	X						
PHAEOPHYTA *Ascophyllum nodosum* (L.) Le Jol.	X	X					
Cladostephus spongiosus (Huds.) C.Ag.	X						

Species	1	2	3	4	5	6	7
Dictyosiphon foeniculaceus (Huds.) Grev.	X						
Ectocarpus fasciculatus Harv.	X						
Elachista fucicola (Vell.) Aresch.	X						
Fucus ceranoides L.		X	X	X	X		
F. serratus L.	X	X					
F. spiralis L.	X	X					
F. vesiculosus L.	X	X					
F. vesiculosus var. *muscoides* Cotton			X	X			
Laminaria digitata (Huds.) Lamour.	X						
Pelvetia canaliculata (L.) Dcne. et Thur.	X	X					
Petalonia fascia (O.F.Mull.) Kuntze	X						
Pilayella littoralis (L.) Kjellm.	X	X					
Ralfsia sp.	X						
Scytosiphon lomentaria (Lyngb.) Link	X						
Sphacelaria sp.	X						

Species	1	2	3	4	5	6	7
RHODOPHYTA							
x*Audouinella membranacea* (Magn.) Papenf.	X						
Acrochaetium sp.	X						
Apoglossum ruscifoluim (Turn.) J.Ag.	X						
Catenella repens (Lightf.) Batt.	X						
Ceramium rubrum (Huds.) C.Ag.	X						
Chondrus crispus Stackh.	X						
Dumontia incrassata (O.F.Müll.) Lamour.	X						
Furcellaria fastigiata (L.) Lamour.	X						
Gigartina stellata (Stackh.) Batt.	X	X					
Hildenbrandia sp.	X	X					
Laurencia hybrida (DC.) Lenorm ex Duby	X						
Lithothamnion sp.	X						
Phycodrys rubens (L.) Batt.	X						
Polyides rotundus (Huds.) Grev.	X						

Species	1	2	3	4	5	6	7
Polysiphonia elongata (Huds.) Spreng.	X						
P. lanosa (L.) Tandy	X	X					
P. nigrescens (Huds.) Grev.	X						
P. urceolata (Lightf. ex Dillw.) Grev.	X						
Porphyra umbilicalis (L.) J.Ag.		X					
Rhodochorton floridulum (Dillw.) Näg.	X	X					
CYANOPHYTA							
+*Entophysalis deusta* (Menegh.) Dr. et Dly.	X	X					
Gloeocapsa crepidinum Thur. ex Born. et Thur.		X	X	X	X		
Lyngbya aestuarii Gom.		X					
Microcoleus cthonoplastes Gom.		X	X				
Oscillatoria nigroviridis Gom.		X	X	X	X		X
Oscillatoria sp.		X	X	X		X	X
+*Plectonema terebrans* (Born.et Flah.) Gom.	X	X					
Phormidium sp.		X	X				

Species	1	2	3	4	5	6	7
Rivularia biasolettiana Born. et Flah.		X	X		X	X	X
CHRYSOPHYTA - BACILLARIOPHYCEAE							
°*Schizonema* sp.	X						
Melosira varians C.Ag.		X					
CHRYSOPHYTA - XANTHOPHYCEAE							
Vaucheria spp.			X	X	X	X	

° this name is here taken to mean all naviculoid diatoms growing in mucilaginous tubes forming macroscopic filaments.

The Algae

The species of intertidal attached algae found are listed in Table 1 and totals of species for each algal class are given in Table 2: The usual pattern of algal distribution along an estuary is shown, namely the red algae being poorly tolerant to estuarine conditions, the brown algae showing the next highest degree of tolerance, while the green algae are the most tolerant of the three major groups of seaweed. The brackish-water component of the flora was represented, as in most estuaries, by *Fucus ceranoides* and *Vaucheria* spp. and the extensive salt-marsh development which often occurs in the brackish reaches of estuaries was colonised by one of the reduced ecads of open-shore *Fucus* species which are found on salt-marshes, particularly in Scottish sea-lochs.

The most interesting point about the algae of the estuary was the vegetation of shores in the upper reaches. In the Clyde and Wear two-zone shores were found at this point, the upper zone dominated by green algae and *Vaucheria*, the lower zone dominated by the filamentous diatom, *Melosira nummuloides*. In the

Table 2: Species totals by class for each sampling site.

Algal group	Site No.	1	2	3	4	5	6	7
CHLOROPHYTA		16	13	4	3	4	1	
PHAEOPHYTA		15	7	2	2	1		
RHODOPHYTA		19	5					
CYANOPHYTA		2	9	6	3	3	2	3
BACILLARIOPHYCEAE		1	1					
XANTHOPHYCEAE				1	1	1	1	
Total		53	35	13	9	9	4	3

Add estuary blue-green algae were the principal species in the upper reaches and there was little coverage by green algae; *Melosira nummuloides* was absent and when a *Melosira* was present it was not abundant and was represented by *M. varians*, a species not recorded by the present author in the Clyde (Wilkinson 1973b).

Within the limitations of the present survey, which was only preliminary, it would appear that the Add estuary may represent a floristically different type of estuary from those of the Clyde and Wear. This view is supported by the authors unpublished observation on two estuaries in Skye which have a similar distribution pattern of algae to the River Add. Observations over a longer period of time on a larger number of estuaries should enable determination of the validity of the two floristic types of estuary described above and also permit recognition of any additional types. It is not possible to say why the Add differs from the Clyde and Wear but since the difference is seen in the upper reaches of the estuaries, it is possible that it is due to some function of the inflowing fresh-water. Further studies could, therefore, usefully include data on the water chemistry of the inflowing water.

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Dr. Martin Wilkinson, Department of Brewing and Biological Sciences, Heriot-Watt University, Chambers St. EDINBURGH
Miss Christine E. Roberts, Institute of Animal Genetics, University of Edinburgh, EDINBURGH.

TRIGGER-FISH AT MACHRIHANISH, KINTYRE

By DUNCAN COLVILLE
Honorary President,
Kintyre Antiquarian and Natural History Society

As mentioned in the paper on the marine fishes of Kintyre (Gibson, Colville and Gemmell, 1973) a specimen of the Trigger-fish or File-fish *Balistes carolinensis* was found on the shore at Machrihanish on 14th November 1958. In view of the importance of this discovery, which has already been briefly noted (*Scot. Nat.*, 1962: 108), it was decided to make it the subject of a separate report. The circumstances were as follows:

The fish was found on the beach at Machrihanish on 14th November 1958 by Mr. D.J.F. Colville, whose attention had been drawn to the spot by a disturbance amongst a group of gulls, and the fish, although not long dead, had already been damaged by the gulls. To Mr. Colville's considerable credit, he at once recognised that the fish was something very unusual, and certainly a species which he had never seen before. He therefore took it to Mr. James C. Gemmell, who tentatively identified it as a specimen of the genus *Balistes*, and after consultation with Mr. Drinkwater, the Fishery Officer, the fish was sent to the Marine Laboratory of the Scottish Home Department at Aberdeen. There the identification was confirmed as that of a Trigger-fish *Balistes carolinensis* by Dr. Bennet B. Rae, who wrote as follows:

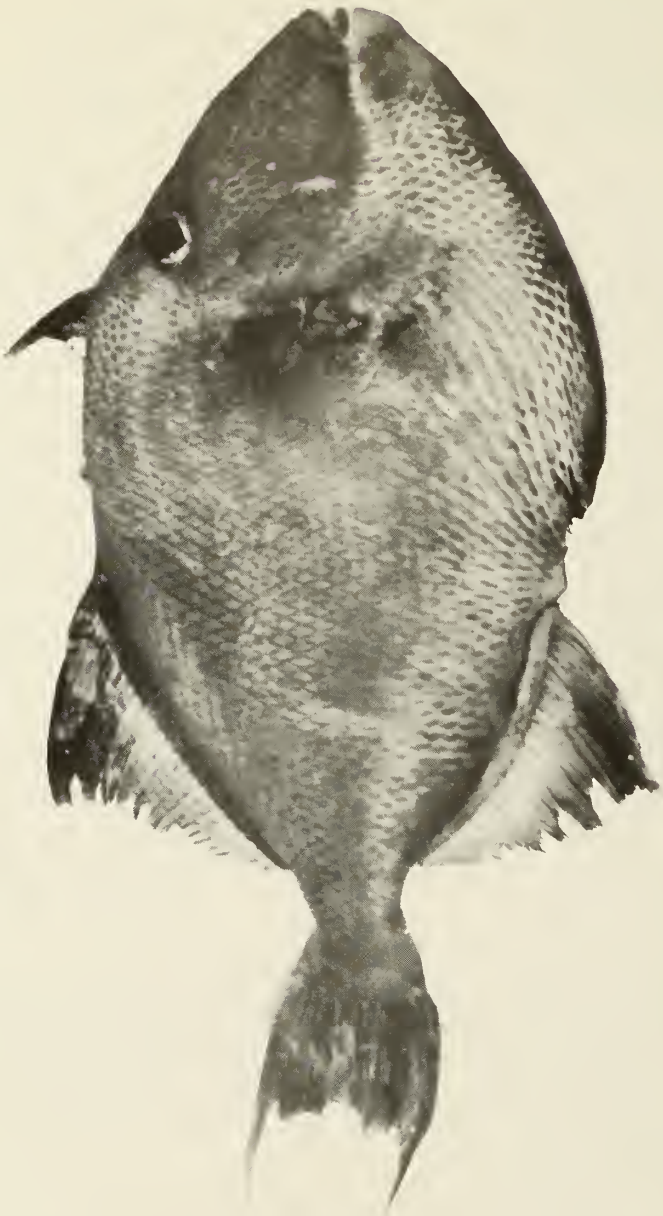
24th November 1958

Dear Mr Colville,

File-fish

I write to thank you for reporting to Mr. Drinkwater, the Fishery Officer, the most interesting finding by you of the specimen of File-fish, or Trigger-fish, on the beach at Machrihanish on 14th November, and for so generously allowing him to forward it to the laboratory for examination, record, and retention.

As Mr. Gemmell correctly surmised, this fish is one of the species of the genus Balistes, *Balistes carolinensis* and is very rare indeed in British waters. So far as the Scottish area is concerned only one other specimen has been recorded, and for this record we have to go back 130 years to 1827 or 1828 (the exact year is not known) when a specimen was found in the Orkneys. Your specimen, therefore, although not the first recorded from Scottish waters, is unique in being the first occurrence for well



TRIGGER-FISH

Machrihanish 14th November 1958

over a century. Records for other British waters - England, Wales and Ireland - are more numerous but are still sufficiently few to place the species in the very rare category. Only thirteen specimens are recorded - seven in the last century (the first also in 1827), and six since 1900 - in 1901, 1909, 1932 and, in more recent years, 1947, 1948 and 1950.

The *Balistes* group of fishes are natives of tropical or sub-tropical waters, inhabiting rocky or coral ground near the coasts. Little is known of their natural history or habits. They are said to feed on coral and molluscs and to be injurious to pearl fisheries. They are considered to be feeble swimmers, easily drifting out to sea and carried considerable distances. This would appear to be the explanation for the occasional occurrence of specimens of *carolinensis* in British waters far from its true habitat. The maximum length is not definitely known. On the Gold Coast it is said to be about 24 inches. British specimens, so far as can be ascertained, range in length from 9½ to 16½ inches. Your specimen was well above the latter extreme, measuring 20½ inches.

The common names - File-fish and Trigger-fish - are derived from peculiarities of the spines of the dorsal fin; the first and largest spine is rough on its front surface hence the name File-fish, while the name Trigger-fish is derived from the peculiar action of this main spine and the second smaller spine which act in concert, the first being depressed only after the second is folded back.

Mr. Drinkwater has informed us that you would like to present this very rare specimen to the Laboratory. We very much appreciate this most generous gesture on your part. We feel, however, that although we would be very proud and it would give us great pleasure to give it first prominence among our rare specimens exhibited here, as this is the first specimen of its kind extant in Scotland, its importance justifies a more national home. We therefore propose, with your approval, to present it to the Royal Scottish Museum in Edinburgh.

I thank you again on behalf of the Laboratory for this extremely rare record. For our own record purposes we have taken photographs of the specimen and I have pleasure in enclosing two copies.

Yours sincerely,

(sgd) Bennet B. Rae

The specimen of the Trigger-Fish has been presented to the Royal Scottish Museum, and the accompanying photograph is reproduced by permission of the Marine Laboratory of the Scottish Home Department.

Mr. Duncan Colville, Kilgour, MACHRIHANISH, by Campbeltown.

THE RABBIT IN KINTYRE

By DUNCAN COLVILLE and J.A. GIBSON
Kintyre Antiquarian and Natural History Society

Since the middle of the 19th century the Rabbit has played an important part in the agricultural and sporting economy of Kintyre, but in the past considerable controversy has surrounded its history and time of introduction to the peninsula. Indeed the columns of the *Oban Times* and the *Campbeltown Courier* have at times carried quite heated correspondence on the subject. This is an interesting question which we have investigated as carefully as we can, so we hope the following historical notes will throw some light on the matter.

Present Position

The current position can be stated quite simply - up to the time of myxomatosis, which reached Kintyre in 1954, the Rabbit was abundant everywhere throughout the Kintyre peninsula, was trapped regularly as an agricultural crop, and large numbers were sold annually as meat or skins. The Rabbit warren at Machrihanish was simply gigantic and must have been one of the biggest in the country. After myxomatosis reached Machrihanish Rabbits were lying everywhere all over the dunes and the golf course, and it was estimated by Mr. Colville that some 10,000 Rabbits must have died in the Machrihanish warren during the early stages of the outbreak. Although now vastly reduced in numbers the Rabbit still occurs widely throughout Kintyre and periodic small localised outbreaks of myxomatosis help to keep the population in check. There are still some Rabbits on Sheep Island, but the Rabbits on Sanda were exterminated over fifty years ago; Mr. James Russell tells us that when his father took over the tenancy of Sanda a clause in the lease demanded that he exterminate the existing Rabbits under a penalty of a £50 fine. The Rabbit is still well known on the neighbouring islands of Gigha and Cara.

Introduction in 1840s

There is no doubt that the present stock of Rabbits in Kintyre began with an introduction in the early 1840s. All available sources are agreed that there were no Rabbits on the Kintyre mainland during the years leading up to the middle of the 19th century, and we have been unable to trace any earlier reference to the Rabbit in any of the estate records or contemporary accounts. Indeed the Rev. Dr. John Smith of Campbeltown, in his book *Agricultural Survey of Argyllshire* (1798), stated

"The only Rabbits on the continent [ie. mainland] of Argyllshire are in a small island in Lochow, used as a warren by the Duke of Argyll. A tract of hilly sandy soil at Machrihanish Bay, near Campbeltown, might be profitably occupied as a warren". Dr. Smith even went so far as to suggest a suitable breed - the Lincolnshire.

It should not be thought, however, that in former times the Rabbit was unknown to Kintyre people, since the *Old Statistical Account* (1793) made it quite clear that Rabbits were abundant on Gigha and Cara, and Rabbits had been well known on Sheep Island since at least the end of the 16th century and possibly much earlier (*Macfarlane's Geographical Collections*, Vol.2: 187).

Gamekeepers were first introduced to Kintyre in 1842, at which date no Kintyre shooting had ever been let, and it is said that Rabbits were introduced with a view to increasing the interest and value of the estate shootings. This seems very reasonable. The late Dugald Macintyre, the well known Kintyre gamekeeper and naturalist, said that his father, also called Dugald Macintyre, released the "first seven Rabbits ever seen in Kintyre" at Machar links (Macharioch) near Southend not long after he was appointed a gamekeeper on the Kintyre Estate in 1842. This he did on the instructions of John Lorne Stewart of Coll, at that time Chamberlain to the Duke of Argyll. We have been unable to discover the exact date of introduction from the Argyll Estate registers, but the Rev. John Macfarlane, minister of Saddell and Skipness parish, writing in November 1843 in the *New Statistical Account* said that "Rabbits have been turned out, but did not succeed". Moreover, on 17th August 1921 Mr. Colville noted in his diary that Lorne Stewart had told him that day that his grandfather had introduced Rabbits to Kintyre nearly eighty years ago. In some of his writings Dugald Macintyre suggested various dates between 1845 and 1846 and implied that these first Kintyre Rabbits were probably obtained from an earlier introduction at Minard in 1845, but from the available evidence we think this date is too late and that the introduction would be not later than early 1843. Moreover, the Rabbits could well have been obtained from John Lorne Stewart's home island of Coll, where they had long been well known.

The statement in the *New Statistical Account* that the Rabbit "did not succeed" is rather odd, but need not concern us unduly, since it seems very likely that the minister was writing too soon after the introduction to properly observe the results; it is also possible, of course, that a few Rabbits introduced might have been quickly picked up by some of the many predators which were around at that time before the gamekeepers started their work in earnest.

At any rate the Rabbits quickly multiplied locally and were soon introduced to several other places in Kintyre, so that for a time the distribution throughout the peninsula was patchy, as can be seen from the descriptions of various shootings. For example, in 1852, Limecraigs shootings to let: "Rabbits becoming very numerous", and Killocraw shootings to let: "Rabbits not very numerous". In those early days it would appear from contemporary correspondence that the Rabbit was not at first much respected by potential shooting tenants, who were more concerned with the bags of traditional 'game', but by 1860 the Rabbits were certainly becoming more highly valued and in that year the *Argyllshire Herald* carried an advert warning anyone against poaching Rabbits on Ballyvain links. Moreover, copies of correspondence in the Argyll Estates letter-book show that from 1860 onwards agricultural tenants were beginning to complain about excessive damage done by Rabbits, and the task of keeping the numbers of Rabbits under control generally devolved upon the gamekeepers employed by the estate to keep 'vermin' in check. After the passing of the ground game act in 1880, however, which conferred upon agricultural tenants new rights in the use of firearms with the object of protecting their crops from damage, most claims for damage done by Rabbits ceased, and indeed from then on agricultural tenants were able to 'farm' the Rabbits and most received considerable income from their sale.

Ancient History

Most of the above is unremarkable; the Rabbit was introduced to Kintyre in the 1840s, and underwent the expected increase and spread until the time of myxomatosis. What is undoubtedly remarkable, however, is that there is good reason to believe that the Rabbit had apparently been introduced to Kintyre some two hundred years previously and may have succeeded for a time before dying out again. The facts are as follows:

At the sale of the contents of Rosneath Castle in November 1940 the Earl of Argyle's Kintyre rental for 1678 was purchased by the National Library of Scotland. In this rental, a copy of which has been examined by Mr. Colville, the farm of Machrihanish was let to John Cunningham, laird of Hill of Beith in Ayrshire, one of the lairds who took part in the 1650 lowland Scots plantation to Kintyre organised by the Marquis of Argyll. He was given the let of Machrihanish farm for twenty-one years from Whitsunday 1669 for 249 pounds Scots plus "2 duzon" of Rabbits yearly, and further investigation showed that Rabbits were mentioned in the rental of no Kintyre farm other than Machrihanish.

If there were no Rabbits in Kintyre at that time, then

where were these Rabbits to come from? After details of the lease were published in local papers subsequent correspondence tried to explain this in various ways. The late Dugald Macintyre suggested that they might have been tame Rabbits. Others thought they might have been obtained from Ayrshire, the laird of Hill of Beith's home county. It was also suggested that the Rabbits might have been obtained from the neighbouring islands of Gigha, Cara or Sheep Island. None of these suggestions seems to us to be entirely satisfactory, particularly since further investigation showed that Rabbits were mentioned in no other Kintyre farm rental. Tame Rabbits would be a very odd thing to insert into a farm lease; where would these be kept, and why only Machrihanish farm? Even assuming that Rabbits were available in Ayrshire at that time (we have no direct evidence of this, although they were present on the Cumbrae islands off the north Ayrshire coast), why only Machrihanish farm when many other Ayrshire lairds had settled in Kintyre farms. If from the neighbouring islands, at first sight the most plausible explanation, then why were Rabbits not mentioned in the leases of other farms which were much nearer to the islands than Machrihanish. We keep coming back to the simple question: why were Rabbits not included in the lease of any other farm? To us the assumption seems inescapable that Rabbits had 'become available' at Machrihanish and at nowhere else in Kintyre. It therefore seems very likely that the Rabbit had been introduced to Machrihanish, which would seem a perfect site for a warren, as indeed was suggested by the Rev. Dr. Smith 150 years later. This also means, however, that since Rabbits were certainly absent from Kintyre by the late 1700s they must have died out at Machrihanish, which anyone knowing the Machrihanish warren nowadays would find very difficult to believe.

There is at least one other early reference to the Rabbit in Kintyre, which we mention in passing. In the book *Glencreggan* or *A Highland Home in Cantire* by Cuthbert Bede (1861), the tale is told that when "McEachin, Laird of Tangie, entertained the great MacCallen Mor (Earl of Argyle) at his house at Tangie (built 1670) he had prepared for Argyle's entertainment a dinner of a very novel character. Upon the table - which must have been a tolerably large one, and which may literally have 'groaned' under the load - he had placed a specimen of every eatable animal that was to be found in Cantire. They were roasted whole, and set up on their stumps. There was an ox, a sheep, a stag, a roe, a goat, a pig, besides other such small deer as hares and rabbits". Although this would seem to confirm the existence of Rabbits in Kintyre at that time, we tend to agree with Mr. Andrew McKerral, the well-known Argyll historian, when he said that Cuthbert Bede's work "however entertaining, should not be mistaken for history".

Conclusion

We feel that the only reasonable conclusion to be drawn from the available evidence is that there were two separate introductions of the Rabbit to Kintyre, some two hundred years apart, - in the mid-1600s and the mid-1800s, and that the earlier introduction succeeded for a time and then died out, however unlikely that may seem. We have done all the research we can on the subject, and feel that our suggestion, although somewhat conjectural, is the solution which best fits most of the known facts. If anyone can supply a better solution, however, we shall be very glad to hear from him.

As a footnote, it only remains to say that there are still some Rabbits on Sheep Island, although at present they do not seem to be very healthy and may well be in danger of dying out. It would perhaps be a pity if this were allowed to happen, for the Sheep Island Rabbits do seem to have the longest lineage of any Rabbits in Kintyre.

Mr. Duncan Colville, Kilgour, MACHRIHANISH, by Campbeltown.
Dr. J.A. Gibson, Foremount House, KILBARCHAN, Renfrewshire.

NOTES ON LAND MOLLUSCS FROM KILBARCHAN, RENFREWSHIRE

By F.J. RAMSAY
Renfrewshire Natural History Society

During the past thirty years I have carefully examined all slugs and snails found in my one-acre garden at Kilbarchan, Renfrewshire, and my notes on the species found are given below. Nomenclature follows *British Snails* by A.E. Ellis (Oxford, 1926), and all species were identified using the key given by Ellis.

MOSS SNAIL *Pupilla muscorum* (L.)
Common.

SLIPPERY SNAIL *Cochlicopa lubrica* (Müller)
Common.

ROUNDED SNAIL *Goniodiscus rotundatus* (Müller)
Common.

GARDEN SLUG *Arion hortensis* Ferussac
Common.

BLACK SLUG *Arion ater*(L.)
Common.

STRAWBERRY SNAIL *Trichia striolata* (Pfeiffer)
Common.

GROVE SNAIL *Cepaea nemoralis* (L.)
Common.

TREE SLUG *Limax marginatus* Müller
One record only; on trunk of Sycamore on 5th July 1948.

FIELD SLUG *Agriolimax agrestis* (Müller)
Common.

The only previous accounts of land molluscs in Renfrewshire seem to be the lists in the British Association *Handbook* of 1901, and in Volume Three of the Renfrewshire Society's *Transactions* (1934). The Moss Snail *P. muscorum* is not listed for Renfrewshire in either of these accounts, so may well be a new county record. The published distribution of the Garden Slug *A. hortensis* and the Tree Slug *L. marginatus* is restricted, and Kilbarchan appears to be a new locality.

The late F.J. Ramsay, The Old Manse, KILBARCHAN, Renfrewshire
(An obituary of Mr. Ramsay appears on pages 119-120).

A CONTRIBUTION TO THE FLORA OF SANDA, KINTYRE

By JOHN MITCHELL and RUSSELL G. NISBET
Nature Conservancy Council

In August 1972 and June 1973 the authors and two other members of the Scottish Ornithologists' Club made two weekend visits to the island of Sanda, 1½ miles off the south-east coast of Kintyre. The Sanda group of islands, which includes Sheep Island and Glunimore, currently holds the largest breeding colonies of Shags *Phalacrocorax aristotelis*, Puffins *Fratercula arctica* and Black Guillemots *Uria grylle* in the Clyde faunal area, and Glunimore is the only locality in Clyde waters where the Manx Shearwater *Procellaria puffinus* has been proved to breed (Gibson, 1956 and 1969). Observations have also shown that the islands lie on a spring and autumn migration route for birds crossing the sea between the south Ayrshire-Galloway coast and the Kintyre peninsula (Eagle Clarke, 1912; Goodbody, 1956). Although the purpose of the two short visits to Sanda was primarily ornithological, a Biological Records Centre field card for flowering plants and ferns was completed, and brief notes taken on the maritime vegetation of the island.

Almost all the published botanical records for Sanda, Sheep Island and Glunimore resulted from two one-day visits in 1898 and 1900 by several members of the Natural History Society of Glasgow. One hundred and two species of flowering plants and ferns were recorded for Sanda, fifty-nine for Sheep Island and one for Glunimore (Paterson and Renwick, 1898; Paterson, 1901). The exclusion of the islands from *The Flora of the Clyde Area* (Lee, 1933) would appear to have been intentional, as it seems unlikely that published records of two uncommon Clyde plants -- *Spergularia rupicola* (Glunimore) and *Beta vulgaris* ssp. *maritima* (Sheep Island) -- were accidentally overlooked. The omission is difficult to understand, as the area covered by the *Flora* was substantially the same as that adopted in the *Handbook* (Scott Elliot, Laurie and Murdoch, 1901) prepared for the second Glasgow meeting of the British Association. The map accompanying the British Association *Handbook* clearly shows the islands to be within the Clyde floral and faunal area. It is possible that the division of Kintyre for the *Flora* was adopted from the map accompanying *A Vertebrate Fauna of Argyll and the Inner Hebrides* (Harvie-Brown and Buckley, 1892), which illustrates the text incorrectly by placing Sanda, Sheep Island and Glunimore outwith the Clyde area. This error was rectified in the *Naturalist's Map of Scotland* (Harvie-Brown and Bartholomew, 1893) published in the following year.

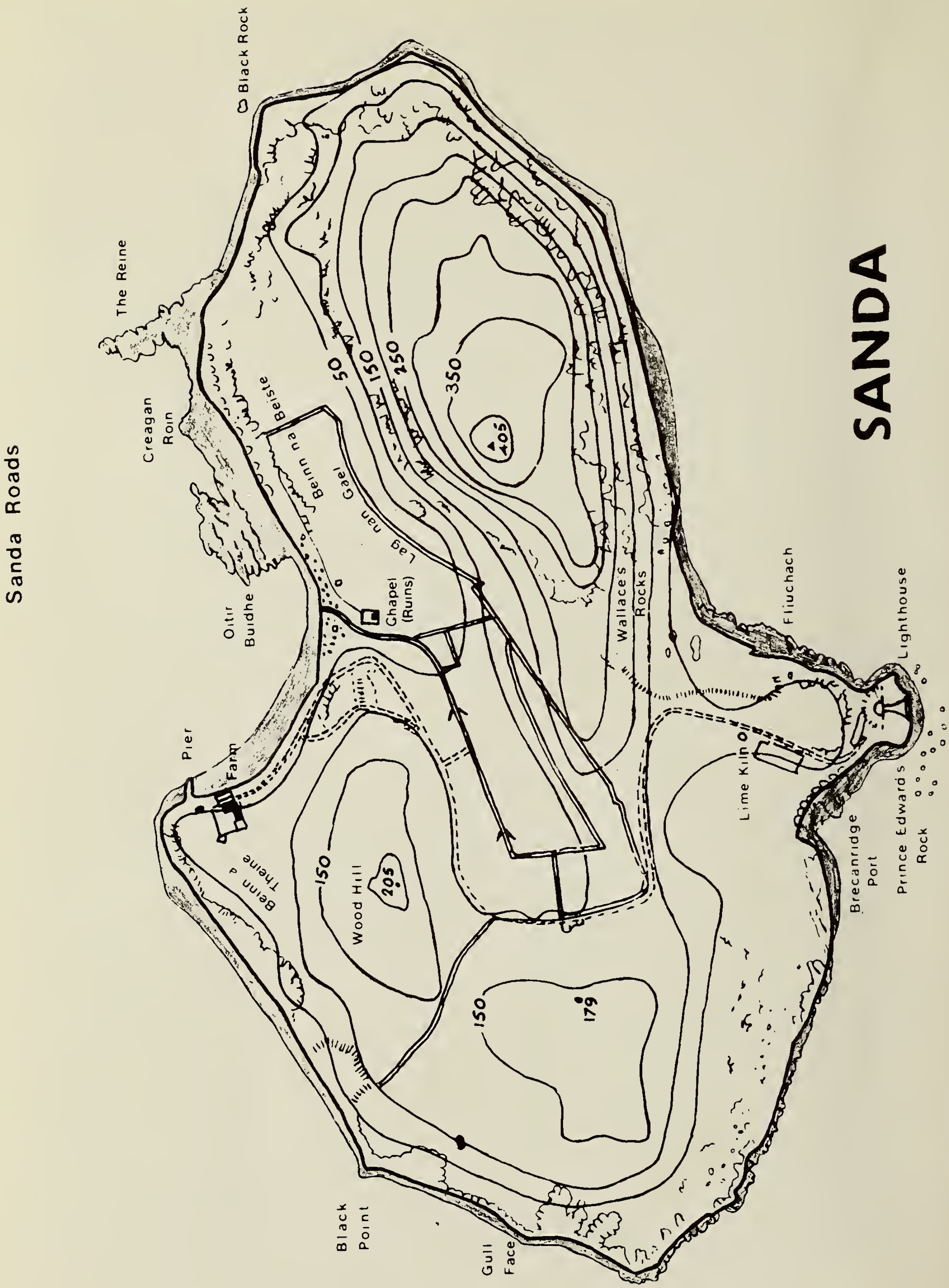
The island of Sanda is about 1¼ miles in length from east to west, ¾ mile wide from north to south and approximately three hundred and forty-six acres in extent. R.G. Symes (H.M. Geological Survey) mapped southern Kintyre in 1891-92, but no geological memoir was ever published. The following brief description of Sanda is based on the six-inch geological map for south Kintyre (unpublished) and notes by McCallien (1928). Sanda is composed almost entirely of Lower Old Red Sandstone, the resistant conglomerates forming ridges where the softer sandstone has been eroded away. The island is roughly divided into two at its shorter axis by a major north-south fault. Seen from the mainland, the western portion rises from the sea cliffs in gentle curves to a height of 205 feet, whereas the eastern portion rises in a series of escarpments to a height of 405 feet. The geological map shows lenticles and thin bands of impure limestone associated with the Old Red Sandstone, but these outcrops are not obvious to the layman's eye. Deposits of calcium carbonate however can be seen in the old sea caves and other places where water seepage occurs. A well-preserved lime-burning kiln, built into the west side of a raised beach, is situated near the lighthouse keepers' garden. The only dwellings on Sanda are the lighthouse station and a farm.

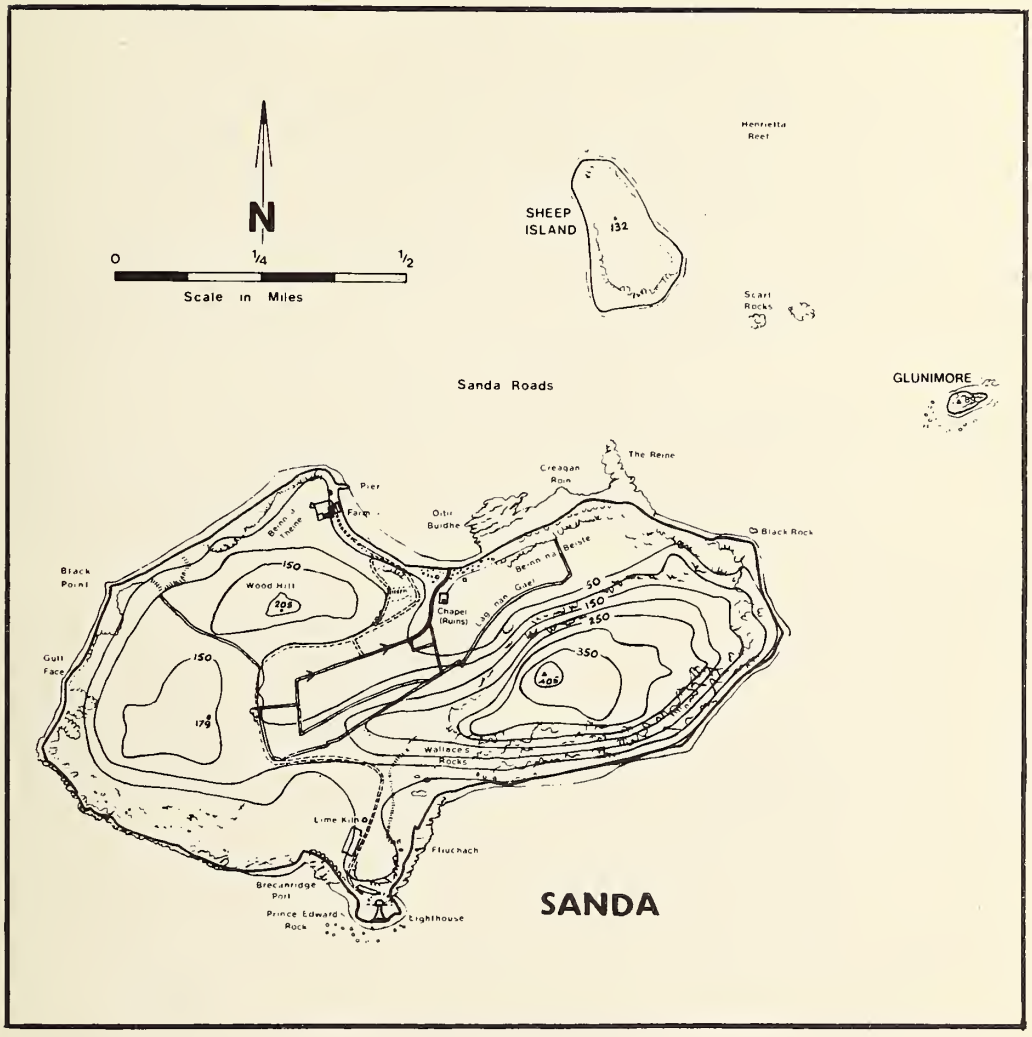
The history of Sanda as an early christian settlement and Norse stronghold is described in detail by White (1873) and Campbell (1924). The latter account also provides an interesting record of land use on the island in the late 16th century. Land capable of cultivation was assessed at that time in terms of money measurement, and in 1584 Sanda was designated a 'twenty shillingland', which suggests about fifty-two acres of cultivated or cultivatable ground. The rest of the land was apparently only considered suitable for the common pasturage of cattle. Two hundred years later, in the *Statistical Account of Scotland* (Campbell, 1792), mention is made of the valuable sheep grazing on the Sanda group of islands. The mid-19th century was a flourishing period for agriculture in southern Kintyre, mainly through the development of dairy farming. Sanda appears to have shared in the economic growth, for the population rose from eleven in 1841 to fifty-seven by 1871. This prosperity was short-lived, however, as the increasing importation of cheap farm produce from abroad resulted in much of the poorer ground going out of cultivation. By 1881 the population of Sanda had been reduced to fourteen, the island then coming under the tenancy of a single sheep farmer (Groome, 1885; MacVicar, 1961). Sheep farming has continued to be the principal agricultural use of the island right up to the present day. The amount of land under cultivation on Sanda has decreased over the years, with only eight to ten acres in 1951 (Borland and Walls, 1951) and less than one acre in 1972/73.

With the gradual abandonment of arable farming on the island, there would inevitably follow a corresponding decline in the number of plant species characteristic of disturbed ground. Of thirteen previously recorded plants which were not re-found by the present authors, five were weeds freqeuntly associated with cultivated ground.

In the second-half of the 18th century, Dr. John Walker recorded ... "The small island of Sanda, on the coast of Cantire, is still covered with dispersed coppice, as also Tutsan and the Great Hairy Woodrush, which are plants whose natural situation is under the shade of trees" (Walker, 1812). Intensive stock grazing and regular muir-burning were probably the main causes of the disappearance of this coppice woodland, although the introduction of several herbivores to the island may have been an additional factor. In 1803 Sanda was purchased by Sir William Cunningham, who "stocked the island with fallow deer, stags and roes, together with a large breed of white goats from Ireland". Sanda was eventually sold again in 1825, and reverted to its previous use as sheep grazing with a small area of cultivated ground (Campbell, 1924). Rabbits were also introduced to the island at an unknown date, these being finally extirpated in the mid-1920s (Gibson, 1970). Today, all that remains of Sanda's former woodland cover is an occasional birch or rowan on the steeper slopes, and the surviving name 'Wood Hill' given to the north-west corner of the island.

The maritime flora is not particularly well represented on Sanda, although several distinct plant communities can be identified. At Oitir Buidhe (Yellow Sandbank), the associated species of the sand and shingle beach include *Honkenya peploides*, *Atriplex glabriuscula*, *A. laciniata*, *Tripleurospermum maritimum* and *Rumex crispus*. Immediately above the shingle beach is an area of blown sand which is now almost completely stabilised by vegetation growth, although sand dune plants such as *Salsola kali*, *Carex arenaria* and *Festuca rubra* var. *arenaria* still occur around the seaward perimeter. There are several small patches of salt-marsh, and characteristic species include *Triglochin maritima*, *Juncus gerardii*, *J. maritimus*, *Blysmus rufus* and *Schoenus nigricans*. Near Brecanridge Port, the brackish water of the salt marsh merges with a fresh water marsh, which contains the following locally uncommon species --- *Berula erecta*, *Oenanthe lachenalii* and *Carex disticha*. In common with the rest of Kintyre and elsewhere on the Clyde coast, post-glacial earth movement has raised most of Sanda's former sea cliffs beyond the direct influence of salt-spray. Only on the north side of the island is a typical sea-cliff community to be found, including *Silene maritima*, *Spergularia rupicola*, *Armeria maritima* and *Plan-*


SANDA
Sanda Roads
The Reine
Creagan Roin
Black Rock
Beinn na Beiste
Lag nan Gael
Oitir Buidhe
Chapel (Ruins)
Pier
Farm
Beinn a Theine
Wood Hill
205
150
179
150
Black Point
Gull Face
50
150
250
350
405
Wallace's Rocks
Fliuchach
Lighthouse
Lime Kiln
Brecanridge Port
Prince Edward's Rock



Above: The Islands of Sanda, Sheep Island and Glunimore.
Scale - Three inches to one mile.

Left: The Island of Sanda.
Scale - Six inches to one mile.

tago maritima, with *Asplenium marinum*, *Cochlearia officinalis* and *Umbilicus rupestris* in the damper clefts.

PLANT LIST (231 species)

Compared with some of the other Clyde islands, Sanda has received relatively little botanical attention, so that the following plant list should not be considered exhaustive. The order and scientific names follow Clapham, Tutin and Warburg's *Flora of the British Isles* 2nd edition (Cambridge 1962). An asterisk indicates a species previously recorded on Sanda, but not seen by the present authors during their visits to the island in 1972 and 1973.

EQUISETACEAE

Equisetum fluviatile	Water Horsetail
Equisetum arvense	Field Horsetail

POLYPODIACEAE

Pteridium aquilinum	Bracken
Blechnum spicant	Hard Fern
Phyllitis scolopendrium	Hart's-tongue Fern
Asplenium adiantum-nigrum	Black Spleenwort
Asplenium marinum	Sea Spleenwort
Asplenium trichomanes	Maidenhair Spleenwort
Athyrium filix-femina	Lady-fern
Dryopteris filix-mas	Male Fern
Dryopteris dilatata agg.	Broad Buckler-fern
Polypodium vulgare agg.	Polypody

CUPRESSACEAE

Juniperus communis	Juniper

RANUNCULACEAE

Anemone nemorosa	Wood Anemone
Ranunculus acris	Meadow Buttercup
Ranunculus repens	Creeping Buttercup
**Ranunculus bulbosus*	Bulbous Buttercup
Ranunculus flammula	Lesser Spearwort
Ranunculus ficaria	Lesser Celandine

CRUCIFERAE

Sinapis arvensis	Charlock
Capsella bursa-pastoris	Shepherd's Purse
Cochlearia officinalis	Scurvy-grass
Cardamine pratensis	Lady's Smock

Cardamine flexuosa	Wavy Bitter-cress
Cardamine hirsuta	Hairy Bitter-cress
Arabis hirsuta	Hairy Rock-cress
Rorippa nasturtium-aquaticum agg.	Watercress

VIOLACEAE

Viola riviniana	Common Violet
Viola palustris	Marsh Violet

POLYGALACEAE

Polygala vulgaris	Common Milkwort
Polygala serpyllifolia	Heath Milkwort

HYPERICACEAE

Hypericum androsaemum	Tutsan
Hypericum tetrapterum	Square-stemmed St. John's Wort
Hypericum pulchrum	Slender St. John's Wort

CARYOPHYLLACEAE

Silene dioica	Red Campion
**Silene vulgaris*	Bladder Campion
Silene maritima	Sea Campion
Lychnis flos-cuculi	Ragged Robin
Cerastium holosteoides	Common Mouse-ear Chickweed
**Cerastium glomeratum*	Broad-leaved Mouse-ear Chickweed
Stellaria alsine	Bog Stitchwort
Sagina procumbens	Procumbent Pearlwort
Honkenya peploides	Sea Sandwort
Spergularia rupicola	Rock Sea-spurrey

CHENOPODIACEAE

Atriplex hastata	Hastate Orache
Atriplex glabriuscula	Babington's Orache
Atriplex laciniata	Frosted Orache
Salsola kali	Saltwort

LINACEAE

Linum catharticum	Purging Flax

GERANIACEAE

Geranium molle	Dove's-foot Cranesbill
Geranium robertianum	Herb Robert
Erodium cicutarium agg.	Common Storksbill

OXALIDACEAE

Oxalis acetosella	Wood Sorrel

PAPILIONACEAE

Ulex europaeus	Gorse
Sarothamnus scoparius	Broom
Trifolium dubium	Lesser Yellow Trefoil
* *Trifolium campestre*	Hop Trefoil
Trifolium repens	White Clover
Trifolium pratense	Red Clover
Anthyllis vulneraria	Kidney Vetch
Lotus corniculatus	Common Birdsfoot Trefoil
Lotus pedunculatus	Greater Birdsfoot Trefoil
Vicia hirsuta	Hairy Tare
Vicia cracca	Tufted Vetch
Vicia sepium	Bush Vetch
Vicia sativa ssp. *angustifolia*	Narrow-leaved Vetch
Lathyrus pratensis	Meadow Vetchling

ROSACEAE

Filipendula ulmaria	Meadowsweet
Rubus fruticosus agg.	Bramble
Potentilla palustris	Marsh Cinquefoil
Potentilla anserina	Silverweed
Potentilla erecta	Common Tormentil
* *Alchemilla vulgaris* agg.	Lady's Mantle
* *Aphanes arvensis* agg.	Parsley Piert
Rosa pimpinellifolia	Burnet Rose
Rosa canina	Dog Rose
Prunus spinosa	Blackthorn
* *Crataegus monogyna*	Hawthorn
Sorbus aucuparia	Rowan

CRASSULACEAE

Sedum anglicum	English Stonecrop
Sedum acre	Yellow Stonecrop
Umbilicus rupestris	Wall Pennywort

SAXIFRAGACEAE

Chrysosplenium oppositifolium	Opposite-leaved Golden Saxifrage

PARNASSIACEAE

Parnassia palustris	Grass of Parnassus

ONAGRACEAE

Epilobium parviflorum	Lesser Hairy Willow-herb
Epilobium montanum	Broad-leaved Willow-herb
Epilobium palustre	Marsh Willow-herb
Epilobium nerterioides	New Zealand Willow-herb

ARALIACEAE

Hedera helix	Ivy

HYDROCOTYLACEAE

Hydrocotyle vulgaris	Marsh Pennywort

UMBELLIFERAE

* *Anthriscus sylvestris*	Cow Parsley
Conium maculatum	Hemlock
Apium nodiflorum	Procumbent Marshwort
Conopodium majus	Pignut
Berula erecta	Lesser Water Parsnip
Oenanthe lachenalii	Parsley Water Dropwort
Oenanthe crocata	Hemlock Water Dropwort
Angelica sylvestris	Wild Angelica
Heracleum sphondylium	Hogweed

EUPHORBIACEAE

* *Euphorbia helioscopia*	Sun Spurge

POLYGONACEAE

Polygonum aviculare agg.	Knotgrass
Polygonum persicaria	Redshank
Rumex acetosella agg.	Sheep's Sorrel
Rumex acetosa	Common Sorrel
Rumex crispus	Curled Dock

URTICACEAE

Urtica urens	Small Nettle
Urtica dioica	Stinging Nettle

BETULACEAE

Betula pubescens	Downy Birch

SALICACEAE

Salix aurita	Eared Willow

ERICACEAE

Calluna vulgaris	Heather
Erica tetralix	Cross-leaved Heath
Erica cinerea	Bell-heather
Vaccinium myrtillus	Blaeberry

EMPETRACEAE

Empetrum nigrum	Crowberry

PLUMBAGINACEAE

Armeria maritima	Thrift

PRIMULACEAE

Primula vulgaris	Primrose
Lysimachia nemorum	Yellow Pimpernel
Glaux maritima	Sea Milkwort

BORAGINACEAE

Myosotis secunda	Creeping Forget-me-not

SCROPHULARIACEAE

Scrophularia nodosa	Common Figwort
Digitalis purpurea	Foxglove
Veronica beccabunga	Brooklime
* *Veronica officinalis*	Common Speedwell
Veronica chamaedrys	Germander Speedwell
* *Veronica serpyllifolia*	Thyme-leaved Speedwell
Veronica arvensis	Wall Speedwell
Pedicularis palustris	Red-rattle
Pedicularis sylvatica	Lousewort
Rhinanthus minor ssp. *stenophyllus*	Yellow-rattle
Euphrasia officinalis agg.	Eyebright

LENTIBULARIACEAE

Pinguicula vulgaris	Common Butterwort

LABIATAE

Mentha aquatica	Water-mint
Thymus drucei	Wild Thyme
Prunella vulgaris	Self-heal
Stachys palustris	Marsh Woundwort
Stachys sylvatica	Hedge Woundwort
Lamium moluccellifolium	Northern Dead-nettle

Lamium hybridum	Cut-leaved Dead-nettle
* *Lamium purpureum*	Red Dead-nettle
Galeopsis tetrahit agg.	Common Hemp-nettle
Scutellaria galericulata	Common Skull-cap
Teucrium scorodonia	Wood Sage
Ajuga reptans	Bugle

PLANTAGINACEAE

Plantago major	Great Plantain
Plantago lanceolata	Ribwort Plantain
Plantago maritima	Sea Plantain
Plantago coronopus	Buck's-horn Plantain

CAMPANULACEAE

Campanula rotundifolia	Harebell
Jasione montana	Sheep's-bit

RUBIACEAE

Galium verum	Lady's Bedstraw
Galium saxatile	Heath Bedstraw
Galium palustre	Marsh Bedstraw
Galium aparine	Sticky Willie

CAPRIFOLIACEAE

Lonicera periclymenum	Honeysuckle

DIPSACACEAE

Succisa pratensis	Devil's-bit Scabious

COMPOSITAE

Senecio jacobaea	Common Ragwort
Senecio vulgaris	Common Groundsel
Solidago virgaurea	Golden-rod
Bellis perennis	Daisy
Achillea ptarmica	Sneezewort
Achillea millefolium	Yarrow
Tripleurospermum maritimum	Scentless Mayweed
Matricaria matricarioides	Pineapple Weed
Arctium minus	Lesser Burdock
Cirsium vulgare	Spear Thistle
Cirsium palustre	Marsh Thistle
Cirsium arvense	Creeping Thistle
Centaurea nigra	Knapweed
Hypochoeris radicata	Cat's Ear
Leontodon autumnalis	Autumnal Hawkbit

Sonchus oleraceus	Common Sow-thistle
Sonchus asper	Prickly Sow-thistle
Hieracium pilosella	Mouse-ear Hawkweed
Taraxacum officinale	Dandelion

JUNCAGINACEAE

Triglochin maritima	Sea Arrow-grass

POTAMOGETONACEAE

Potamageton sp.	Pondweed

LILIACEAE

Narthecium ossifragum	Bog Asphodel
Endymion non-scriptus	Bluebell
Allium ursinum	Ramsons

JUNCACEAE

Juncus squarrosus	Heath Rush
Juncus gerardii	Saltmarsh Rush
Juncus bufonius	Toad Rush
Juncus effusus	Soft Rush
Juncus conglomeratus	Compact Rush
Juncus maritimus	Sea Rush
Juncus acutiflorus	Sharp-flowered Rush
Juncus articulatus	Jointed Rush
Juncus bulbosus	Bulbous Rush
Luzula sylvatica	Greater Woodrush
Luzula campestris	Field Woodrush
Luzula multiflora	Many-flowered Woodrush

IRIDACEAE

Iris pseudacorus	Yellow Flag

ORCHIDACEAE

Orchis mascula	Early Purple Orchid
Dactylorchis maculata ssp. *ericetorum*	Heath Spotted Orchid
Dactylorchis fuchsii	Common Spotted Orchid

CYPERACEAE

Eriophorum angustifolium	Common Cotton-grass
Eriophorum vaginatum	Hare's-tail Cotton-grass
Eleocharis quinqueflora	Few-flowered Spike-rush
Blysmus rufus	Smooth-leaved Blysmus
Schoenus nigricans	Black Bog-rush

Carex binervis	Green-ribbed Sedge
Carex panicea	Carnation Sedge
Carex flacca	Glaucous Sedge
* *Carex pilulifera*	Pill Sedge
Carex caryophyllea	Spring Sedge
Carex nigra	Common Sedge
Carex otrubae	False Fox Sedge
Carex disticha	Brown Sedge
Carex arenaria	Sand Sedge
Carex echinata	Star Sedge
Carex remota	Remote Sedge
Carex pulicaris	Flea Sedge

GRAMINEAE

Molinia caerulea	Purple moor-grass
Sieglingia decumbens	Heath Grass
Glyceria fluitans	Floating Sweet-grass
Festuca rubra	Red Fescue
Festuca ovina	Sheep's Fescue
Lolium perenne ssp. *perenne*	Perennial Rye-grass
Dactylis glomerata	Cock's-foot
Cynosurus cristatus	Crested Dog's-tail
Arrhenatherum elatius	False Oat
Holcus lanatus	Yorkshire Fog
Holcus mollis	Creeping Soft-grass;
Deschampsia cespitosa	Tufted Hair-grass
Deschampsia flexuosa	Wavy Hair-grass
Aira caryophyllea	Silver Hair-grass
Agrostis canina	Brown Bent
Agrostis tenuis	Common Bent
Agrostis stolonifera	Creeping Bent
Anthoxanthum odoratum	Sweet Vernal-grass
Phalaris arundinacea	Reed Canary-grass

Acknowledgments:

To our fellow ornithologists A. McIver and G. Patrick, we would like to express our appreciation of their patience with us whenever we spent time looking for plants instead of birds.

We are extremely grateful to A. Kenneth (B.S.B.I. recorder for Kintyre) and A. McG. Stirling for the identification of several collected specimens and helpful comments on the original draft of this paper. Also to N. Mitchell for the accompanying map of the Sanda group of islands.

It is a particular pleasure to thank E. Myers (manager of Sanda Farm) and the lighthouse station staff for their warm hospitality during our two visits to the island.

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Mr. John Mitchell, 22 Muirpark Way, Drymen, by Glasgow G63 ODX.
Mr. Russell G. Nisbet, 46 Greenwood Road, Clarkston, Glasgow, G76 7JN.

FUNGI AND MOSSES FROM HAMILTON HIGH PARKS, LANARKSHIRE

By AUDREY WALLACE
Honorary Secretary, Hamilton Natural History Society

The High Parks near Hamilton, Lanarkshire (NS734538), which belong to His Grace the Duke of Hamilton, extend to over 1800 acres of woodland and meadow. The ancient oaks which can still be seen are said to be a remnant of the old Caledonian forest, though they may in fact have been planted about the time of King David I (1124-1153). The underlying rocks are carboniferous and the river Avon has cut a deep gorge through the coal measures.

A herd of wild White Cattle *Bos taurus* grazes in the Parks all the year round and is untended except for being given food during the hard weather. These animals are never used for breeding and are never sold live. The herd is kept at around 23 and weak or unwanted calves are slaughtered.

Five hundred and fourteen acres are given over to mixed arable farming with beef cattle and sheep. Winter feeding for stock is provided from haylage, which is formed from grass in a drier state than for silage. Grain is also stored without air and then rolled before being used for fodder.

There are 550 acres of dedicated woodland - mainly conifers, though there are also plantations of poplar and other hardwoods. When the trees are felled they are handled by the Estate sawmill and treated with 'Celcure' before being marketed.

The woodland provides cover for many mammals and birds including Roe Deer, Badgers, Foxes, Hares, game birds, Crows, Wood Pigeons, etc.

The area also includes the Hamilton Golf Course, and a sand quarry which is worked commercially.

The Hamilton Natural History Society has held two successful Nature Trails in the High Parks. On another two occasions, on 29th September 1961 and 21st October 1962, Miss M.P.H. Kertland of Queen's University, Belfast, has conducted fungus forays in the Parks, and a further fungus foray was led by Dr. M.N. Burge of Strathclyde University on 10th October 1971. A list of the species of fungi found on all these occasions is given below, along with some of the mosses and liverworts also found.

FUNGI

Nomenclature in accordance with Collin's *Guide to Mushrooms and Toadstools*, 1963; and *British Cup Fungi*, Ray Society 1960. Common names added where known.

Agarics:

Amanita rubescens (The blusher)
Armillaria mellea (Honey fungus)
Clitocybe clavipes
C. flaccida
C. geotropa
Clitopilus prunulus (White mealy-cap)
Collybia butyracea (Buttery top)
C. confluens (False fairy ring)
C. (Marasmius) dryophila
C. fusipes
C. maculata (Rust-spot fungus)
Coprinus atramentarius
C. comatus (Lawyer's wig)
Cortinarius semisanguineus
Cystoderma sp.
Entoloma (Rhodophyllus) clypeatum
Grifolia sp.
Gymnopilus penetrans.
G. (Flammulina) sapineus
Hygrocybe (Hygrophorus) setaceus
Hypholoma fasciculare (Sulphur tuft)
Inocybe griseo-lilacina (Satin top)
Lactarius blennius
L. helvus
L. pyrogalus
L. tabidus
Lepista (Tricholoma) saeva (Blewits)
Leucocortinarius (Armillaria) bulbiger
Lyophyllum connatum
Mycena galericulata (Helmet Mycena)
M. pura (Fairy screen)
Nolanea (Entoloma) sericea
Omphalina sp.
Oudemansiella (Armillaria) mucida
Paxillus involutus (Curled edge fungus)
Pholiota mutabilis
Pluteus cervinus (Deer's cap)
Psathyrella (Hypholoma) candolleana
P. (Psilocybe) spadicea
Rhodotus palmatus
Russula aeruginea
R. cyanoxantha

R. emetica (The sickener)
R. fellea
R. mairei
R. ochroleuca (Yellow smooth-edged Russula)
Tricholoma terreum
Tricholomopsis rutilans (Purple blewit, plums and custard)

Bolets and Puff-Balls:

Boletus chrysenteron
B. granulatus
B. scaber
Lycoperidon echinatum (Spiny Puff-ball)
L. excipuliforme
L. perlatum (Smooth Puff-ball)

Bracket Fungi and associated groups:

Coltrichia (Polyporus) perennis
Daedalea quercina
Ganoderma applanata (Beech bracket)
Piptoporus (Polyporus) betulinus (Birch bracket)
Stereum rugosum
Trametes versicolor (Fairy-stool)

Calocera cornea
Clavaria fusiformis (Fairy club)
Corticium sp.
Nectria cinnabarina (Coral spot)

Sistotrema (Sterium) confluens

Stink Horns:

Mutinus caninus (small)
Phallus impudicus (large)

Cup Fungi and other Ascomycetes:

Aleuria (peziza) aurantia (Orange-peel fungus)
Hypoxylon fragiforme
H. fuscum
Mollisia cinerea
Otidea alutacea (Hare's ear)
Peziza badia
Rhytisma acerinum (Tar-spot of sycamore)
Xylaria hypoxylon (Candlewick)

MOSSES AND LIVERWORTS

Nomenclature in accordance with the British Bryological Society's *Census Catalogues of Mosses* (3rd ed., 1963) and *Liverworts* (4th ed., 1965).

Mosses:

Barbula rigidula
Brachythecium rutabulum
Bryum capillara
Camptothecium sericeum
Ceratodon purpureus
Cirriphyllum piliferum
Eurhynchium praelongum
E. striatum
Hypnum cupressiforme var. resupinatum
Isothecium myusuroides
Mnium hornum
M. undulatum
Neckera complanata
Polytrichum aloides
Rhacomitrium heterostichum
Rhytidiadelphus squarrosus
Thamnium alopecurum
Thuidium tamariscinum
Tortula muralis

Liverworts:

Conocephalum conicum
Lophocolea heterophylla
Marchantia polymorpha
Plagiochila asplenioides var. major

Acknowledgements

Grateful acknowledgement is made to Miss M.P.H. Kertland who named the fungi and to Mrs J.W. Fitzgerald who named the mosses and liverworts.

The Estate Commissioner, Mr. A.D.L. McDonald, gives every facility to the Hamilton Natural History Society and members have been taken round the High Parks under the guidance of the head forester.

It is to be greatly regretted that vandalism on an ever-increasing scale costs the estate over £1500 annually and causes the death or mutilation of many animals as well as the destruction of trees and property.

Mrs Audrey Wallace, Wingfield, 28 South Park Road, Hamilton.

THE NOTABLE TREES OF RENFREWSHIRE

By ROBERT WILSON and IAN W. GRANT
County Botanical Recorders,
Renfrewshire Natural History Society

As a contribution to European Conservation Year the Renfrewshire Natural History Society elected to research and up-date the records of all the old and notable trees in Renfrewshire which were listed in the British Association *Handbook* prepared for the Glasgow Meeting of 1901. Accordingly the Society's Botanical Recorders, Messrs Wilson and Grant, carried out the necessary survey during the summer of 1970 and their report is given in Tables 1 and 2.

Table 1: Notable Trees in Renfrewshire, as recorded in the British Association Handbook of 1901

Location	Species	Remarks
Auldhouse Estate	Sweet Chestnut	Two trees of which there is now no trace. This estate is now within the Glasgow boundary in the Thornliebank district.
Ardgowan Estate	Sycamore Ash Holly Oak Wellingtonia	These trees were sited near to the Old Ardgowan Castle, but are all now gone.
Bargaran (Erskine)	Oak	This was the 7-stemmed "Witches Oak". Regrettably it stood in the way of the M8 en route to Erskine Bridge and was removed in 1969.
Bishopton House	Sycamore	No tree remaining.

Location	Species	Remarks
Blythswood Estate	Tulip Tree Sycamore False Acacia Hawthorn Birches (2) Beech	In 1970 only the Beech was still to be seen and it was in the last stages of decay. The golf course is now on the site.
Castle Semple (Lochwinnoch)	Sweet Chestnut Cedar of Lebanon	The Cedar was destroyed in 1927 and there is no trace of the Chestnut.
Craigbet (Bridge of Weir)	Yew (2)	These were "Marriage Trees", a male and a female, planted about 1620 and of which there is now no trace.
Craigends	Horse Chestnut Yew (male)	No trace. This is the Craigends Yew about which the R.N.H.S. is so concerned. Since the developers took over some years ago, damage to this important tree has been steadily increasing.
Duchal (Kilmacolm)	Sweet Chestnut	This ancient tree has had extensive dieback of the main branch systems, but is re-growing from the old hulk of the bole. Quite impressive.
Elderslie House (Renfrew)	Crack Willows (3) Birch Beech	The Deanside Dock Development has engulfed all these tree sites.
The Wallace Memorial (Elderslie)	Yew (male)	This tree, in fine condition, is too well known to require any further comment.

Location	Species	Remarks
Erskine House	Sycamore (2) Birch Beech Sweet Chestnut Walnut Chile Pine Cedar of Lebanon	Of this outstanding group, only one Cedar of Lebanon remains, on a site close to the house.
Finlaystone House	Elm Turkey Oak Yew (female) Cedar of Lebanon	Gone. Gone. Both the yew and the Cedar are still extant.
Househill	Hornbeam	No trace of the tree; the estate is now a large housing area.
Houston	Sycamore	No trace.
Langbank	Sycamore	No trace.
Loganraes (Barrhead)	Sycamore	This tree had been damaged by lightning many years ago and had been consequently greatly reduced in size. However the remains were finally blown down during the hurricane of 1968 which wreaked so much havoc in the County.
Pollok House	Horse Chestnut Elm Walnut Turkey Oak (2) Beech Ash	The Horse Chestnut, the famous Beggars' Tree, is in good health and situated near the entrance to the house. All the other listed trees are gone. Pollok House is now within the Glasgow boundary.

Location	Species	Remarks
Rosehill (Nitshill)	Hawthorn	No trace.
South Barr House	Rowan	No trace.

Table 2: Measurements of Notable Trees in Renfrewshire
Original Figures from B.A. Handbook of 1901

Location & Species	Date	Girth	at	Height	Spread
Craigends	1899	21'2¾"	2'0"	44'	85'6"
YEW (male)	1912	22.8	"		91'
Taxus baccata	1949	27.2	"		123'
	1952	27.3	"		126'
	1961	27.8	"		129'
	1970	27.9	"	48'	129'
	Remarks: One limb dead				
	1974	Tree heavily damaged by children and Contractors' traffic. The R.H.N.S. warned the County Planning Department early in 1972 and made recommendations regarding the area. Obviously, these advices have gone **unheeded.**			
Duchal	1891	14.6½"	4.3"		
SWEET CHESTNUT	1907	15.10	"		
Castanea sativa	1970	19.4	"		
	Remarks: Tree in poor condition, having lost most of its canopy.				
Wallace Memorial	1891	9'11"	1'0"		47'
YEW (male)	1912	11'0	"		50'
Taxus baccata	1969	13.10	"		56'9"
	Remarks: Healthy.				

Location & Species	Date	Girth	at	Height	Spread
Erskine	1893	9.1½"	1'6"		
CEDAR OF LEBANON	1908	10.2½	"		
Cedrus libani	1914	10.8½	"		
	1970	14.0	"		75'
	Remarks: Healthy.				
Finlaystone	1899	9.3¼"	1'6"	38'	
YEW (female)	1970	12.2	"	"	47'
Taxus baccata	(The "John Knox" tree)				
Finlaystone	1899	8.6¾"	G.L.	46'	47'6"
CEDAR OF LEBANON	1970	12.2	"	"	67.6
Cedrus libani					
Pollok House	1899	13.2½	2.0"	64'	92'
HORSE CHESTNUT	1970	16.6	"	60'	95'
Aesculus hippocastanum	(Known as the "Beggars' Tree")				

As a postscript to this report, we are of the opinion that it is now extremely important for a new survey to be carried out of today's notable county trees, in view of the very great risks trees now face compared with the altogether gentler age of 1901. Without detracting in any way from the undeniable praticality of the modern chain saw, it must be pointed out that it can fell an ancient tree rapidly and with little difficulty, whereas knowledgeable sawyers at the turn of the century, would have avoided these gnarled "old uns" like the very plague. Furthermore, many developers tend to fell first and apologise afterwards; only public vigilance can thwart this design. Thus the Society appeals to all to safeguard, wherever possible, the relatively few fine trees left in the County of Renfrew.

There are still quite a number of important trees within the county which the Society now feels should be properly recorded. These are to be found on estates such as Ardgowan, Caldwell, Craigends, Duchal, Erskine, Finlaystone, Polnoon and around towns and villages such as Bridge of Weir, Eaglesham, Inverkip, Johnstone etc.

It is hoped, therefore, that a serious effort will now be made to record the outstanding trees existing in our county at the present day, and for any who wish to help with the actual recording, the following details are required: 1. Type of tree. 2. Location. 3. Approximate age if known. 4. Girth at breast height or, if this is not possible, the girth at a stated height. We shall be very grateful for any details and shall be glad to come at short notice to inspect, identify and measure any noteworthy tree, in particular any tree which appears to be threatened. All information or requests for help should be sent to either of the County Recorders at the undernoted addresses; (telephone numbers: Johnstone 20367 and Uplawmoor 304).

As only seven of the trees recorded in 1901 are left to us perhaps that bare figure is the most telling advertisement for the need for an entirely new survey. The Renfrewshire Society has already commenced this task, and will be grateful for all the help it can get; the rest, as they say, is up to you.

Mr. Robert Wilson, 13 Shanks Crescent, JOHNSTONE, Renfrewshire.
Mr. Ian W. Grant, Caldwell Law, UPLAWMOOR, Renfrewshire.

SOME RENFREWSHIRE BOTANICAL RESIDENTS FROM ASIA

By ROBERT WILSON and IAN W. GRANT
County Botanical Recorders
Renfrewshire Natural History Society

Quite recently it became apparent to the authors, as Botanical Recorders for the County of Renfrew, that the now ubiquitous Japanese Knotweed or Japanese Polygonum *Polygonum cuspidatum* had not been officially recorded in Renfrewshire as a naturalised garden escape. This is the very prolific cane-like plant, with heart shaped leaves, which grows in thickets of up to six feet high, seemingly in every piece of waste ground and particularly wherever road-making materials have been dumped or stored; (perhaps tar waste provides the ideal seeding ground).

These observations led us to study the species still further, and we then discovered, in the grounds of Erskine House, a magnificent thicket of a similar plant but with long lanceolate leaves and a most attractive white inflorescence, a much more handsome plant altogether than *cuspidatum*. On examination this proved to be *Polygonum polystachium*, a native of the high mountains of Assam and Sikkim, where it grows at elevations of 7,000 to 12,000 feet. Quite unbelievably it seems to relish our Western exposure; perhaps our climate reminds it of the monsoons!

The next "find" was a plant with very large leaves, of up to eighteen inches in length, and in some cases with canes of up to ten feet in height. Specimens of this plant, the Great Knotweed *Polygonum sachalinense*, were found as far apart as Ullapool, Loch Lomondside (where it is plentiful), Edinburgh Zoo, Irvine, Johnstone and Uplawmoor, but there is no doubt that many more locations exist; we have a reference to it as a garden escape, being found at Giffnock, in the Society records of 1919.

Quite obviously all these plants enjoy our Western exposure and prefer moist ground, although *cuspidatum* seems to be able, in colonising waste ground, to alter its stature to suit the environment, which undoubtedly accounts for its spread throughout the land. As proof of their liking for the west coast a visit to Inverlael Lodge at the head of Loch Broom, near Ullapool, will supply the glorious spectacle of all three of these giant polygonums growing together in great profusion, and as the thickets adorn the roadside there is little difficulty in finding them.

Polygonum cuspidatum Sieb. & Zucc. JAPANESE KNOTWEED

Leaves broadly ovate, cuspidate, truncate at base. Inflorescence lax, creamy white. Native of Japan, introduced c.1914. Grows up to seven feet high.

Polygonum sachalinense Schmidt. GREAT KNOTWEED

Leaves ovate and acute, weakly cordate at base. Native of Sakhalin. Grows to ten feet. Very large leaves to eighteen inches in length.

Polygonum polystachium Wallich. No common English name

Leaves lanceolate and acuminate, cordate to cuneate at base. Ochreae of upper leaves very long. Inflorescence divaricately branched, white and conspicuous, slight tinge of yellow. Native of Assam and Sikkim, mountainous region 7,000 to 12,000 feet. Grows to seven feet. Long leaves to twelve inches.

Footnote:

The Polygonum genus of the order Polygonaceae is well represented in Renfrewshire with nine species, in addition to the above, as follows:

P. bistorta	Bistort	Frequent
P. aviculare	Knotgrass	Very common
P. raii	Ray's Knotgrass	Common
P. convolvulus	Black Bindweed	Common
P. amphibium	Amphibious Bistort	Common
P. persicaria	Spotted Persicaria	Very common
P. lapathifolium	Pale-flowered Persicaria	Common
P. hydropiper	White Pepper	Common
P. minus	No common English name	Very rare

Polygonum viviparum, the Alpine Bistort, is to be found outwith Renfrewshire on the higher hills of the greater Clyde area.

Mr. Robert Wilson, 13 Shanks Crescent, JOHNSTONE, Renfrewshire.
Mr. Ian W. Grant, Caldwell Law, UPLAWMOOR, Renfrewshire.

OBITUARY

FREDERICK J. RAMSAY

Fred Ramsay was born at the Old Manse in Kilbarchan, Renfrewshire, his family home, on 29th January 1903. As a boy he attended Allan Glen's School in Glasgow and then proceeded to Glasgow University where he read Chemistry. Even in his late teens, however, there were some signs of his ultimately crippling illness, and he was not actually able to complete his degree course. Looking back, it is obvious that even then he was suffering from the disease of ankylosing spondylitis, which proceeded rapidly, so that by the age of twenty-four he was totally confined to bed.

Over the next few years the joints of his spine became permanently fixed, and it says much for the doctor who attended him at that time that he arranged for his head to be tilted downwards slightly so that he could see the ground beneath his feet and look through a microscope. From then on, until he died at the age of seventy-one, his back and legs were literally fixed like a board. Very fortunately he retained fairly full use of his arms and had slight movement in his ankle joints, so with the aid of sticks and by making wriggling movements with his feet he was able to support himself and move very slowly and laboriously around the house and garden. He had an immensely keen mind, a very rare philosophy of life, and a sense of humour. He often made the joke that if tilted back and placed against the wall he could remain there indefinitely without effort, just like a plank, and this dreadful statement was literally true. On occasions he did get stuck in this position and had to wait until the next day when someone came along to prop him up again.

For much of his life he was cared for by his devoted sister, until she herself suffered a serious illness, and for the last ten years of his life he lived alone, with a housekeeper coming in during the day. He devoted his intensely active mind to inventing the most ingenious devices to enable him to get about his house and to use his microscope and his collecting apparatus. Fortunately he was financially independent, and so was able to indulge his love of natural history, particularly insects, the study of which undoubtedly kept him sane through a near half-century of devastating illness. Apart from his arms, which were freely mobile, and his ankle joints, which were capable of about a five degree movement, his body was totally rigid from head to toe, and it is almost impossible to conceive of anyone being more physically handicapped. Despite this he made the most intensive study of the natural history of his own one-acre garden, which was allowed to go semi-wild to attract as much wildlife

as possible. Possibly it was also fortunate that his family doctor for the last twenty years of his life was also a very keen naturalist, which provided a constant stimulus for exchange of ideas.

Mr. Ramsay amassed a very fine library of natural history books from which he became entirely self-taught, since it was quite impossible for him ever to attend a lecture or visit a museum. He had the ancient definition of genius i.e, an infinite capacity for taking pains, and the mounting and labelling of his small entomological specimens had to be seen to be believed; considering his handicap, the accuracy of the fine work he did bordered on the impossible. His insect collection, one of the finest quality, has been most gratefully received by the Natural History Department of the Royal Scottish Museum, and is a monument to what can be achieved by the perseverance of an almost impossibly handicapped person.

Although his main natural history interests were entomological, Mr. Ramsay also had a great interest in birds, which he caught in traps he built himself, and colour ringed. One particularly fine piece of work he did was a three-year study of a pair of Robins nesting in his garden, the lives of which he followed, along with most of the off-spring of several broods, all of which he coloured ringed. He had a lengthly correspondence with the late Dr. David Lack, who was considerably impressed by Mr. Ramsay's research and incorporated much of Ramsay's work into his book *The Life of the Robin*, a copy of which he inscribed in terms of gratitude for Mr. Ramsay. During all this correspondence Lack never knew of Ramsay's disability, and when Mr. Ramsay's family doctor, who knew David Lack well, ultimately told him, Lack found this virtually impossible to believe, since the quality of the work had been so high.

Few people ever met Fred Ramsay. It was not that he was a recluse, but he was well aware that casual visitors, particularly other naturalists with whom he had corresponded and who wished to visit him, found themselves very embarrassed and perplexed in his presence. This was very true, since his disability was far outwith the imagination of the ordinary man, and indeed it could be simply appalling to behold. Thus he worked on silently and alone, but he was a very great naturalist, who overcame overwhelming handicaps, and well deserves to be remembered through this obituary. He died on 6th April 1974. His books and papers have been passed on to the Renfrewshire Natural History Society, of which he was a member for fifty years yet was never able to attend a meeting, and his entomological collection has been presented to the Royal Scottish Museum, where it finds an honourable resting place. J.A.G.

THE RENFREWSHIRE NATURAL HISTORY SOCIETY

Founded 1847

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Lord Lieutenant of the County of Renfrewshire

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The Renfrewshire Natural History Society is the oldest Natural History and Antiquarian society in the West of Scotland. It was founded by the late Morris Young F.E.S. on 18th December 1847, and is now one of the oldest County Learned Societies in Great Britain.

The Society deals with all aspects of the history, natural history, archaeology and antiquities of the county of Renfrewshire, and its general interests extend over the whole of the West of Scotland. Either directly or through members it is affiliated to most major natural history and archaeological organisations in the British Isles.

The Society meets regularly for lectures and discussions during the winter months, and during summer field meetings are arranged to places of natural history or archaeological interest. The Society publishes the *Western Naturalist*, periodical *Proceedings*, and a regular newsletter. All publications, including the *Western Naturalist*, are sent to members free of charge.

The annual subscription for full membership is one pound. Over 65, juniors, students, and family members: 25p.

Applications for membership should be made to the Secretary.

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Published by The Renfrewshire Natural History Society
Department of Biology, Paisley College of Technology, Paisley