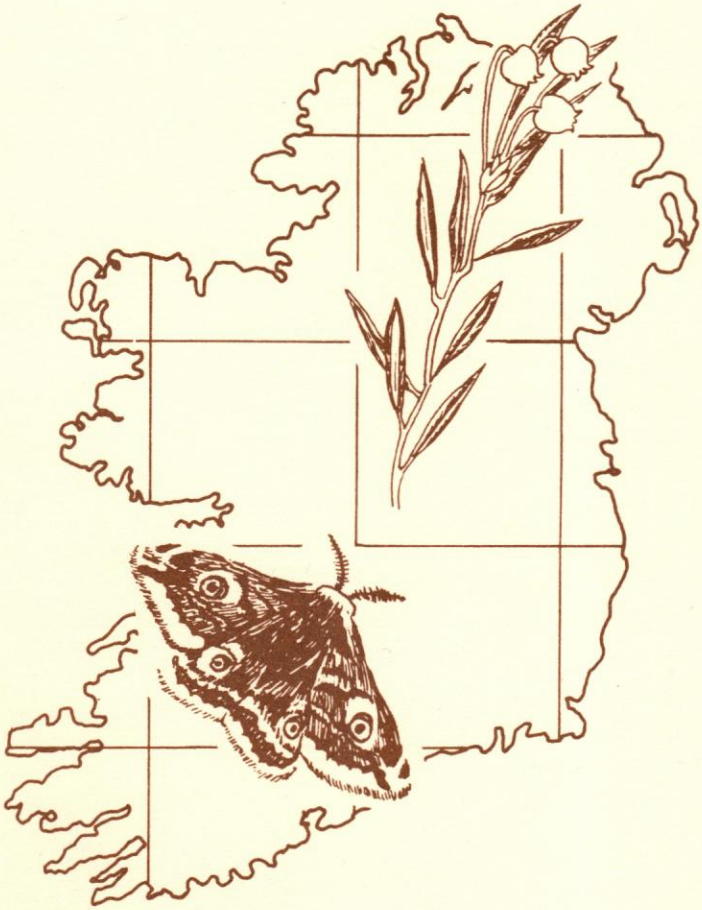
IRISH BIOGEOGRAPHICAL SOCIETY



Bulletin No. 17(1): 1-122

THE 1993-1994 COMMITTEE OF THE IRISH BIOGEOGRAPHICAL SOCIETY

Chairman: S. Wistow, L.R.A.M.
Deputy Chairman: P. Ashe, B.Sc., Ph.D.
Secretary: J. M. Lynch, B.Sc., Ph.D.
Treasurer: M. J. Keatinge, B.A.(Mod.), Dip.Stats.
Field Meetings Secretary: C. F. Byrne, B.Sc., Ph.D.
Editor: J. P. O'Connor, B.Sc., Ph.D.
Executive Members: T. M. Bolger, B. Sc., Ph.D., M. J. Costello, B.Sc., Ph.D., R. Dolan, B.C.L., H. F. Fox, B.A. (Mod.), J. M. C. Holmes, B.A. (Mod.), M.Sc., S. L. Parr, B.Sc., Ph.D., C. Ronayne, B.Sc.

LIST OF SPONSORS
Allied Irish Banks PLC
Electricity Supply Board
The National Museum of Ireland
The Office of Public Works
Premier Finance Company Limited
Premier Periclase
Salmara

Bulletin of The Irish Biogeographical Society
Number 17

ISSN 0032-1185
Abbreviation: *Bull. Ir. biogeog. Soc.*

Editor: J. P. O'Connor

DATE OF PUBLICATION: 10 December 1994

The Irish Biogegraphical Society desires it to be understood that it is not answerable for any opinion, representation of facts, or train of reasoning that may appear in the following papers. The authors of the various articles are alone responsible for their contents and for the correctness of references.

BULLETIN OF THE IRISH BIOGEOGRAPHICAL SOCIETY
Number 17

CONTENTS

THIS BULLETIN IS DEDICATED TO PROFESSOR ROBERT BLACKITH AND DR RUTH BLACKITH WHO WERE ELECTED HONORARY MEMBERS OF THE SOCIETY AT THE ANNUAL GENERAL MEETING OF 1993.

Bull. Ir. biogeog. Soc. No. 17 (1994)

EDITORIAL

Publication of this year's *Bulletin*, originally planned for early summer, has been delayed in order that a two part volume could be issued. It contains a variety of interesting papers including a major study of the Mollusca of Strangford Lough. This article has been split between the two halves of the *Bulletin* so that the maps and text may be consulted simultaneously.

The *Bulletin* continues to be very successful and is now very widely abstracted. In addition, exchange agreements have been established with scientific bodies and institutions in many countries including several outside Europe.

On behalf of the Irish Biogeographical Society, I wish to thank our sponsors, the authors, the referees and all those who helped with this *Bulletin*. We are especially grateful to Mr J. M. C. Holmes who provided invaluable assistance with its production.

J. P. O'Connor
Editor
21 September 1994

Bull. Ir. biogeog. Soc. No. 17 (1994)

RECORDS OF THE GIANT HOGWEED, *HERACLEUM MANTEGAZZIANUM* SOMMIER AND LEVIER, ALONG SOUTHERN IRISH RIVERS AND STREAMS WITH A REVISED DISTRIBUTION MAP FOR THE REGION

J. Lucey

Heracleum mantegazzianum Sommier and Levier, the giant hogweed, was introduced to the British Isles in the nineteenth century as a garden ornamental from the Russian Caucasus. Easily recognised by its enormous size (Clapham *et al.*, 1962) it has become naturalized in waste places, especially near rivers, and has reached pest status in some areas. Because it may cause severe dermatitis in humans (Jones and Russell, 1968) it has been targeted as an undesirable plant with potential public health implications. Furthermore, where it grows in dense stands other plants growing in its shade are killed off so that when it dies back there is nothing but bare earth which may lead to soil erosion, particularly of riverbanks, in winter. The plant is not, however, regarded as an agricultural pest and hence has not been added to the list of those legislated for under the Noxious Weeds Act of 1936.

The known distribution of the giant hogweed in Ireland was published by Wyse Jackson (1989) but since that time there have been various radio and newspaper reports, particularly during the 'silly season' when growth of this plant is at its maximum, warning of its dangerous spread (e.g. Cusack, 1993).

Over the past ten years, in the course of biological sampling for water quality monitoring, records of the occurrence of *H. mantegazzianum* along rivers surveyed in the southern part of the country were kept. In this region, which includes the south-east, south-west and south as well as a part of the mid-west and midlands, some 1800 sites on almost 400 rivers and streams were

visited.

The records are listed below with the following information: county and river name, vice-comital division number, date and grid reference (the Sub-Zone letter, a three-figure Easting coordinate and a three-figure Northing coordinate); the recorder's name is given where other than the author.

Cork (H5): R. Bride, W845916, W856912, W878919, 17.vii.1986; Shanowenadrimina Stream, W842922, 8.viii.1990.
Limerick (H8): Annagh R., R686578, 28.vii.1987, K. J. Clabby; Ballynaclough R., R554556, 4.viii.1985; R. Cahernahillia, R828482, 25.ix.1984, P. Mullins; Carrowkeel Stream, R651580, 29.vi.1987; R.Galey, R108364, 7.ix.1993; Killeengarriff R., R679548, 8.vii.1987, K. J. Clabby; R.Loobagh, R633263, 11.viii.1986 and 30.viii.1988; Mulkear R., R653554, R643576, 8.vii.1987, K. J. Clabby; Newport R., R686603, 29.vi.1987; R. Shannon, R582573, 30.viii.1985.
Tipperary (H10): Newport R., R703618, 25.ix.1984, R705618, R699617, 29.vi.1987.
Limerick/Tipperary (H8/10): Killeen Stream, R686606, 29.vi.1987.
Kildare (H19): Tully Stream, N733100, N733104, N717079, N712059, 9.vii.1986, N682044, 2.ix.1993.

These records, together with those of Wyse Jackson (1989), have been plotted on the 10km squares of the Ordnance Survey National Grid based on presence or absence as shown in Fig. 1. Although 24 records were collected, the present study increases the number of 10km square recordings for *H. mantegazzianum* in the region only from 15 (Wyse Jackson, *op. cit.*) to 20. Within the region there was only one area where the growth of the giant hogweed could be considered to be out of control and at pest proportions *viz.* its spread along the Newport River. Its occurrence along this river has been known for more than half a century (Praeger, 1939)

but it does appear to have become more consolidated there and to have spread further downstream in the past two decades. West of Newport it has colonised the roadside - where in the summer of 1993 its presence at one particular site could be described as a hazard to pedestrians as well as motorists - and restricts public access to the river in places. Similarly, but to a much lesser extent, downstream colonisation has been recorded along the Tully Stream between 1986 and 1993. Four of the five 10km squares recordings added by the present study are only new in the sense that they have not been recorded by others in the past. The River Galey locus is the only one that can be truly described as a new invasion, along any of the southern Irish river sites surveyed, in the last decade having been first recorded there in 1993 but not on prior visits in 1982, 1986 and 1989.

The most effective chemical method for control of giant hogweed is by application of the herbicide glyphosate (Roundup). This is best done in April or May, when the plants are still small, as it is not practicable and indeed may be hazardous to apply the herbicide to mature colonies in summer (Williamson and Forbes, 1982). As the plants are very often growing alongside watercourses care should be exercised when applying the herbicide, which is harmful to fish, and the relevant Regional Fisheries Board should be consulted before spraying. A biological method of control has been advocated also by Williamson and Forbes (*op. cit.*) who report that grazing with cattle or pigs, which relish the plant and suffer no ill effects, can be effective in some situations. In this context it is curious to note that its recommended Irish name, ***Feabhrán capaill*** (Scannell and Synnott, 1987), should, by its derivation, seem to indicate an association with horses.

References

Clapham, A. R., Tutin, T. G. and Warburg, E. F. (1962) *Flora of the British Isles*. 2nd edition. Cambridge University Press, Cambridge.

Cusack, J. (1993) Warning on Hogweed danger. *The Irish Times*, 22 June: 1.

Jones, J. G. and Russell, D. G. (1968) Giant hogweed dermatitis. *Practitioner* 200: 704.

Praeger, R. L. (1939) A further contribution to the flora of Ireland. *Proc. R. Ir. Acad.* 45B: 231-254.

Scannell, M. J. P. and Synnott, D. M. (1987) *Census Catalogue of the Flora of Ireland*. 2nd edition. Stationery Office, Dublin.

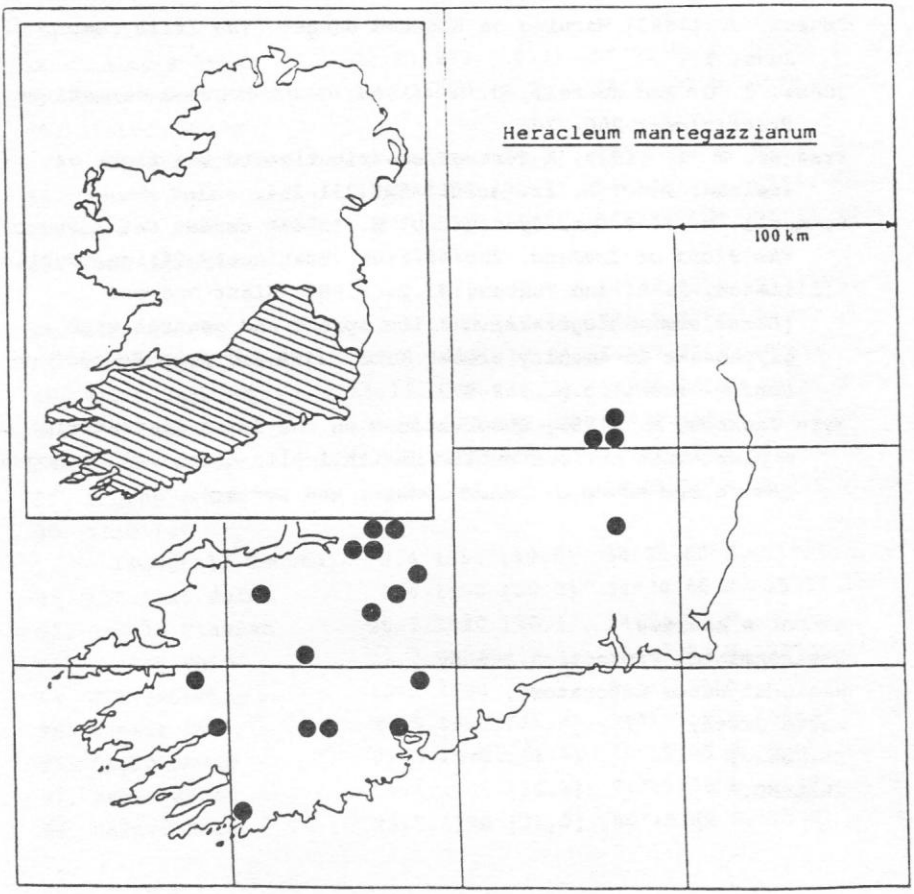
Williamson, J. A. and Forbes, J. C. (1982) Giant hogweed (*Heracleum mantegazzianum*): its spread and control with glyphosate in amenity areas. *Proc. 1982 Br. Crop Protection Conf. - Weeds*: p.p. 967-972.

Wyse Jackson, M. (1989) Observations on the Irish distribution of a plant with serious public health implications: giant hogweed (*Heracleum mantegazzianum* Sommier and Levier).

Author's address
Environmental Protection Agency,
Regional Water Laboratory,
Butts Green,
Kilkenny,
IRELAND.

Bull. Ir. biogeog. Soc. No. 17

FIGURE 1: the distribution of *Heracleum mantegazzianum* in southern counties of Ireland based on presence in 10km squares. The data are the records from the present study combined with those of Wyse Jackson (1989). The study area is shown as hatched in the inset.



Bull. Ir. biogeog. Soc. No. 17 (1994)

NEW RECORDS OF *BERAEODES MINUTUS* (L.) AND *ALLOTRICHIA PALLICORNIS* (EATON) (TRICHOPTERA) IN IRELAND

Michael J. Duke

O'Connor (1987) recorded *Beraeodes minutus* (L.) from counties Cavan, Kerry and Tipperary. He also reported *Allotrichia pallicornis* (Eaton) from counties Dublin and Wicklow. In the course of an extensive survey of aquatic macroinvertebrates in 1992, new distribution records for these species were discovered by the author.

In October 1992, ten specimens of *B. minutus* were taken on the River Tolka in Co. Meath. These were found in a silted stretch surrounded by meadow. In the same month, one specimen was also collected on the Upper Inny near Oldcastle, Co. Meath. This site was also at a silted stretch with similar land usage. In May 1992, four specimens of *A. pallicornis* were taken on the Upper Inny, Co. Meath. They occurred in a fast-flowing section, in an area associated with intensive pig farming. The new records are summarised below (Table 1). Both species were identified using Wallace *et al.* (1990). Voucher specimens have been deposited in the National Museum of Ireland.

TABLE 1. New records for *Beraeodes minutus* (L.) and *Allotrichia pallicornis* (Eaton) in 1992.

Species	Date	River	Grid ref.	Bedrock type
B. minutus	10.92	Tolka	O017433	Upper/Middle Limestone
B. minutus	10.92	Upper Inny	N552789	Lower Limestone
A. pallicornis	5.92	Upper Inny	N529808	Lower Limestone

Acknowledgement

I would like to thank Dr J. P. O'Connor of the National Museum of Ireland for confirming the identity of both species.

References

O'Connor, J. P. (1987) A review of the Irish Trichoptera. p.p. 73-77. *In* Bournaud, M. and Tachet, H. (eds) *Proc. 5th Int. Symp. Trichoptera*. Junk, Dordrecht.

Wallace, I. D., Wallace, B. and Philipson, G. N. (1990) A key to the case-bearing caddis larvae of Britain and Ireland. *Scient. Publs Freshwat. Biol. Ass.* 51.

Author's address

Department of Zoology,
University College,
Belfield,
Dublin 4,
IRELAND.

Bull. Ir. biogeog. Soc. No. 17 (1994)

THE DISTRIBUTION OF FRESHWATER BRYOZOA IN IRELAND

Thomas Smyth

Introduction

The phylum Bryozoa (Greek, *bryo* meaning "moss", and *zoa* meaning "animals") can be divided into three classes *viz.* the Gymnolaemata and the Stenolaemata which comprise all the marine and a few freshwater species, and the Phylactolaemata which are only found in freshwater habitats (Mundy, 1980). All are sessile with one true exception, *Cristatella mucedo* Cuvier. The colony form varies among the species but their general plant-like appearance earned these animals the common name "moss animals", from which the phylum name Bryozoa was coined by Ehrenberg in 1831, but only one year after J. Vaughan Thompson, the British naturalist, had named them the Polyzoa (Clarkson, 1986).

The living marine species number some 4000 species, including 192 Irish species (Wyse Jackson, 1991). The freshwater Bryozoa are much fewer in numbers with only 35 recognised species worldwide (Bushnell, 1966; Mundy, 1980), and the fossil record is based solely on their asexually produced statoblasts which up until 1983 had dated the class back to the Pleistocene and Upper Tertiary with Cretaceous reports in need of further investigation (Boardman *et al.*, 1983). Fossil statoblasts have since been found in deposits of Upper Permian, Jurassic, Cretaceous, and Miocene age (Vinogradov, 1992).

The Phylactolaemata are small colonial invertebrates made up of individuals or "zooids" arranged in a colony which despite their class characteristics conform recognisably to the general bryozoan type with lophophore, deeply looped alimentary canal, conspicuous retractor muscles and dorsal ganglion (Ryland, 1970). Of the

recognised phylactolaemate species perhaps seven occur in Ireland with a single gymnolaemate species (Mundy, 1980). A summary of the characteristics of European freshwater bryozoans is given in Table 1, modified from Mundy (1980)

Recorded distribution of Irish Bryozoans

The majority of the records for bryozoans found in Irish freshwaters are the result of work done between 1842 and 1856 by G. J. Allman (Allman, 1856), and between 1911 and 1919 by Jane Stephens (Stephens, 1919), particularly in the West, in association with A. R. Nichols (Nichols, 1912), with some work done by M. Buchanan in the late 1920's. Many of Stephens' finds were examined by Fritz Braem, of Berlin, in 1912. Braem published his overview of the fresh-water Bryozoa in 1890, looking at phylactolaemate and gymnolaemate development and life histories. Some further recorded specimens were collected by A. W. Stelfox on Inisbofin, Co. Donegal in 1911.

George James Allman (1812-1898) was born in Cork, educated in Belfast, and studied for his B.A. and H.D. degrees in Dublin (1844). Before taking up natural science he spent some time as a barrister and then in medicine. He devoted his time to researching marine invertebrates, notably coelenterates and bryozoans; his papers on these (e.g. the "Challenger" series), and especially his monographs on the gymnoblastic hydroids and on the fresh-water Polyzoa, are of first importance. In 1844, he was appointed Professor of Botany at Trinity College, Dublin, in succession to his father William Allman and then in 1856 he became Regius Professor of Natural History at Edinburgh, Scotland, from which he retired in 1870 to live at Weybridge, England. He was elected a Fellow of the Royal Society in 1854, and was President of the Linnean Society (1874-1881) and of the British Association (1879); he received the Cunningham Medal of the Royal Irish Academy in

1878. He died at Weybridge in 1898.

Jane Stephens was born in Dublin, 1879, took her B.Sc. degree in the Royal University of Ireland, gained a Technical Assistantship in the National Museum in Dublin in 1905, later to become Assistant Naturalist. Stephens specialised in sponges. She left the museum in 1920 on marrying Dr R. F. Scharff, himself retiring as acting Director of the National Museum in 1921.

The lists below are derived from specimen labels and register recordings of those specimens which are kept in the Natural History Division of the National Museum of Ireland. The few recent records (Scannell, 1974; O'Keeffe, 1986; Smyth, 1993; Martin and Ní Neachtain, 1994) have also been included. They contain all available records for the seven phylactolaemate and one gymnolaemate Bryozoa, found in Irish freshwaters. Samples are arranged by date and where possible, referred to vice county, and the collector's name and date of collection are given. The references in bold are published works in which the records occurred but the collection dates were unknown.

Family Fredericellidae

Fredericella sultana (Blumenbach, 1779)

Grand Canal (Dublin, H21), **Allman, 1856**; Bandon (Mid Cork, H4), **Allman 1856**; Cleggan (West Galway, H16), G. P. Farran 1901; stream from L. Unchin (East Donegal, H34), collector not recorded, 1911; L. Nalacken, and outlet (North Kerry, H2), Stephens 1913; Connor Pass (North Kerry, H2), Stephens 1913; Coumanare Lakes (North Kerry, H2), Stephens 1913; L. Adoon (North Kerry, H2), Stephens 1913; R. Dodder at Clonskeagh (Dublin, H21), Stephens 1914; Glenealo R. (Wicklow, H20), Stephens 1914; L. Ouler (Wicklow, H20), Stephens 1914; L. Dan (Wicklow, H20), Stephens 1914; L. Tay (Wicklow, H20), Stephens 1914; Annamoe River (Wicklow, H20), Stephens 1914; L. Dan (Wicklow, H20), Stephens 1915; L.

Coumshingaun (Waterford, H6), Stephens 1915; stream at Edmondstown (Dublin, H21), Stephens 1918; outlet from L. Inagh (West Galway, H16), Stephens 1918; R. Dodder at Dolphin's Barn (Dublin, H21), Stephens 1918; R. Barrow at Graiguenamanagh (Kilkenny, H11), Stephens 1919; L. Sessiagh (West Donegal, H35) D. C. Campbell, 1919.

Family Plumatellidae

***Plumatella emarginata* Allman, 1844**

Millrace of R. Dodder (Dublin, H21), Stephens 1914; lake near Castlewellan at Annisborough (Down, H38), Stephens 1914.

***Plumatella fruticosa* Allman 1844**

Grand Canal (Dublin, H21), Allman, 1856; R. Bandon (Mid Cork, H4), Allman, 1856; L. Brawn (West Mayo, H27), Stephens 1911; L. Feeagh (West Mayo, H27), Stephens 1911; stream from L. Feeagh into Furnace L. (West Mayo, H27), Stephens 1911; Lugaloughaun (West Mayo, H27), Stephens 1911; Clogher L. (West Mayo, H27), Stephens 1911; Doon Lake (West Donegal, H35), Stephens 1911; stream from lake west of Glendalough (Wicklow, H20), Stephens 1918; Owengowla R. (West Galway, H16), Stephens 1918; outlet from L. Inagh (West Galway, H16), Stephens 1918.

***Plumatella fungosa* (Pallas, 1768)**

Broadway Dam, Belfast (Antrim, H39), collector not recorded; L. Neagh (Derry, H40), D. Jewson (pers. comm., 7.i.1994).

***Plumatella repens* (Linnaeus, 1758)**

L. Erne (Fermanagh, H33), Thompson, 1837; Monkstown garden pond (Dublin, H21), G. Price 1895; L. Chillan, Cleggan (West Galway, H16), Farran 1901; Parknasilla (South Kerry, H1), R. F. Scharff 1905; L. Corrib (North-East Galway, H17), R. F. Scharff 1905; Pound Lake (Donegal, H?), Stephens 1911; Church Lake (Inisbofin, H16), Stelfox 1911; Kiltooris L. (West Donegal, H35), Stephens 1911; stream from L. Cummer (South Kerry, H1), Stephens 1911; Clare Island (West Mayo, H27), Stephens 1911; Carn Lake (West Donegal, H35), Stephens 1912; Renvyle L. (West Galway, H16), Smyth 1992.

Family Lophopodidae

Lophopus crystallinus **(Pallas, 1768)**

Pond in the Zoological Gardens (Dublin, H21), **Allman, 1856.**

Family Cristatellidae

Cristatella mucedo **Cuvier, 1798**

Glandore (West Cork, H3), **Allman, 1856;** Killarney (North Kerry, H2), **Allman, 1856;** Armagh (Armagh, H37), **Allman, 1856;** Lough Namucka (West Mayo, H27), Halbert 1910; river from L. Inagh (West Galway, H16), Stephens 1918; Derryclare Lake (West Galway, H16), Stephens 1918; Ballynahinch River (West Galway, H16), Stephens 1918; L. Derg (no county recorded), no collector recorded, 1918; quarryhole, Crumlin (Dublin, H21), Stephens 1919; White Lake (Westmeath, H23), O'Keeffe 1986; Renvyle L. (West Galway, H16), Scannell 1973; Smyth 1992; L. Owel (Westmeath, H23), Smyth 1994; canal outlet from L. Owel (Westmeath, H23), Martin and Ní Neachtain 1994.

Family Paludicellidae

Paludicella articulata **(Ehrenberg, 1831)**

L. Erne (Fermanagh, H33), **Thompson, 1837;** L. Erne (Fermanagh, H33), **Allman, 1856;** Grand Canal (Dublin, H21), **Allman, 1856;** L. Kiltooris (West Donegal, H35), Stephens 1911; L. Doon (West Donegal, H35), Stephens 1911; L. Roshin (East Donegal, H34), Stephens 1911; stream from L. Cunnel (West Mayo, H27), Stephens 1911; Lugaloughaun (West Mayo, H27), Stephens 1911; L.Moher (West Mayo, H27), Stephens 1911; L. Beltra (West Mayo, H27), Stephens 1911; L. Nahaltora (West Mayo, H27), Stephens 1911; L. Nacorra (West Mayo, H27), Stephens 1911; Pollagowly L. (West Mayo, H27), Stephens 1911; Islandeady (West Mayo, H27), Stephens 1911; L. Ree (Roscommon/Longford), Stephens 1913; L. Clogharee (North Kerry, H2), Stephens 1913; Coumanare Lake and outlet (North Kerry, H2), Stephens 1913; L. Adoon (North Kerry, H2), Stephens 1913; outlet from L. Coumshingaun (Waterford, H6), Stephens 1915; stream from L. Coomadavallig (West Cork, H3), Stephens 1917; L. Cumeenadilure (South Kerry, H1), Stephens 1917; L. Bofin (West Galway, H16),

Stephens 1918; Seecon L. (West Mayo, H16) Stephens 1918; stream from lake west of Glendalough (Wicklow, H20), Stephens 1918; L. Inagh (West Galway, H16), Stephens 1918; Owengowla R. (West Galway, H16), Stephens 1918; outlet from L. Inagh (West Galway, H16), Stephens 1918; R. Dodder, below Dolphin's Barn (Dublin, H21), Stephens 1918; quarryhole at Crumlin (Dublin, H21), Stephens 1919; cold water supply, Rathgar (Dublin, H21), Buchanan 1929.

In addition to the above, bryozoans were collected from the following locations but remain unidentified. The list has been compiled from the records in the National Museum of Ireland and personal communications. The source is given where the collector has not been named, e.g. NMI (National Museum of Ireland). Museum register dates are used as an approximate collection date: Cumeenadilure L. (South Kerry, H1), Stephens 1917; Lagan Canal (no county recorded), W. H. Patterson *circa* 1913; Golagh L. (East Donegal, H34), Trevelyan 1911; outlet from Park L. (West Cork, H3), NMI 1917; L. Coomasaharn (South Kerry, H1), NMI 1913; L. Fad (East Donegal, H34), NMI 1917; R. Shannon below L. Allen (Roscommon, H25), NMI 1916; L. Mambrack (no county recorded), Stephens 1909; L. Altnadua near Castlewellan (Down, H38), Stephens 1916; L. Doo (West Mayo, H27), Stephens 1913; L. Corrib (North East Galway, H17), T. Whilde, (pers. comm., 3.xii.1993); and L. Neagh (Derry, H40), D. Jewson, (pers. comm., 7.i.1994).

Discussion

Freshwater bryozoans are found throughout the world except in polar regions and at a wide range of altitudes from sea level to high mountain lakes, and at depths of less than one metre to deep lake bottoms. The tendency to spread globally as well as locally is attributed to their statoblasts which in a dry state are blown or carried over large distances, with the ability to survive drying allowing for considerable spread.

Bryozoans are widespread in warmer months in lakes, ponds, slow rivers and streams, mostly in clear, well oxygenated, quiet water with an abundance of submersed vegetation (Hyman, 1959), but are seldom found without careful search (Ryland, 1970). They mostly occur in shallow water from less than one metre to several metres depth adhering to submersed logs, twigs, rocks, and vegetation, such as the underside of lily fronds (*Nuphar, Nymphaea*) or pondweeds (*Potamogeton*). The gelatinous types are somewhat limited to the stiller waters while plumatellids may occur in swift streams or along wave swept lake shores (Hyman, 1959). To escape periphytic algae and keep colonies seston- and excrement-free they generally prefer the underside or sides of objects which have settled in dark or shaded places. Bryozoans have even been found blocking water supply systems, prior to the modern filtering mechanisms, and cooling circuits of power plants.

Of the species listed in Ireland, *Plumatella repens* is perhaps the most universal with worldwide distribution, while *Cristatella mucedo* is confined to circum-boreal and Northern Hemisphere regions. Freshwater bryozoans are clearly very under-recorded in Ireland, the accompanying maps (Figs 1 and 2) indicating that they have chiefly been searched for in western Ireland and in Wicklow. There have been very few records since the 1920s. Stephens' notes, in the National Museum of Ireland, suggest a definite preference of bryozoans for the underside of stones, and association with freshwater sponges *Ephydatia fluviatilis* and *Spongilla lacustris*.

Although setting out to find sponges, due to a similar habitat preference, Stephens (Stephens, 1912) also collected Bryozoa specimens from many of the locations she sampled. In collecting, Stephens concentrated along the shores of the lakes. Sponges were usually found growing on or under stones. They were also found on the stems of aquatic plants. Dredging was unsuccessfully attempted on several occasions. Sampling of 43 lakes and 25 rivers in the

Mayo area and islands off the coast of Mayo was carried out several times in the period 1909-1911. She found that sponges were much rarer in the streams and rivers than in the lakes, though they were often found in streams draining lakes and usually most abundant a short distance from the lake, but never in the inlet feeder streams. Stephens also noted the absence of sponges from limestone lakes. In lakes on non-calcareous rocks the stones are clean and lie loosely on each other, thus affording shelter and a free access of water to the sponges while in limestone lakes the stones are often partly embedded in soft sand or mud and sometimes covered in a thick calcareous deposit leaving an unfavourable substrate. These conditions represent those in which Stephens (1919) found fresh-water Bryozoa, that is, clear, shallow water, often in the outlet stream of the lake and growing on the underside of stones or stems of aquatic vegetation.

In Renvyle Lough in 1992, I found evidence of freshwater sponges in the same area as the statoblasts of two species of bryozoan suggesting a possible common occurrence. From the data it would appear that *Cristatella mucedo* seems to prefer lowland, alkaline water bodies, and so are not recorded in Wicklow, in contrast to *Plumatella* spp. In a study of Michigan's ectoprocts, Bushnell (1966) looked at a number of species including *Plumatella repens* and *Cristatella mucedo* in Wintergreen Lake. Bushnell considered this to be one of the richest lakes in the country with respect to nutrients accruing from natural fertilization, the lake and surrounding area being a bird sanctuary. In 1974, Bushnell stated that *Plumatella repens* was very commonly found in extreme eutrophic situations and less common or absent in oligotrophic situations. He cited a study by Dendy in 1963 where farm ponds were purposely fertilized monthly and rich growths of *Plumatella repens* resulted. *Cristatella mucedo* was found in both oligotrophic and eutrophic situations and was markedly eurythermal.

Lophopus crystallinus was only noted from the pond in the Zoological Gardens, Dublin in 1856 and never since; if this is a correct identification, it may well have been imported with some exotic waterfowl.

TABLE 1. Irish, British and European freshwater Bryozoans. Nomenclature follows Mundy (1980). * denotes species recorded in Ireland.

Species	Characteristics
Class Phylactolaemata	
Family Fredericellidae	
Fredericella australiensis	Circular sessoblast, distinct annulus, circular lophophore.
*Fredericella sultana**	Oval/reniform sessoblasts, no annulus, circular lophophore.
Family Plumatellidae	
Hyalinella punctata	Floatoblasts and sessoblasts circular; thick, soft, translucent zooecium.
Plumatella casmiana	Two floatoblasts - normal elongate form, and broadly oval form.
P. coralloides	Zooids mutually adherent but never throughout.
*P. emarginata**	Dorsal annular area greater than ventral, floatoblast flat on dorsal side, encrusting colony.
*P. fruticosa**	Floatoblasts 2.5 times as long as broad, polar annular area much wider, openly branching colonies, free zooids triangular in cross section.
*P. fungosa**	Floatoblast capsule has reticulated pattern of ridges, zooids mutually adherent throughout and form dense spongy colonies.
*P. repens**	Floatoblast capsule has tubercles, no reticulate pattern, zooids not mutually adherent.

Species	Characteristics
Family Lophopodidae	
*Lophopus crystallinus**	Floatoblasts drawn into points at poles, gelatinous colonies.
Pectinatella magnifica	Floatoblasts saddle shaped, single row of hooks arising from annulus, gelatinous zooecium.
Family Cristatellidae	
*Cristatella mucedo**	Circular floatoblasts, two rows of hooks arising from capsule, vermiform, gelatinous, mobile colony.
Class Gymnolaemata	
Order Ctenostomata	
*Paludicella articulata**	No statoblasts, no epistome but hibernaculae, freshwater.
Victorella pavida	No statoblasts, no epistome, brackish.

Acknowledgements

I would like to thank Mr Mark Holmes and the staff of the National Museum of Ireland for their help, permitting me to use their records and examine the specimens deposited in the museum, Dr Julian D. Reynolds, my supervisor, for his guidance in preparing this paper and those who took time to answer my letters.

Bibliography

Allman, G. J. (1856) *A monograph of the fresh-water Polyzoa, including all the known species, both British and foreign.* Ray Society, London.

Boardman, R. S., Cheetham, A. H., and Cook, P. L. (1983) Introduction to the Bryozoa p.p. 1-48. *in* Robinson, R. S. (ed.) *Treatise on Invertebrate Palaeontology. Part G. Bryozoa revised.* 1. Geological Society of America and University of Kansas, Boulder and Lawerence, U. S. A..

Braem, F. (1890) Untersuchungen über die Bryozoen des sussen Wassers. *Bibliotheca Zoologica* 2: 1-134.

Bushnell, J. H. (1966) Environmental relations of Michigan Ectoprocta and dynamics of Natural Populations of *Plumatella repens*. *Ecological Monographs* 36: 95-123.

Bushnell, J. H. (1974) Bryozoans (Ectoprocta). p.p. 157-194. *In* Hart, Jr., C. W. and Fuller, S. L. H. (eds) *Pollution Ecology of Freshwater Invertebrates*. Academic Press, London.

Clarkson, E. N. K. (1986) *Invertebrate palaeontology and evolution*. p.p. 117-129. 2nd edition. Unwin Hyman, London.

Hyman, L. H. (1959) *The invertebrates - smaller coelomate groups*. 5. McGraw - Hill, London.

Mundy, S. P. (1980) A key to the British and European freshwater bryozoans. *Scient. Publs Freshwat. Biol. Ass.* 41.

Nichols, A. R. (1912). Clare Island Survey. Polyzoa. *Proc. R. Ir. Acad.* 31 (53): 1-14.

O'Keeffe, C. (1986). The ecology of two populations of the freshwater crayfish *Austropotambius pallipes* (Lereboullet) in Ireland. Unpublished Ph.D thesis, Dublin University.

Praeger, R. L. (1949) *Some Irish naturalists. A biographical note-book*. Dundalgan Press, Dundalk.

Ryland, J. S. (1970) *Bryozoans*. p.p. 144-155. Hutchinson, London.

Scannell, M. J. P. (1974) *Cristatella mucedo* Cuvier (Polyzoa) in Renvyle Lough. *Ir. Nat. J.* 18: 120-121.

Smyth, T. J. (1993) Studies on statoblasts of the freshwater Bryozoa (Phylum Ectoprocta, Class Phylactolaemata) *Plumatella repens* and *Cristatella mucedo*: with special attention to the effects of temperature and light on germination. Unpublished B.A. Mod. thesis, Dublin University.

Stephens, J. (1912) Clare Island Survey. Fresh-Water Porifera. *Proc. R. Ir. Acad.* 31 (60): 1-18. Pl. I.

Stephens, J. (1919) Field notebook (MS). National Museum of Ireland, Dublin.

Thompson, W. (1856) *The natural history of Ireland. 4 Mammalia, reptiles, and fishes. Also Invertebrata*. Bohn, London.

Vinogradov, A. V. (1992) Evolution Ways of Phylactolaemata. Unpublished Ph.D. thesis. Regional Museum of Regional Studies, Krasnoyarsk.

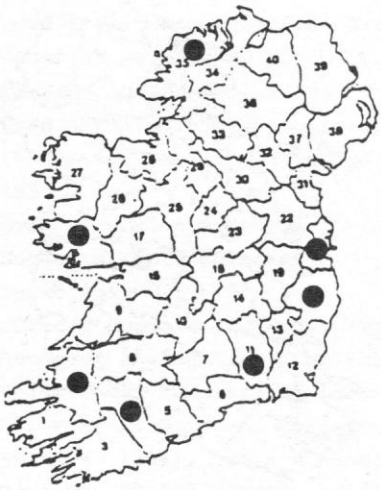
Wyse Jackson, P. N. (1991) Distribution Of Irish marine Bryozoa, together With biographical notes relating to the chief researchers in the group. *Bull. Ir. biogeog. Soc.* 14: 129-258.

Author's address

Department of Zoology,
Trinity College,
Dublin 2,
Ireland.

Bull. Ir. biogeog. Soc. No. 17

FIGURE 1: distribution maps of *Fredericella sultana*, *Cristatella mucedo*, *Lophopus crystallinus* and *Paludicella articulata*.



Fredericella sultana

Cristatella mucedo

Lophopus crystallinus

Paludicella articulata

Bull. Ir. biogeog. Soc. No. 17

FIGURE 2: distribution maps of *Plumatella fruticosa*, *P. repens*, *P. fungosa* and *P. emarginata*.

Plumatella fruticosa

Plumatella repens

Plumatella fungosa

Plumatella emarginata

Bull. Ir. biogeog. Soc. No. 17 (1994)

THE MARINE MOLLUSCA OF IRELAND 1. STRANGFORD LOUGH, CO. DOWN

J. D. Nunn

Introduction

Strangford Lough is a fully saline fjardic lough, about 24km long and 4-8km wide, linked to the Irish Sea *via* a channel known as 'The Narrows' (8km long, 0.7-2.5km wide). It lies about 14km from the city of Belfast, on the east coast of Northern Ireland (Figure 1). The lough is a complex tidal estuary. The massive volume of water (275-401 million cu. m.) which flows in and out in the normal tidal cycle produces currents of up to 8 knots in the Narrows. There is complete mixing of the water in this channel. As the current moves through the Narrows, over the rocky, uneven seabed, there is considerable turbulence, especially at the whirlpool known as the Routen Wheel. The flooding tide flows into the south of the lough up the main channel and side branches. It goes north towards Dunnyneill Island at a reduced rate (2-3 knots), with comparatively still water to the south-west. Some turbulence is caused by the tidal stream hitting the island. North of Dunnyneill, the ebb/flood streams north/south at about one knot. Around Pawle reefs, where the channel is less than 1km across at low tide, the current increases to >1 knot. North of Pawle reefs, the current is slight, although it can be higher between Long Sheelagh and Youran Reefs, and off Mahee Island Point (Figures 2A and 2B).

Freshwater influences are not considered to be significant in Strangford Lough (Brown, 1990). The only river of any size is the Quoile, in the south-west corner, and salinity is reduced in this area only at low water. Other sources of freshwater include Comber River (north-west lough), Carrstown Burn and a stream at the north end of Millquarter Bay. The total annual influx of fresh water

into the lough (*via* rivers and rain) is less than 3x the saltwater influx on each tide, and is probably equivalent to the yearly loss by evaporation. Consequently, Strangford Lough can be considered to be always fully saline (Erwin *et al.*, 1986).

Strangford Lough is a very sheltered sea lough, with only the south entrance to the Narrows being exposed to significant prolonged wave action. With a fetch of only 5-10km with prevailing westerly winds, wave action mainly affects the east coast of the lough and there is little or no evidence that it affects the sublittoral below 10m depth (Erwin, 1977).

In depths less than 10m, sediments are relatively coarse, due to slight wave action - finer sediments cannot settle. However, in the sheltered west coast, there is frequently soft mud. The sublittoral substrata below 10m are laid out according to the 'energy' levels within the lough, which means the current strength (Erwin, 1977; Brown, 1990). The Narrows is dominated by bedrock, boulders and cobbles, with patches of coarse gravel and pebbles in bays. The south basin of the lough is mainly coarse sand and gravel, with boulders. In the deeper northern part of the centre channel, there is fine mud. At the sides amongst the islands and pladdies and part of the centre channel, lies the *Modiolus modiolus* (L.) community with mud and shell debris. The Quoile Estuary up to Killyleagh Reefs is dominated by soft black mud. Finally, in the far north are muddy sand flats.

Strangford Lough is relatively unpolluted, although local areas are subject to human impact, e.g. pollution by rubbish or outfalls. Gault *et al.* (1983) showed high levels of mercury and chromium in two separate mussel populations, possibly due to anti-fouling paint on boats. High levels of chromium (Killyleagh), copper, cadmium and nickel (Newtownards) may be due to sewage discharge. Other possibilities are a local tannery, light industry

at Newtownards or tip leachate. Oysters close to the contaminated area were healthy and fit for human consumption. Currently *Crassostrea gigas* (Thunberg) is farmed by Cuan Fisheries at a number of sites, e.g. off Sketrick Island. There are local fisheries for Dublin Bay prawns, lobsters, crabs and scallops.

Strangford Lough is now recognised to be the most diverse sea lough in the British Isles (Gubbay, 1988). More than 72% of bottom living animals and plants from Northern Ireland are present, 28% not found elsewhere in Northern Ireland. The habitat diversity is represented by a range of substrata (solid bedrock to fine silt/clay), depth (0-66m), current (0-8 knots), salinity (Narrows - Quoile Estuary), intertidal (steep bedrock to wide mud flats), and the presence of animals (e.g. *Modiolus modiolus*) which can introduce diversity by providing a substrate for other species to colonise. Strangford Lough is an ideal area for ecological studies. It is accessible, small enough to sample, relatively pollution free, temporally stable and mainly euhaline. The diversity of habitat implies a diversity of molluscan fauna, and thus Strangford Lough represents an ideal location for a detailed survey of this group.

Historical background to molluscan studies in Strangford Lough

During the late 18th and early 19th century, very little work was done on the marine fauna of Ireland. John Templeton (1776-1825) systematically dredged the Northern Ireland coast and some of his molluscan records were published in 1935 by Fisher. An account of the Irish Testacea was published in 1818 by Brown. The lack of records was remedied by the foundation of the Belfast Natural History Society in 1821 (later (1842) renamed the Belfast Natural History and Philosophical Society). Two of its members, George Hyndman (1796-1867) and William Thompson (1805-1852) were active in exploring the marine life off the coasts of Down and Antrim by

dredging. Other important naturalists were members, e.g. George Dickie (1812-1882), the first Professor of Natural History at Queen's University, Belfast, and Charles Wyville-Thomson (1830-1882). These people composed a unique group, the Belfast Dredging Committee, and were all active at the same period in the mid-19th century. Many of their results were published in the Reports of the British Association (1857-59). In 1852, William Thompson died, and volume IV of his great work *The Natural History of Ireland* was edited and published by Robert Patterson (1802-72), another active member of the Society. Many of the dredged molluscan records first appeared here. However, it was Dickie (1858) who produced the first paper on a distinct geographical area, which appropriately was Strangford Lough.

Faunistic reports appeared from time to time in the *Irish Naturalist*, *Proceedings of the Belfast Naturalists' Field Club*, *Proceedings of the Royal Dublin Society* and *Proceedings of the Royal Irish Academy*. However, all the active workers had died by 1882, and little work was done in subsequent years. Their work was summarised by Praeger (1889) and further reported by Nichols (1900), in *The Marine Mollusca of Ireland*, still the most recent checklist of the marine Mollusca of Ireland. Many of these early records gave very little precise information, rarely recording whether the specimens were collected alive or dead.

In 1903, the Ulster Fisheries and Biology Association was formed under the direction of Professor G. Wilson at Larne Harbour. A fisherman's house was rented and fitted out as a marine laboratory. Representatives of the Belfast Natural History and Philosophical Society, Belfast Naturalists' Field Club and Queen's College met there. Some work was done and a few papers published, but little further information gathered on the molluscan fauna. In 1908, the laboratory closed because of the distance from Belfast, and financial problems. During this period until the 1960's, most

work was conducted intermittently, with only Nora Fisher-McMillan publishing work directly relevant to the Mollusca.

From 1937 to 1940, laboratory space was available at Ardglass at the Fish Market Building. When war broke out, the building was given up, and premises in Portaferry rented. In 1945, Queen's University purchased a house which became the Marine Biology Station. For about 10 years, many sites in Strangford Lough were dredged, and all these records, together with the earlier ones, were published by Williams (1954) in an annotated checklist. This is still the most recent comprehensive checklist available.

The expansion of Queen's University activity in marine biology, especially in the late 1960's, led to the appointment of permanent staff, with a full time director in 1971. Very little of the published work during this period concerned Mollusca (with the exception of Hartnoll (1967) and work on oysters by Parsons (1971, 1972, 1974) and Briggs (1979, 1983a, 1983b)).

In 1972, the Ulster Museum began a diving survey of Strangford Lough, which was extended in 1980 to become part of the Northern Ireland Sublittoral Survey (Erwin *et al.*, 1986). The molluscan fauna of Strangford Lough was also surveyed by Heriot-Watt University (Wilkinson *et al.*, 1988) as part of the Northern Ireland Littoral Survey, both surveys being commissioned by the DOE (NI). Many records of Mollusca were made during this period. Other workers for Queen's University (Boaden, Seed, Brown, O'Connor, Platts, Roberts, C.D., Roberts, D.) studied certain molluscan species intensively (e.g. ***Modiolus modiolus***) at specific areas (e.g. Greyabbey) or specific habitats (algal epifauna at the Dorn, coarse shelly sand meiofauna).

However, it can be seen that no recent specific survey of Strangford Lough for Mollusca had been carried out. The principal

workers in the lough either covered the whole area looking at marine life in general (and thereby missing many of the small rarer species) or chose a few molluscan species to study in depth in particular areas. The last comprehensive checklist published was more than 35 years ago (Williams, 1954). The aim of this paper is to draw together all previous work on the Mollusca of Strangford Lough and, together with the results of further fieldwork, to produce a detailed annotated checklist, distribution maps and a comprehensive bibliography.

Methods

The area called `Strangford Lough' refers to the whole main body of the lough, together with the Narrows up to the south entrance line drawn between Ballyquintin Point and Killard Point (Figures 2A and 2B). Beyond this line is considered to be part of the main Irish Sea.

Compilation of the checklist was achieved in two distinct ways - by a search of all previous literature and museum collections referring to Strangford Lough to obtain old records, and by a field work survey of 118 littoral sites, 39 dived sites and 15 dredged sites (172 in total) around the lough and Narrows.

(a) Literature Search

A wide range of sources of information concerning the Mollusca of Strangford Lough are listed in the references. The principal areas of search were:- (i) **Strangford Lough: a bibliography**, compiled by Alison McCloy, 1986. This was the main source for published work relating to Mollusca; (ii) **Northern Ireland Sublittoral Survey** (Ulster Museum). This survey held records for Mollusca for Strangford Lough from 1980 to 1986. The computer records held by the museum also incorporated data reaching back to May 1973; (iii)

Northern Ireland Littoral Survey (Heriot-Watt University). This survey also covered Strangford Lough, and proved to be a valuable source of information relating to access to shore sites; (iv) **Molluscan records for Sea Area 28.** These records are held by Helena Chesney at the Ulster Museum as marine recorder for this area on behalf of the Conchological Society of Great Britain and Ireland. Sea Area 28 incorporates Strangford Lough; (v) **Marine Mollusca collections** (Ulster Museum and National Museum of Ireland). Data are held by the Ulster Museum for all the specimens in their reference collections. The material reaches back to the mid-19th century, collected by naturalists such as Hyndman, Thompson and Dickie. The National Museum of Ireland holds the Waller and Praeger Collections; (vi) **Marine Biology Station,** Portaferry. There were a number of additional records from notes made by workers at the Station on the copy of the checklist published by Williams (1954). These mainly date from the 1960's and 1970's; (vii) **Journals.** *Journal of Conchology, Journal of Molluscan Studies, Proceedings of the Malacological Society, Irish Naturalist, Irish Naturalists' Journal,* were all examined from their inception to date for any papers which had been overlooked by previous bibliographers. Early issues of *Proceedings of the Royal Irish Academy* were also consulted, together with classic works by Forbes and Hanley (1853), Jeffreys (1863-1869, mainly 1865), Thompson (1856) and checklists by Brown (1818), Fisher (1935), Dickie (1858), Praeger (1889), Nichols (1900) and Williams (1954); (viii) **A number of individuals** were consulted for casual observations of species; Baxter, J., Boaden, P. J. S., Breen, J.; Brown, R. A., Picton, B. E., Reid, W. and Roberts, D.

(b) Littoral Survey

For the present survey, sites were selected, if possible, on the following basis to include:- (i) a full range of habitats present in the area; (ii) representative sites with habitats which occur

extensively; (iii) sites with restricted or unusual features; (iv) even geographic coverage; (v) high human impact areas; (vi) areas under-recorded by previous workers.

Very detailed habitat (substratum) maps of Strangford Lough were made available to me by the National Trust, which considerably aided site selection. The Northern Ireland Littoral Survey raw data sheets also gave valuable information on access to sites around the lough. Permission was sought, either by letter or locally, from landowners to cross their land, or to land on private islands. In every case, permission was granted, and many expressed a personal interest in the research being carried out. Such help is gratefully acknowledged.

A total of 118 shore sites were surveyed during the period June 1986 to April 1992. Figure 3 shows the littoral sites visited by the author, which are listed in Table 1. Coverage complied with the list of prerequisites for site selection. Areas still under-recorded are many islands (e.g. the group off Whiterock) and pladdies (e.g. the reefs north-west of Kircubbin). It was not possible to cover these sites within the time and boat availability.

Most sites were searched for 1-1½ hours, unless several sites were being studied on the same tide. Almost all sites were examined on a good spring tide (predicted low water 0.5m or less above Chart Datum) in the early morning or late afternoon. Sites were visited at all times of the year, provided suitable spring tides were available, and weather conditions permitted.

Many sites could not be reached, or reached easily, without the use of a boat. The Marine Station boats - either the punt or the 'Nerilla' were used, depending on the distance to be travelled. On one occasion the National Trust boat was used (Angus Rock) and on

another occasion, a local diving club inflatable was used (Swan Island).

One or two buckets full of algal samples (mainly red algae, *Cladophora* spp. and *Fucus serratus* (L.)) were removed for further examination. Descriptive notes were made of the area searched, together with records of any unusual non-molluscan species. Samples of algae were taken to the laboratory, and soaked for a minimum of three hours (usually overnight) in fresh water. The algae were shaken and removed from the water. Detached Mollusca were collected and preserved in 70% alcohol. Additional larger molluscan species observed on the shore were identified, fixed in 10% formalin for 2-3 days, washed with fresh water, and transferred to 70% alcohol. Small species of mollusc were examined under a light binocular microscope (Hampshire Micro) with 10X and 30X magnification. Identification was principally from personal experience, but several texts were used for the most difficult species *viz.* Jones and Baxter (1987), Thompson and Brown (1984), Brown and Picton (1979), Fretter and Graham (various 1976-1986), Tebble (1966). Confirmation of identification of the most difficult species was obtained from Dr J. Baxter (chitons), B. Picton (opisthobranchs) and Dr S. Smith (all others).

(c) Sublittoral Survey

The aim of the sublittoral survey was to dive (if possible) or dredge sites underrecorded by the Ulster Museum in the Northern Ireland Sublittoral Survey (Erwin *et al.*, 1986). The dives were carried out from the hard boat 'Ocean Vaux', (which was fitted with a Decca Navigator, which enabled accurate latitude and longitudes to be obtained for where the divers descended and ascended) or were casual dives dictated by the diving clubs to which the author belonged (Queen's University Belfast SAC, Dolphins SAC). This often meant repeatedly diving at the same

sites, e.g. Marlfield Bay, Ballyhenry Point, Lees Wreck, 'The Pins' and Ringhaddy Harbour. These are the most popular sites for amateur divers and are consequently well recorded. This resulted in only the south end of the lough and the north entrance to the Narrows being covered in detail. Long journey times made it difficult to organise dives in the northern half of the lough. However, a number of under-recorded areas were dived - west of Round Island, north-east of Killyleagh Reefs, Verde Rocks, off Shark Island, Castleward Bay and the shallow waters (<10m) of Ballywhite Bay and Ballyhenry Bay. A number of areas still remain under-recorded - the pladdies in the north-east of the lough, north of Bird Island, east of Dunsy Island, area to the west of Angus Rock and Millquarter Bay. Because of the patchy nature of the survey, a full range of habitats could not be sampled.

A total of 39 dive sites were surveyed over the period July 1986 to January 1992. The divers collected samples of molluscs, algae, bryozoa, hydroids etc. in plastic bags, and observed the Mollusca on each site. After each dive, each pair filled out a basic pre-prepared form describing the site to the best of their ability.

The samples obtained by the divers were removed to the laboratory and left for 1-2 days in still sea water. As the water deoxygenates and warms, opisthobranchs leave the cover of their habitat, and move to the surface of the water where they can easily be seen, removed and identified. The samples were then treated in the same way as the algal samples from the shore, i.e. soaked in fresh water. The opisthobranchs were left for several hours (depending on size) in a solution composed of 50% seawater and 50% of a 7% magnesium chloride solution. This relaxes the animals. The animals were then fixed in 10% formalin for 2-3 days, and then transferred to 70% alcohol.

A limited dredging survey (15 sites) was carried out from the

Marine Station boat `Nerilla' in 1990. The dredge sites were designed to fill the gaps left by the diving survey, particularly in the centre of the lough, and Holm Bay. Dredging was typically carried out with an ordinary dredge, or in muddier areas, a ring dredge, for about 5 -15 minutes. In the soft mud areas in the Quoile Estuary, it was only possible to use a grab. Samples were roughly sorted on board the boat, and then transported to the laboratory, where detailed identification took place.

The dive sites are shown in Figure 4 and the dredge sites in Figure 5, and listed in Table 2. The depths given are not corrected to Chart Datum. In many cases, the exact time of the dive was not recorded, so corrections could not be made. The inaccuracy in depth is no more than +/- 2m, and frequently less. Visibility underwater during dives ranged from 2-10m, which was more than adequate for satisfactory sampling of fauna and flora, and for descriptive purposes.

Discussion: survey results

The total number of species recorded from Strangford Lough is 306. Of these, 274 were living, with 22 dead only, and 10 of unknown status (Table 3A). Altogether, 249 species have been seen living in the lough since 1960, which is approximately 80% of the total molluscan fauna of Northern Ireland. Preliminary work by the author on a checklist of the marine Mollusca of Ireland suggests a minimum of 467 species recorded, which means that Strangford Lough holds perhaps 60% of the molluscan species in Ireland. This is broadly in line with the findings of the Northern Ireland Sublittoral Survey which recorded 72% of the sublittoral fauna of Northern Ireland to be present in the lough (Erwin *et al.*, 1986).

A total of 24 species have not been recorded since early work in the 19th century (Table 3B). It is possible that some of these

species could be found in the lough. For example, *Jujubinus montagui* (W. Wood) was found living off Strangford Bar in 1941 (Williams, 1954) and *Polinices catenus* (da Costa) was found north of Fairway Buoy (Marine Station notes, 1964). *Alvania beanii* (Hanley in Thorpe) is often associated with maerl, having been found by the author living at Tra Coirealach, Co. Galway, and at Iolla Bheag, Loch Broom, Scotland (Nunn, 1990) in maerl beds there. It is therefore likely to be found, if at all, with the maerl bed in Castleward Bay - especially as dead shells were recorded in that same locality. Similarly, *Turbonilla rufescens* (Forbes) may also be found there, as it too seems to be associated with maerl, being found by the author in Mulroy Bay, Co. Donegal, close to offshore maerl beds, and at Iolla Bheag as above (Nunn, 1990). Several of the remaining species are associated with coarse shelly gravel, and may yet turn up (e.g. *Alvania cancellata* (da Costa), *Haedropleura septangularis* (Montagu)).

Of the living species recorded since 1960, the author has personally seen 190 (i.e. confirmed presence). 13 species were recorded new to this century (Table 3C), and a further 20 living species (+2 varieties, 1 dead shell) have been added to the total checklist by the author (Table 3D). Five species (*Emarginula crassa* (J. Sowerby), *Melarhaphe neritoides* (L.), *Thesbia nana* (Lovén), *Modiolus barbatus* (L.), *Sphenia binghami* (Turton)) are considered dubious, and possible errors of identification.

Although Strangford Lough has now been extensively surveyed for Mollusca, a number of species may yet be found in its waters that currently lie just outside the area under study. These include *Melanella alba* (da Costa) off Strangford Bar (Dickie, 1858), *Trophonopsis barvicensis* (Johnston) north of Strangford Fairway, 1977 (C. D. Roberts, UM collections), *Antalis entalis* (L.) (north scallop ground outside lough, 1959, Marine Station notes) and *Arcopagia crassa* (Pennant) (Strangford Fairway, Northern Ireland

Sublittoral Survey), *Scaphander lignarius* (L.) trawled near Fairway Buoy (UM).

Most of the molluscs living in Strangford Lough are not endemic to the area. However, Strangford Lough is the only known recent site in Ireland for *Rissoa lilacina* subsp. *porifera* Lovén, *Philinoglossa helgolandica* Hertling, *Hedylopsis brambelli* Swedmark, *Crenella decussata* (Montagu) and *Limatula subauriculata* (Montagu) (Seaward, 1991). In addition, two species, rare elsewhere in Ireland, are found here - *Doto cuspidata* Alder and Hancock and *Tragula fenestrata* (Jeffreys). *Rissoella globularis* (Jeffreys in Forbes and Hanley) appears to be living at a number of sites on the north and west coasts of Ireland, but it is only locally common in Strangford Lough (Nunn and McGrath, 1989). The chiton *Acanthochitona crinitus* (Pennant), rare elsewhere, is present in unusually high intertidal numbers, as is *Calliostoma zizyphinum* var. *lyonsii* Leach. This is considered to be of Northern Ireland significance (Davison and Boaden, 1990).

Mollusca are the second most diverse group of animals on Earth, with prosobranch gastropods being one of the most varied groups of marine macroinvertebrates. This diversity, linked to their ability to colonise a wide range of habitats, means that the study of Mollusca in specific areas could give an index of the health and diversity of those sites. Strangford Lough, using the molluscan fauna as the criterion, can therefore be regarded as one of the richest and most diverse areas in the British Isles for marine life. The lough supports a wide range of habitats which have been exploited by at least 274 living species of mollusc over the last hundred years. Comparable inlets with strong tidal currents at their entrance, such as Lough Hyne, Co. Cork and Mulroy Bay, Co. Donegal also have many molluscan species (at least 182/172 live species respectively, unpublished research by author).

An overview is useful when looking at geographical distribution and selecting valuable sites for conservation purposes. A more complete understanding of the molluscan fauna of Strangford Lough can be achieved when set in the context of its position geographically within the British Isles, north-west Europe, and the Atlantic systems. The marine fauna present in any area is profoundly influenced by a broad range of factors (e.g. water temperature and direction of current flow). Strangford Lough lies, together with the majority of the British Isles, within the Eastern Atlantic Boreal Region (Briggs, 1974). The northern boundary of the warmer Lusitanian Province lies close to the western entrance to the English Channel, and influences south-west England, south-west Wales and south-west Ireland. The warm water of the Gulf Stream, one of the most important currents in the Atlantic Ocean, runs northwards to become the North Atlantic Drift. It divides in the middle of the North Atlantic, with one branch flowing north and east past the west coast of Ireland and the west coast of Scotland towards Norway. A persistent intrusion of this warmer water flows past the north coast of Northern Ireland and south into the Irish Sea close to the Co. Down coast (Irish Sea Study Group Report, 1990). The main drift of the Irish Sea, especially close to the Scottish coast, however, is northwards. This is a weak drift, averaging 2-8km per day (Irish Sea Study Group Report, 1990), although weaker currents have been reported (0.16 miles per day (Lewis, 1964)). This direction can be reversed, particularly during times of strong winds (Lewis, 1964). A typical Atlantic storm will first force water north out of the Irish Sea, and then back in a southerly direction, with flows which if persistent, would be equivalent to up to 50x the yearly average current speed. This suggests that it is possible for molluscan fauna with pelagic dispersal development phases to reach Strangford Lough from anywhere in the Irish Sea, the north and west coasts of Ireland or the west coast of Scotland.

The second potential influence upon the fauna of Strangford Lough is the presence of stratified water outside the lough during the summer, although this mixes to some extent while flooding through the Narrows. Oceanic fronts exist off Malin Head, Co. Donegal and off the Ards Peninsula, although their exact positions can vary by up to 50 miles from year to year. The stratified water which lies off the Ards Peninsula towards the west of the Isle of Man has a surface layer of warmer water about 20-30m thick. Between April and October, this water is up to 5°C warmer than the bottom layer. Fronts are essentially offshore phenomena, so it is rather difficult to envisage how this could influence intertidal populations. However, many species on the shore are dependent on oceanic water for dispersal through pelagic larvae. There can be a close relationship between the limits of larval drift, the presence of stratified water and populations on the shore. Southern species *Monodonta lineata* (da Costa) and *Gibbula umbilicalis* (da Costa), which are associated with stratified water (Crisp, 1989), are either absent from the lough (*M. lineata*) or occur only in the Narrows (*G. umbilicalis*). Other southern species with their northern limit in the British Isles (Lewis, 1964) appear to be unaffected by the presence or absence of stratified water (*Patella ulyssiponensis* Gmelin, *Melarhaphe neritoides* (L.)) (Crisp, 1989). Their absence (*M. neritoides)* or scarcity (*P. ulyssiponensis*) in Strangford Lough is more likely to be due to lack of the appropriate exposed habitats.

A number of species that are near the northern limits of their ranges are present in Strangford Lough (e.g. *Diodora graeca* (L.), *Elysia viridis* (Montagu) (DoE, 1991)) together with 33 other species which have a predominantly western coast distribution in the British Isles (e.g. *Tricolia pullus* (L.), *Pleurobranchus membranaceus* (Montagu), *Tapes aurea* (Gmelin)) (Seaward, 1982, 1991). A further 13 species have have a predominantly southern/ south-western distribution in the British Isles (e.g. *Leptochiton*

cancellatus (G. B. Sowerby II), *Geitodoris planata* (Alder and Hancock), *Rissoa lilacina* Recluz). It has been suggested that these species enter *via* St. George's Channel in the south of the Irish Sea (Williams, 1954), but it is perhaps more likely that these species enter the lough *via* the southern flow of the North Atlantic Drift from the western/north-western coast of Ireland. Many south-western species are absent from the Irish Sea, possibly due to its relatively sheltered nature, absence of exposed rocky habitats, or a requirement to avoid low temperatures in the winter (Erwin *et al.*, 1986).

This suggests that Strangford Lough has a large number of the 'southern' warmer species (which normally have a 'western' distribution). However, the molluscan fauna of the lough is predominantly north-western in character, rather than south-western. All except three of the species in Strangford Lough live on the west coast of Scotland (*Lepidomenia* sp., *P. helgolandica*, *H. brambelli*) (Smith, S. M., McKay, D. and Nunn, J. D., unpublished work). This area must be seen as the closest in similarity. While many species which occur in the lough have also been found on the north and west coasts of Ireland, others have not. A total of 86 species with 2 varieties which occur in Strangford Lough have not yet been found on the north coast of Northern Ireland. Ten of these species have not been found anywhere living recently on the south-western/western or northern coast of Ireland (e.g. *C. decussata*, *L. subauriculata*, *D. cuspidata* (Seaward, 1982, 1991). This therefore suggests that these species could not have entered the lough *via* the North Atlantic Drift. Other species which commonly exist on the north and west coasts of Ireland do not occur in Strangford Lough (32 species e.g. *Simnia patula* (Pennant), *Barleeia unifasciata* (Montagu), *Marshallora adversa* (Montagu)). Many of them reach no further east than Malin Head, and do not appear to be able to cross the oceanic front there. On the other hand, there are many

northern species in Strangford Lough. They typically occur on the west coast of Scotland, and probably extend into the North Channel reaching Rathlin Island down to the Isle of Man. As the main current in the Irish Sea is northerly, it appears that these species must spread during the temporary current reverses that occur during poor weather. These northern species include *Tonicella marmorea* (O. Fabricius), *Tectura testudinalis* (Müller), *Cuthona concinna* (Alder and Hancock) with 15 others.

Checklist and distribution maps

The records collected (old and new) were used to compile a checklist of the marine Mollusca of Strangford Lough (SL), together with ecological notes. Distribution maps for each species were drawn up. Such maps have the potential to show correlations which can be very informative. The distributions shown frequently ask questions which can only be answered by further and more detailed ecological observations and experiments (Norton, 1978). Distribution patterns are likely to reflect environmental conditions (e.g. aspect, substratum, temperature, wave action), and in a wider context, a biogeographical distribution (e.g. the western bias of some southern species around the British Isles). Identification of influences on the distribution patterns of certain species is strengthened if many species show similar trends. The maps shown here are limited, in so far as they only show presence/absence, not abundance. Like all such maps, they are only a 'snapshot' of the situation at the time of the collection of the records.

There are a number of abbreviations and terms used in the checklist:- **SL**: Strangford Lough; **UM**: Ulster Museum Sublittoral Survey (Erwin *et al.*, 1986); **NMI**: National Museum of Ireland, Dublin; **HW**: Heriot-Watt University; Northern Ireland Littoral Survey (Wilkinson *et al.*, 1988); **BEP**: Bernard Picton, an

acknowledged expert in the recording and identification of opisthobranchs; **SMS**: Shelagh Smith, an acknowledged expert in the recording and identification of mollusca. All other recorders of mollusca are referred to by their full name; **Shallow sublittoral**: <10m; det.: 'determined by', i.e. identification made, or confirmed by a particular expert.

Many of the place names referred to in the text are shown in Figures 2A and 2B. **Taxonomy** follows Smith and Heppell (1991).

Wellstream Bay; this name is no longer in use on present day maps of SL. Dickie (1858) carried out dredging in two areas as part of his survey which refer to this name:- Wellstream Bay - west of Chapel Island, 5 miles from open sea, ½ mile from shore, 15f; Upper Wellstream Bay - Quoile Estuary, 6 miles from open sea, 1 mile from shore, 4-8f. The old names are retained in the checklist for ease of description.

Maps; these show all live records irrespective of date, and only for species with three or more records.

The location of material from 19th century collections in the Ulster Museum, Belfast, and National Museum of Ireland, Dublin are given.

Class CAUDOFOVEATA

Order Chaetodermatida

Chaetodermatidae

***Chaetoderma nitidulum* Lovén, 1844**

A single live specimen found on Killyleagh Reefs (P. J. S. Boaden, pers. comm.) in January 1990.

Class SOLENOGASTRES

Order Pholidoskepia

Lepidomeniidae

***Lepidomenia* sp.**

Recorded from Angus Rock as *Lepidomenia hystrix* Boaden (Boaden, 1966). There is some taxonomic confusion surrounding this species, and the correct identity of specimens as *L. hystrix* is doubtful (Smith and Heppell, 1991). This is the only record for the British Isles.

Class POLYPLACOPHORA

Order Neoloricata

Leptochitonidae

***Leptochiton asellus* (Gmelin, 1791) (Fig. 6)**

Common, living. Extensively recorded by UM sublittorally, and by the author low on shore, and in both dived and dredged material. Principally found attached to stones and large dead shells. Absent from the north/north-west, and recently from the Quoile estuary. Old records: recorded common, living by Dickie (1858) in Castleward Bay; rare, living, Wellstream Bay and Upper Wellstream Bay; four specimens recorded from Portaferry as *Chiton albus* and *Ischnochiton albus* (Thompson, UM).

***Leptochiton cancellatus* (G.B. Sowerby II, 1840) (Fig. 6)**

Rare, living on the shore at Inner Mahee Island and Angus Rock (1989/90, J. Baxter pers. comm.) and sublittorally south-west of Dunnyneill Island (5.8.1983) and in Ringhaddy Harbour (17.12.1975) (UM). The latter record may be an error for juvenile *Leptochiton asellus*. Three specimens were dredged off Limestones in 1941 (Williams, 1954). Old records: two specimens, November 1834, as

Callochiton laevis (SL only) and five specimens from Portaferry August 1837 (both Hyndman, UM); recorded from Killinchy oysters as *Chiton cancellatus* in Templeton MSS (Praeger, 1889).

Hanleyidae

Hanleya hanleyi **(Bean in Thorpe, 1844)**

Not seen since the 19th century. One specimen from SL 1839 as *Chiton ruber marmoreus* (Thompson, UM). One specimen from SL (Hyndman, UM).

Ischnochitonidae

Ischnochiton albus **(L., 1767)**

A single specimen (det. J. Baxter) obtained by diving 10-16m in Castleward Bay in maerl lying on coarse sandy gravel (12.5.1990). Old record: from SL as *Chiton albus* by Mr S. A. Stewart (Praeger, 1889).

Callochiton septemvalvis **(Montagu, 1803) (Fig. 7)**

Uncommon, usually single specimens, living on the lower shore and shallow sublittoral. Recorded by the author, J. Baxter and HW from scattered locations in the lough and Narrows. One specimen recorded from Castleward Bay in 1941 (Williams, 1954). Old records: from Rathgarmont on oysters as *Chiton laevis* (Brown, 1818) and in Castleward Bay in 7-20f (Dickie, 1858); one specimen from SL in 1834, and two specimens from Portaferry 1837 as *Callochiton laevis* (Hyndman, UM).

Lepidochitona cinereus **(L., 1767) (Fig. 7)**

Abundant, living. Very common under small stones and dead shells mid-shore on muddy-gravel patches. Particularly abundant in lower shore at Bankmore Hill. Not sublittoral in SL. Recorded from many sites by author, SMS and HW. Absent from the north/north-west. Old records: among Kilinchy oysters in Templeton MSS (Praeger, 1889) as *Chiton marginatus*; commonly in SL (Dickie, 1858) as *Chiton cinereus*; three specimens from Portaferry as *Chiton cinereus* (Thompson, UM); five specimens from Portaferry, August 1837 (Hyndman, UM).

Tonicella marmorea (O. Fabricius, 1780) (Fig. 8)
Widely recorded from lower shore and the sublittoral by the author, J. Baxter, UM and HW. Scattered records from Ringhaddy, 9m, 1942 (Williams, 1954), 1955 (no locality, 27mm long, Marine Biology Station notes), Greyabbey 1974 (P. J. S. Boaden, pers. comm.) and Doctors Bay 1976 (SMS). Absent from the north/north-west and Quoile Estuary. This is a northern species, rarely found on the open coast in Northern Ireland. It is common only in SL. Old records: Mr S. A. Stewart from SL as *Chiton marmoreus* (Praeger, 1889); as *Chiton laevigatus* from SL (Thompson, 1856); one specimen from SL 1839 as *Chiton ruber marmoreus* (Thompson, UM); one specimen from SL (Hyndman, UM).
Tonicella rubra (L., 1767) (Fig. 8)
Widely recorded from lower shore and the sublittoral by the author, J. Baxter and HW. Recorded as common by Williams (1954). Absent from the north/north-west. Old records: as *Chiton ruber* among oysters from Killinchy, Down (Templeton MSS; Thompson, 1856); six specimens from Portaferry (August 1837) (Hyndman, UM); one specimen from SL as *T. ruber* `under stones on `Long Sheila Island' 16th April 1852' in the same collection. Recorded as *Chiton ruber*, rare, live from Castleward Bay by Dickie (1858); three specimens, SL, Waller Collection, Reg. No. 93.1889 (NMI).
Acanthochitonidae
Acanthochitona crinitus (Pennant, 1777) (Fig. 9)
Very widely recorded from mid to lower shore by the author, J. Baxter and HW. Abundant at sites in the north-east, but absent from the north/north-west. Found sublittorally at three sites - off Marlfield Bay (UM), west of Limestone Pladdy (10m) and off Ballyhenry Point (5m), by the author. A single specimen of an unusual red-backed form was found at North Marlfield Bay at low water by the author. Williams (1954) recorded large specimens being taken each year at L.W.S.T. This species is rare on the open coast, and is only in SL from Northern Ireland. In spite of an extensive search by J. Baxter and author, no specimens of

Acanthochitona fascicularis have been found. All have proved to be *A. crinitus*. Old records: as `*Chiton fascicularis* on oysters from Killinchy, plentiful' (Brown, 1818); two specimens as *Acanthochites fascicularis* (Thompson, UM), and one specimen from Portaferry as `*crinitus*' (Hyndman, UM); recorded as *Chiton fascicularis*, very rare, living from Castleward Bay by Dickie (1858); recorded by Mr S. A. Stewart (Praeger, 1889) as *Chiton fascicularis*; as var. *gracilis* by Adair (Praeger, 1889); and a specimen measuring nearly an inch and a half in length (Jeffreys, 1865).

Class GASTROPODA

Order Archaeogastropoda

Superfamily Fissurellacea

Fissurellidae

***Emarginula crassa* J. Sowerby, 1813**

Recorded dead from coarse shelly gravel north-east of 17fm plateau, off Ballyhenry Point on 29.6.1976 (UM). Also by P. J. S. Boaden on *Modiolus modiolus*, and at the Dorn. Not recorded otherwise from SL (Williams, 1954). The identifications may be errors for large *Emarginula fissura*.

***Emarginula fissura* (L., 1767) (Fig. 9)**

Recorded from both sublittoral sites (author, UM) and from L.W.S.T. (author, HW). Only one or two specimens usually found at each site. Largely confined to the north end of the Narrows and the southern part of the main lough. Recorded by Williams (1954) as `not common' from similar sites. Rare on the open coast. Old records: from the centre of SL as *Fissurella reticulata*, rare, dead (Dickie, 1858); and from Castleward Bay and Upper Wellstream Bay, common, dead.

***Diodora graeca* (L., 1758) (Fig. 10)**

Commonly found over most of SL, particularly in the north-east where the specimens are large (25mm plus) and abundant under large stones and boulders. Uncommon in the Narrows and absent from the north-west. Found from L.W.S.T. to 20m+. Recorded from a number

of sites by Williams (1954). Old records: `*Patella graeca* - not uncommon in Lough Strangford' (Brown, 1818); SL, 1849 (Hyndman, UM).

Superfamily Patellacea

Acmeidae

Tectura testudinalis **(Müller, 1776) (Fig. 10)**

Widely recorded, common, from the shore, particularly on small smooth stones, by the author and HW. Rarely recorded from the sublittoral, at a few scattered sites by UM, in less than 8m. Absent from the north-west. Old records: dead (shell only) from Castleward Bay (Dickie, 1858); five specimens, SL (Thompson, UM).

Tectura virginea **(Müller, 1776) (Fig. 11)**

Widely recorded, and common where found, from the lower shore by the author and HW. Typically found on bedrock at low water which has been colonised by pink encrusting coralline algae. Absent from the north-west. Principally found in the Narrows and southern part. Also found to 20m+ at similar sites, e.g. Audley's Point and Marlfield Bay. Old records: common, living, from Castleward Bay, Upper Wellstream Bay and the centre of SL (Dickie, 1858); `*Patella virginea* - not uncommon in Lough Strangford' (Brown, 1818); thirteen specimens as *Lottia pulchella*, Portaferry, August, 1837 (Hyndman, UM).

Patellidae

Patella ulyssiponensis **Gmelin, 1791 (Fig. 11)**

This species was not seen by the author. It has been recorded as `not uncommon' in pools at Killard, Kilclief and Black Islands (Williams, 1954) and from Doctors Bay by R. Anderson in 1970. HW recorded this species from 12 different sites scattered around the lough. The records of this species, particularly from the main lough, must be considered dubious.

Patella vulgata **L., 1758 (Fig. 12)**

Common everywhere, and abundant in places all around SL. Rare in the shallow sublittoral (e.g. Ballywhite Bay, Castleward Bay). Old record: (Praeger, 1889).

Helcion pellucidum (L., 1758) (see Fig. 12)
Common where found attached to the fronds and stems of *Laminaria* spp. Single specimens of var. *laevis* found under the base of their holdfasts. As widely distributed as their algal support, and conseqently found at L.W.S.T. and the shallow sublittoral. Absent from the north/north-west. Old records: live records as *Patella pellucida*, common, living, from Castleward Bay and rare, living, Wellstream Bay (Dickie, 1858); six specimens, SL (Thompson, UM).
Propilidiidae
Propilidium exiguum **(Thompson, 1844)**
Not been seen since a live record from deep water off Limestones, on shells, in 1941 (Williams, 1954). Old record: recorded as *Propilidium ancycloides* by Hyndman on oysters from SL (Thompson, 1856).
Superfamily Trochacea
Trochidae
Margarites helicinus **(Phipps, 1774) (Fig. 13)**
Widely distributed, both on shore and the shallow sublittoral. Northern species in the British Isles. Old record: recorded as *Margarita helicina*, living, common in SL by Thompson (1856).
Jujubinus miliaris **(Brocchi, 1814)**
A single live specimen recorded from 18m, north-west of Green I., Quoile Estuary (UM). Found as shell only by the author, dredged in Bird Island Passage, and from the Limestones in 27m in 1941 (Williams, 1954). Old records: specimen (s?) of '*Trochus clelandi*' sent to Thompson (1856) by James Rose Cleland Esq. from sand ooze in the deeper portions (10-23f) of SL; found dead in Upper Wellstream Bay, and living in Castleward Bay (rare) on mud, small stones and gravel in 7-20f by Dickie (1858); also found by Dickie as *Trochus millegranus*, on mud, rare, living in 15-25f in the centre of SL; six specimens, SL (Thompson, UM).
Jujubinus montagui **(W. Wood, 1828)**
A single shell found by author in Castleward Bay. Not seen living since 1857. Old records: three specimens from Portaferry in August

1837 as *Calliostoma montagui* (Hyndman, UM); found dead in Castleward Bay, but living (rare) in Wellstream Bay in mud at 15f by Dickie (1858).

Gibbula magus **(L., 1758) (Fig. 13)**

Found living at only a few shore sites; Dunnyneil 18.7.1971 (H. Chesney), Ballyhenry Point 17.8.1971 (UM), Darragh Island Causeway (P. J. S. Boaden, pers. comm.). More commonly found in the shallow sublittoral on coarse gravel (e.g. Ballyhenry Bay, Long Sheelagh, Kate's Pladdy, Ballywhite Bay). Sublittoral records from the author, Marine Station and UM, mainly in the south. Absent from the Narrows. Old records: three specimens from Portaferry as *Trochus magus* (Thompson, UM). Found common, living in Castleward Bay by Dickie (1858), as *Trochus magus*.

Gibbula tumida **(Montagu, 1803) (Fig. 14)**

Sublittoral species, found living at several localities around the lough, but in low numbers. Absent from the north. Old records: five specimens from Portaferry, August 1837 (Hyndman, UM); found living by Dickie (1858), common, living, in Upper Wellstream Bay, the centre of the lough, Castleward Bay, and rare, living from Wellstream Bay; Thompson (1856) reported limited numbers from the deeper portions (10-12f).

Gibbula cineraria **(L., 1758) (Fig. 14)**

One of the commonest species, being found abundantly from L.W.N.T. down to 31m+. Absent only from the extreme north-west. Old records: two specimens from Portaferry August 1837 (Thompson, UM); found common, living in bay off Killyleagh, Upper Wellstream Bay, Castleward Bay and the centre by Dickie (1858).

Gibbula umbilicalis **(da Costa, 1778) (Fig. 15)**

Rare, recorded live from a few sites near the mouth of the Narrows into the Irish Sea (Mullog Point, Craigadarkin, Carrstown Point, Ballyquintin: Green Isle) by the author. Widely recorded around the whole lough by HW, which was an error of identification for juvenile *Gibbula cineraria* which also has an umbilicus. Recorded from Kilclief, Killard Point and Big Rock by Williams (1954). Old

record: as *Trochus umbilicatus*, rare, dead from Upper Wellstream Bay in mud by Dickie (1858).

Calliostoma zizyphinum **(L., 1758) (Fig. 15)**

One of the most widely distributed species in SL. Only excluded from upper reaches of the Quoile Estuary and the north-west. Found at low water, often on *Fucus serratus*, under overhangs or large stones and boulders. Can be locally extremely abundant (e.g. Inner Mahee Island, Church Point). Commonly found in the sublittoral down to 35m+, generally in smaller numbers, although can be locally as abundant as on the shore (e.g. west of Limestone Pladdy). Old records: found living, very common, in Castleward Bay and rare in Upper Wellstream Bay and the centre by Dickie (1858); seven live specimens, SL, Waller Collection, Reg. No. 93.1889 (NMI); four specimens, Portaferry 1898 (Mrs R. Russel, UM).

var. *lyonsii* (Leach)

The pure white form of species. It is abundant on the shore and in the sublittoral, particularly on the eastern shore of the main lough. The only other similar sites are Clachan Sound and Torsa Channel on the west coast of Scotland. Old records: numbers found on the beach at Ardmillan adherent to 'wrack' by Thompson (1856); living in Castleward Bay and Upper Wellstream Bay (both rare) by Dickie (1858); ten specimens SL Waller Collection, Reg. No. 93.1889 (NMI); four specimens, SL, nine specimens, Portaferry, April 1898 and five specimens, Portaferry, August 1905 (all Welch, UM); six specimens, SL (Thompson, UM); 16 specimens, Portaferry 1898 (Mrs R. Russel, UM).

Dikoleps nitens **(Philippi, 1844)**

Not seen recently. Reported by Nichols (1900) as *Cyclostrema nitens* from SL, in the Waller collection (NMI); two specimens, as *Trochus pusillus*, Strangford, Waller Collection, Reg. No. 93.1889 (NMI).

Skeneidae

Skenea serpuloides **(Montagu, 1808)**

Not seen recently. Reported by Nichols (1900) as *Cyclostrema*

serpuloides (NMI).

Phasianellidae

Tricolia pullus **(L., 1758) (Fig. 16)**

Found principally on the lower shore and shallow sublittoral from the Narrows and the southern part of the lough by the author. Recorded from Killard, 1946, and off Kilclief, 7m, 1941, by Williams (1954). Old records: recorded as common, living from Castleward Bay as *Phasianella pullus* (Dickie, 1858); seven specimens, SL (Thompson, UM).

[*Turbo ziczac*]

This species was recorded from SL by Brown (1818). This is clearly an error, as this is normally considered to be an Indo-Pacific species, *Littorina ziczac* (Gmelin, 1791). It may, however, have been an error for the above species.

Order Mesogastropoda

Superfamily Cerithiacea

Cerithiidae

Bittium reticulatum **(da Costa, 1778)**

Dead shells found at scattered locations around main body of SL. Apparently alive at the Dorn (HW). Possible error for worn specimens of *Cerithiopsis tubercularis*. Old record: as *Cerithium reticulatum*, common, dead from Castleward Bay (Dickie, 1858).

Turritellidae

Turritella communis **Risso, 1826 (Fig. 16)**

Dead shells found at scattered locations on the shore. Sublittoral living in the main body of SL, especially in the south/south-west and the mouth of the Quoile (UM, author). This is consistent with its preferred habitat of stiff mud with some shell gravel and small stones. Old records: as *Turritella terebra*, live dredged (Thompson, 1856); common, living from Castleward Bay, centre of SL; rare, living from Wellstream Bay; common, dead from bay off Killyleagh, Upper Wellstream Bay (Dickie, 1858).

Superfamily Littorinacea
Littorinidae
Lacuna crassior (Montagu, 1803) (Fig. 17)
Recorded living from five sites; sublittoral - Marlfield Bay, Ballyhenry Bay (author), west of Carrstown Point, Holm Bay (UM); littoral - Black Islands (author). Old records: very rare, dead from Castleward Bay (Dickie, 1858) and on *Laminaria* sp., SL (Thompson, 1856).
Lacuna pallidula (da Costa, 1778) (Fig. 17)
Recorded living and common at many sites, both shore and shallow sublittoral. Occasionally abundant on lower and extreme lower shore, especially in Ballyhenry Bay. Very large specimens were present at Craigadarkin (12.3.1990). Old records: `sparing, *L. digitata*, also on oysters' (Thompson, 1856); `*Laminaria*, SL, chiefly on broad fronds' (Praeger, 1889).
Lacuna parva (da Costa, 1778) (Fig. 18)
Recorded living and common at many sites, both shore and shallow sublittoral, principally in the Narrows, but also the south and mid lough (HW, author). Very large specimens (10mm+) were present at Craigadarkin (12.3.1990). Old record: as *Lacuna puteolus*, SL found by Mr S. A. Stewart (Praeger, 1889).
Lacuna vincta (Montagu, 1803) (Fig. 18)
Recorded living and abundant at many sites, both shore and shallow sublittoral. Frequently attached to fronds of *Laminaria* spp. Absent from the north-west. Very large specimens (16mm+) were present at Craigadarkin (12.3.1990). Old record: very common, live, Castleward Bay (Dickie, 1857).
Littorina littorea (L., 1758) (Fig. 19)
Recorded living (and abundant in places) at almost all sites around SL. Extends from mid-tide to the shallow sublittoral. Pelagic eggs fairly frequent except in autumn months (Gotto, 1951). Eggs most frequently seen in April (Boyd, 1973a).
Littorina mariae Sacchi and Rastelli, 1966 (Fig. 19)
Recorded living from many sites in SL. Absent from the north-west

of the lough. Common, occasionally abundant (e.g. Dogtail Point) from mid-tide to low water. Yellow, and stripey brown forms seen.

Littorina neglecta Bean in Thorpe, 1844 (Fig. 20)

Recorded living and common in upper shore rock crevices from scattered sites around SL. It should be noted that this may not be a true species (Smith and Heppell, 1991). Its status is discussed, together with evidence for *L. neglecta* being an ecotype of *Littorina saxatilis* in Reid (1993).

Littorina nigrolineata J. E. Gray, 1839 (Fig. 20)

Found living and common at a number of sites in SL, which is the only known locality for this species in Northern Ireland (Matthews and Montgomery, 1987). The red-brown morph is present on the red sandstone stones around the lough. It is absent from the north/north-west. Old record: 12 specimens, Mahee Island, SL, September 1931 (Welch, UM).

Littorina obtusata (L., 1758) (Fig. 21)

Recorded living and very common from mid-shore around the whole lough. Old records: as *Littorina littoralis* (which may also include *L. mariae*), October 1834, 20+ specimens (Hyndman, Thompson, UM).

Littorina saxatilis (Olivi, 1792) (Fig. 21)

Recorded living and abundant from the upper shore around the whole of SL. Mainly under or on small stones. Normally dominant species in upper shore. Old record: as *L. rudis*, near Killard, August 1837, four specimens (Hyndman, UM); three specimens near Killard, SL, August 1837 (Hyndman, UM).

Melarhaphe neritoides (L., 1758)

Not recorded by author, although searched for at many potential sites. Matthews and Montgomery (1987) state that this species is only found on the Giants' Causeway and at Ardglass in Northern Ireland. Williams (1954) records *M. neritoides* from Castleward Bay, Bar Hall and Killard Point, and as common and gregarious in some localities. HW records this species from two sites: Herring Bay (on boulders) and Mahee Island. All these records are

doubtful, especially as *M. neritoides* is very easy to confuse with juveniles of *L. littorea* or *L. saxatilis*, or with the species *L. neglecta*.

Skeneopsidae

Skeneopsis planorbis **(Fabricius, 1780) (Fig. 22)**

Recorded living and abundant at many shore sites and in the shallow sublittoral. Absent from the north-west. Occasionally abundant in middle and lower shore, particularly Outer Chapel Island and Craiglee Rocks. Old record: as *Skenea planorbis*, abundant (Praeger, 1889).

Superfamily Cingulopsacea

Cingulopsidae

Eatonina fulgida **(J. Adams, 1797)**

Recorded from two shore sites by the author; Braddock Island and Chapel Island Causeway. This species was particularly abundant in *Fucus serratus* at Braddock Island. Its abundance at this site, and the fact that it is also not uncommon at Chapel Island Causeway, yet completely absent at sites close by, suggest that this species has very specific habitat preferences. This species reproduces by direct development with no larval dispersal phase (Fretter and Graham, 1977).

Superfamily Rissoacea

Rissoidae

Rissoa interrupta **(J. Adams, 1800) (Fig. 22)**

Recorded living and abundant from many shore sites around SL, especially in the muddier habitats. Absent only from the extreme north-west. Also found in the shallow sublittoral to 18m. Very common on Braddock Island. *R. interrupta* is considered to be a full species by Smith and Heppell (1991).

Rissoa lilacina **Recluz, 1843**

Recorded living by the author from a single site in SL *viz.* Cloghy Rocks. Old record: as *Rissoa violacea*, dead, common from Castleward Bay by Dickie (1857). *R. violacea* is now considered to be confined to the Mediterranean (Smith and Heppell, 1991)

subsp. *lilacina porifera* Lovén, 1846
Recorded living by the author from a single site *viz.* Ballyhenry Island (south). This is the only recorded site for this subspecies in Ireland, although it is not uncommon on the west coast of Scotland.
subsp. *lilacina rufilabrum* Alder, 1844
Recorded living by the author from the wreck 'The Pins' in Ballyhenry Bay in about 10m. A dead shell was recorded dredged from 2m west/south-west of Skate Rock.
Rissoa membranacea (J. Adams, 1798)
Recorded living by SMS from Doctors Bay (July, 1976), a shallow bank west of Dunnyneill Island (UM), and by the author (UM), as abundant, living in Ballyhenry Bay. The animals were in 3-4m on the blades of *Zostera marina* L. An extensive bed covered the top of a mud bank in the south part of the bay. Dead shells were also recorded from Castleward Bay. Old record: common, dead, Castleward Bay by Dickie (1858).
Rissoa parva (da Costa, 1778) (Fig. 23)
Widely recorded living from SL by the author and HW, from the shore and shallow sublittoral. Absent in the north/north-west.
Alvania beanii (Hanley in Thorpe, 1844)
Not seen living in SL. Old records: as *Rissoa beanii*, common, dead from Castleward Bay by Dickie (1858); as *Rissoa reticulata* from dredged Ardmillan shell sand by Praeger (1889).
Alvania cancellata (da Costa, 1778)
Not seen living in SL. Old record: as *Rissoa crenulata*, rare, dead from Castleward Bay by Dickie (1858).
Alvania punctura (Montagu, 1803) (Fig. 23)
Recorded living by the author from a few scattered sites in the south and the Narrows. The sites were mainly sublittoral (to 29m). Two sites (Angus Rock and Salt Rock) are very unusual as the fauna of the lower shore there are more characteristic of the shallow sublittoral e.g. *Tubularia* sp., *Caryophyllia smithii* Stoke and

Broderip, *Corynactis viridis* Allman. Old records: from SL, in the Belfast Naturalists' Field Club's `Guide to Belfast' 1874 (Nichols, 1900).

Alvania semistriata **(Montagu, 1808) (Fig. 24)**

Recorded living by HW from Carrstown Point, and by the author from Outer Chapel Island, Bankmore Hill, Ballyhenry Point (20m) and Angus Rock.

Cingula trifasciata **(J. Adams, 1800) (Fig. 24)**

Common species where found at a number of sites scattered around the lough. Occasionally abundant in middle shore (Marlfield Bay, Swan Island) and lower shore (Ballyquintin: Green Isle). Found under `slatey' flat stones generally just below the upper shore zone. Not normally found living at low water as reported by Williams (1954).

Manzonia crassa **(Kanmacher in J. Adams, 1798)**

Recorded living by HW from Carrstown Point. Shells found at the Dorn, Ballyhenry Point, east of Chapel Island, Ballywhite Bay and Castleward Bay by the author. Old records: as *Rissoa costata*, rare, dead from Castleward Bay by Dickie (1858). Also found dead by Praeger (1889).

Onoba semicostata **(Montagu, 1803) (Fig. 25)**

Very common, living at many sites around SL, both shore and shallow sublittoral. Absent from the north-west. Old records: as *Rissoa striata*, common, dead, Castleward Bay by Dickie (1858); as *Rissoa costata*, 13 specimens, SL, Reg. No. 22.1893 (NMI).

Pusillina inconspicua **(Alder, 1844) (Fig. 25)**

Recorded living by the author from eight sites scattered around SL from the shore and the shallow sublittoral (<10m). Absent from the north-west and the Narrows.

Pusillina sarsi **(Lovén, 1846) (Fig. 26)**

Widely distributed, living, around the lough in suitable sites, frequently silty or muddy sand. Absent from the north. Found on the shore and shallow sublittoral. Depth range 0-20m+.

Bull. Ir. biogeog. Soc. No. 17

Hydrobiidae

Hydrobia ulvae **(Pennant, 1777) (Fig. 26)**

Extremely abundant, living on the mud/sand flats at the north end. Elsewhere found in all suitable muddy sandy habitats e.g. the Quoile. Williams (1954) recorded this species from Bar Hall, Millquarter Bay and Ballyhenry Bay, although neither the author, nor HW recorded it from any site in the Narrows. Old record: as *Rissoa ulvae*, in soft sand and ooze, Thompson (1856).

Iravadiidae

Hyala vitrea **(Montagu, 1803)**

A single dead shell dredged from west-south-west of Skate Rock in 2m by the author (det. SMS).

Caecidae

Caecum imperforatum **(Kanmacher in G. Adams, 1798)**

Not seen living. Old record: as *Caecum trachea*, 'SL (Waller)', Jeffreys (1865).

Caecum glabrum **(Montagu, 1803)**

Recorded from the north of Cloghy Rocks (Poizat, 1979).

Superfamily Strombacea

Aporrhaiidae

Aporrhais pespelecani **(L., 1758) (Fig. 27)**

Recorded living from the mouth of the Quoile, and the extreme south, by UM, Marine Biology Station (trawl, mouth of Quoile, 1964/1965) and the author (Killyleagh Reefs). The area is consistent with its preferred habitat of muddy gravel (not soft mud). Williams (1954) recorded the species live from off Ballywhite Bay (13m, 1944; 1950). Old record: common, live, Castleward Bay and Upper Wellstream Bay by Dickie (1858).

Superfamily Calyptraeacea

Calyptraeidae

Calyptraea chinensis **(L., 1758)**

There is a brief report of shells only being found in SL (Morrow *et al.*, 1993).

Capulus ungaricus (L., 1758) (Fig. 27)
Recorded living from a *Modiolus modiolus* bed near Black Rock (Roberts, 1975), from SL in general (Hiscock and Mitchell, 1980), and by the author from north-east of Limestone Rock where three specimens were attached to living *M. modiolus* shells. Williams (1954) recorded the species from Limestones, Killyleagh, Ringhaddy and Ballywhite. Old records: `*Patella ungarica* not uncommon and of large size adhering to oysters etc. in Lough Strangford' (Brown, 1818); as *Pileopsis Hungaricus*, rare, dead from Castleward Bay by Dickie (1858).

Superfamily Lamellariacea

Triviidae

Trivia arctica (Pulteney, 1799) (Fig. 28)
Recorded living from both the shore, and (more commonly) the sublittoral by the author and UM. Depth range 0-33m+. Mainly found in the Narrows and south basin. Generally no more than one or two specimens found at any one site.

Trivia monacha (da Costa, 1778) (Fig. 28)
Recorded living from both the shallow sublittoral and (more commonly) the shore by the author and HW. Mainly found in the Narrows, but distributed over most of the lough except the north-west. Old records: as *Cypraea Europaea*, very common, dead, from Castleward Bay by Dickie (1858). This could refer to either this or the above species, or both; 12+ specimens as *Cypraea europaea*, Strangford, Waller Collection, Reg. No. 93.1889 (NMI); as *Bulla diaphana*, `two specimens taken by Mr Hyndman and myself when dredging in Strangford Lough' (Thompson, 1844). `*Bulla diaphana* is the young of *Cypraea Europaea* before the outer lip is formed' (Praeger, 1889).

Lamellaridae

Lamellaria latens (Müller, 1776) (Fig. 29)
Recorded living at sites scattered around SL by the author and HW, mainly from the Narrows.

Lamellaria perspicua (L., 1758) (Fig. 29)
Recorded living from five sites by the author, all littoral, and one sublittoral site (Bird Island Passage) by UM. Williams (1954) recorded this species from Killard Point at L.W.S.T. on the compound ascidian *Trididemnum* sp. Old record: as *Sigaretus tentaculatus*, January 1835, two small individuals dredged by Hyndman and Thompson (Thompson, 1856).
Velutina velutina (Müller, 1776) (Fig. 30)
Recorded living from six sites around SL: mouth of the Quoile, approx. 15m (Marine Biology Station, 1964); east of Black Rock from *Modiolus modiolus* bed (UM, 1975); south-west of Dunnyneill Island, 26m (UM); Swan Island, Lees Wreck (13m), Ballyhenry Island (author, 1986-90).
Superfamily Naticacea
Naticidae
Polinices catena (da Costa, 1778)
Not seen living in SL. Old records: as *Natica monilifera*, rare, dead, Castleward Bay and centre of SL by Dickie (1858).
Polinices fuscus (Blainville, 1825)
Not seen living in SL. Old records: as *Natica sordida*, one specimen (Thompson, UM); as *Natica sordida*, very rare, dead, Castleward Bay and centre of SL by Dickie (1858).
Polinices montagui (Forbes, 1838)
Not seen living recently. Old records: as *Lunatia montagui*, from Belfast Naturalists' Field Club's 'Guide to Belfast', 1874 (Nichols, 1900).
Polinices polianus (delle Chiaje, 1826) (Fig. 30)
Recorded living off Killyleagh, 13m, 1941 and Limestones, 1942 by Williams (1954). A single living specimen recorded from sandy gravel close to Lees Wreck in 13m, in Ballyhenry Bay, by the author. Old records: Portaferry, six specimens (Thompson, UM); as *Natica nitida*, common live from Castleward Bay, and rare, live from Wellstream and Upper Wellstream Bay, by Dickie (1858); six live specimens as *Natica alderi*, Strangford, Waller Collection,

Reg. No. 93.1889 (NMI).

Superfamily Triphoracea

Cerithiopsidae

Cerithiopsis tubercularis **(Montagu, 1803) (Fig. 31)**

Recorded living by the author from L.W.S.T. and the shallow sublittoral at seven sites around SL, principally from the Narrows.

Superfamily Epitoniacea

Epitoniidae

Epitonium turtonis **(Turton, 1819)**

Recorded dead from SL by Mr S. A. Stewart as *Scalaria turtonae* (Praeger, 1889). It was speculated that this may be a fossil record.

Aclididae

Aclis gulsonae **(Clark, 1850)**

Old records: from SL by Waller (Jeffreys, 1865), as var. *tenuicula*, one specimen, Strangford, off the Bar, Waller Collection, Reg. No. 93.1889, labelled variously as *Jeffreysia ?gulsonae* and *?Odostomia gulsonae* (NMI).

Superfamily Eulimacea

Eulimidae

Eulima bilineata **Alder, 1848**

A single dead specimen found by the author from Castleward Bay in coarse sand at 10m. Old record: living specimens recorded as *Eulima trifasciata*, rare, by Dickie (1858) from the same site.

Melanella alba **(da Costa, 1778)**

Recorded from off Kilclief in 13m, sand, 1942 by Williams (1954). He does not state if the specimen(s) were living. Found dead off south-east of Ballyquintin Point in 25m (UM, 1976) and off Stork Shoal in 29m (UM, 1977) in *Ophiothrix* sp. community. Old records: as *Eulima polita*, one specimen, 1846 (Hyndman, Thompson, UM); 'very few individuals, 8-10f, pure sand' (Thompson, 1856); as *Eulima polita*, very rare, dead, from Castleward Bay by Dickie (1858).

Vitreolina philippi (Rayneval and Ponzi, 1854)
One living specimen found by the author at 35m, north of Chapel Island in the south basin. Old record: as '*Vitreolina sinuosa*', live, Killyleagh (Fisher, 1933).

Order Neogastropoda

Superfamily Muricacea

Muricidae

Boreotrophon truncatus (Ström, 1768) (Fig. 31)
Recorded living from Rue Point in 2.5m, Bird Island Passage in 14m (UM), Granagh Bay (HW) and from six other sublittoral sites by author, mainly in the north entrance to the Narrows. Old record: as *Trophon clathratus*, very rare, dead, Castleward Bay by Dickie (1858).

Ocenebra erinacea (L., 1758) (Fig. 32)
Recorded living from many sites around SL from both the shore and the shallow sublittoral (to 25m). Absent from the north-west. Rarely common at any one site. Rare from the open coast, only found in SL and Carlingford Lough in Northern Ireland. Old record: rare, dead, Castleward Bay by Dickie (1858).

Trophonopsis barvicensis (Johnston, 1825)
Not seen living. Shell only in coarse shelly gravel from north-east of 17 fathom plateau, north of Ballyhenry Point in 36m (UM, 1976). Recorded live from just outside the lough in Strangford Fairway (UM).

Trophonopsis muricatus (Montagu, 1803)
Found living 300m north-west of South Dunnyneill Island east of Black Rock (UM, 1976). Shells found by author from Castleward Bay and west of Limestone Pladdy. Old records: as *Trophon muricatus*, common, dead from Castleward Bay; rare, dead, from Wellstream Bay and the centre of SL, by Dickie (1858); two specimens, SL (Thompson, UM).

Nucella lapillus (L., 1758) (Fig. 32)
Abundant, living around whole of SL. Mainly found on the shore, but also in the sublittoral from Lees wreck (2m), Angus Rock

(north-east) (35m), west of Round Skart Rock (12-20m) (author); north of Chapel Island (2m), west of Rue Point (32.5m), west of Carrstown Point (8m) (UM).

Buccinidae

Buccinum undatum **L., 1758 (Fig. 33)**

Found living, although rarely common, at most sites in SL, both shore and sublittoral. Absent from the extreme north-west. Found at 90 sublittoral sites by UM. Depth range 0-42m+. Egg masses recorded by Williams (1954) from November to April. Juveniles and egg masses at North Point, Killyleagh (29.3.1990), Moore's Point (31.3.1990) and Stonedyke Bank (23.2.1992). Old records: rare, live, Castleward Bay, Upper Wellstream Bay; common, live, centre of SL by Dickie (1858).

Colus gracilis **(da Costa, 1778)**

Occasionally in lobster pots, Killard (Williams, 1954).

Neptunea antiqua **(L., 1758) (Fig. 33)**

Recorded living from a number of sublittoral sites by the author and UM, mainly in the centre of the lough, and south basin. Williams (1954) recorded two living specimens from Limestones, 27m, 1944. Old record: as *Fusus antiquus*, rare, living, Castleward Bay by Dickie (1858).

Hinia reticulata **(L., 1758) (Fig. 34)**

Recorded living from a few sites by UM, in the Narrows and the mouth of the Narrows. Williams (1954) recorded this species from the *Laminaria* sp. zone from Ringhaddy, Kilclief and Killard. Old record: as *Buccinum hepaticum*, rare from SL by Brown (1818).

Hinia incrassata **(Ström, 1768) (Fig. 34)**

Found common, living at many sites from the shore and shallow sublittoral. Absent from the north/north-west. Old record: common, dead, Castleward Bay; rare, dead, centre of SL by Dickie (1858).

Nassa hepatica **Montagu**

'Recorded from SL on the authority of Turton and Brown (*Monoceros hepaticus*). It is a West Indian shell' (Praeger, 1889).

Superfamily Conacea

Turridae

Haedropleura septangularis (Montagu, 1803)

Not seen living recently in SL. Old record: as *Mangelia septangularis*, rare, live, from Castleward Bay by Dickie (1858).

Mangelia attenuata (Montagu, 1803) (Fig. 35)

Recorded living from three sites *viz.* the Dorn (HW), Ringhaddy Harbour (BEP, 1975) and North of Chapel Island (author). Dead shell found in Castleward Bay (author).

Mangelia nebula (Montagu, 1803)

Recorded living from Ballywaddon (pers. comm. SMS, one specimen found, July 1976). Old record: as *Mangilia nebula*, SL, H., f. Thompson MS (Nichols, 1900).

Mangelia coarctata (Forbes, 1840) (Fig. 35)

Recorded living from Castleward Bay, west of Long Island, Verde Rocks (north-east) (author) and east-north-east Mahee Point (UM). Dead shell found dredged from Bird Island Passage.

Oenopota rufa (Montagu, 1803)

Single living specimen found on Lees Wreck (UM). A single living specimen also found low on the shore from Dogtail Point (author). Dead shells from Castleward Bay (author) and bay north of Audley's Point (UM). Shells were taken in 13m off Killyleagh in 1939 (Williams, 1954). Old records: as *Pleurotoma rufa*, three specimens, October 1834 in 8-10f, SL (Thompson, 1856); as *Mangelia rufa*, rare, dead from Castleward Bay by Dickie (1858).

Oenopota turricula (Montagu, 1803)

Recorded from east of Black Rock, dead, in mud samples from a *Modiolus modiolus* bed in 27m (UM). Old record: Castleward Bay, dead, in mud, small stones and gravel as *Mangelia turricula* (Dickie, 1858).

Raphitoma linearis (Montagu, 1803) (Fig. 36)

Recorded living from Beardy Rocks, Bird Island, Lees Wreck (author) and channel between Long Rock and Dunnyneill Island. Shells found south-east of Ballyquintin Point, north-east of

Ballyhenry Point (UM) and Castleward Bay (author). Old records: as *Defrancia linearis*, 10 specimens (Thompson, UM); as *Mangelia linearis*, two specimens, 1857 (Dickie, UM); from Castleward Bay, rare, dead (Dickie, 1858).

Raphitoma purpurea (Montagu, 1803)

Dredged off Killyleagh, 13m, 1940, status unknown (Williams, 1954). Shells found in Castleward Bay and on Killyleagh Reefs (author).

Thesbia nana (Lovén, 1846)

Killyleagh, 1939 (Williams, 1954), status unknown, possibly live. Considered to be an anomalous record (Seaward, 1991).

Superfamily Rissoellacea

Rissoellidae

Rissoella diaphana (Alder, 1848) (Fig. 36)

Recorded living from many sites in SL, from the shore and shallow sublittoral (author, HW). Absent from the Quoile Estuary and the north-west.

Rissoella globularis (Jeffreys in Forbes and Hanley, 1853) (Fig. 37)

Recorded living from many sites in SL, from the shore and shallow sublittoral (author, SMS). Found generally in siltier habitats than the other two *Rissoella* spp. This is the only area in Ireland where the species is commonly found (Nunn and McGrath, 1989).

Rissoella opalina (Jeffreys, 1848) (Fig. 37)

Recorded living from many sites in SL, from the shore and shallow sublittoral (author). Common on extreme lower shore, Ballyhenry Island (south).

Superfamily Omalogyracea

Omalogyridae

Omalogyra atomus (Philippi, 1841) (Fig. 38)

Very widely distributed, living around SL on the shore and shallow sublittoral. Absent from the Quoile Estuary and the north-west. Frequently overlooked because of its tiny size. Abundant at Bar Hall Bay (24.5.1990) and Craiglee Rocks (8.8.1990).

Ammonicerina rota (Forbes and Hanley, 1850)
Five specimens found by author (det. SMS) from Gransha Point amongst weed washings.
Superfamily Pyramidellidacea
Pyramidellidae
Odostomia plicata (Montagu, 1803)
Recorded by the author from Dogtail Point (det. SMS). Old record: from SL by Hyndman and Thompson (Thompson, 1856).
Odostomia turrita Hanley, 1844 (Fig. 38)
Recorded living from many sites, both the shore and shallow sublitoral (author). Absent from the Quoile Estuary and the north/north-west.
Odostomia unidentata (Montagu, 1803) (Fig. 39)
Recorded living from many sites around SL from the shore to the sublittoral (28m) (author), mainly from the Narrows and south basin. Old record: dredge, soft sand (Thompson, 1856).
Brachystomia carrozzai (Aartsen, 1987)
Recorded by the author from two sites (det. SMS); in weed washings from Jackdaw Island and the Dorn.
Brachystomia eulimoides (Hanley, 1844) (Fig. 39)
Recorded by the author, living, from 11 sites scattered around SL, from the shore to the shallow sublittoral. Old records: as *Odostomia pallida*, on soft sand and ooze, dead (Thompson, 1856); Ardmillan shell sand (Praeger, 1889).
Brachystomia scalaris (Macgillivray, 1843) (Fig. 40)
Recorded living from 19 sites around SL, from the shore to the shallow sublittoral, in the Narrows to mid-lough.
Chrysallida indistincta (Montagu, 1803)
Recorded living from two sites by the author (det. SMS) *viz.* Herring Bay (shore) and dredged from South Rock to Sand Rock in 10-25m. Old record: as *Chemnitzia indistincta*, very rare, dead, from Castleward Bay by Dickie (1858).
Chrysallida obtusa (Brown, 1827) (Fig. 40)
Recorded living from five sites *viz.* Herring Bay (HW), north-east

Mahee Point, Ringhaddy Harbour, Ragheries and Bird Island Passage (author) (det. SMS). Shells were recorded from Ballywhite Bay (author) and Killyleagh (Fisher, 1933).

Jordaniella nivosa (Montagu, 1803)

A single specimen from each of two sites recorded by the author (det. SMS) from weed washings; Angus Rock and Ballyhenry Point in 15-40m.

Partulida spiralis (Montagu, 1803) (Fig. 41)

Recorded living from four sites by the author (det. SMS) *viz.* Ballyhenry Island (south), Dunnyneill Island (south-east) (28m), north of Chapel Island (35m) and Chapel Island Causeway.

Tragula fenestrata (Jeffreys, 1848)

Three living specimens were dredged by the author (det. SMS) from Bird Island Passage in 6-24m.

Turbonilla lactea (L., 1758)

Recorded living under stones at extreme low water, from Kilclief and Kilard, 1940 by Williams (1954). Also recorded living from Ballywaddon (pers. comm. SMS, one specimen, July 1976). A dead shell was recorded from north of Audley's Point (UM). Old record: as *Chemnitzia elegantissima*, very rare, dead, from Castleward Bay, by Dickie (1858).

Turbonilla rufescens (Forbes, 1846)

Not seen living. Old records: as *Chemnitzia scalaris*, very rare, dead, from Castleward Bay by Dickie (1858). Praeger (1889) published this record as *Odostomia scalaris* var. *rufescens*.

Turbonilla crenata (Brown, 1827)

Not seen living. Shell recorded from grab sample off Town Rock (9m) by the author.

Order Cephalaspidea

Superfamily Acteonacea

Acteonidae

Acteon tornatilis (L., 1758)

Not seen living. Old record: as *Tornatella fasciata*, very rare, dead Castleward Bay (Dickie, 1858).

Superfamily Philinacea

Scaphandridae

Scaphander lignarius **(L., 1758)**

Off Kilclief, 9m, 1942 and off Green Island, 13m, 1941 (Williams, 1954)

Cylichnidae

Cylichna cylindracea **(Pennant, 1777)**

Not seen living. Old record: as *Bullinella cylindracea*, rare, dead from Castleward Bay, by Dickie (1858).

Philinidae

Philine aperta **(L., 1767)**

Recorded living, fairly abundant from the mouth of the Quoile, Agassiz trawl, 12-18m, Easter and July 1964 (Marine Biology Station). Not recorded by UM.

Philine punctata **(J. Adams, 1800)**

Single living specimen recorded from Marlfield Bay in 19m by the author.

Superfamily Bullacea

Haminoeidae

Haminoea navicula **(da Costa, 1778)**

Recorded living, abundant and breeding from the mouth of the Quoile, Agassiz trawl, 12-18m, July 1964 (Marine Biology Station). Not recorded by UM.

Superfamily Retusacea

Retusidae

Retusa obtusa **(Montagu, 1803) (Fig. 41)**

Recorded living from six sites by HW (Granagh Bay, Isle O'Valla, Newtownards, Pawle Island, Yellow Rocks, Drummond Island) and from Ballyhenry Island (south) by the author. Dead shell dredged from the Quoile, off Salt Island by the author. Old record: as *Cylichna obtusa*, very rare, dead, Castleward Bay, by Dickie (1858).

Retusa truncatula **(Bruguire, 1792) (Fig. 42)**

Recorded living from Horse Island, Angus Rock, Salt Rock and dredged from Bird Island Pasage by the author. Old record: one

specimen as *Cylichna mammillata*, Strangford, Waller Collection, Reg. No. 93.1889 (NMI).

Superfamily Runcinacea

Runcinidae

Runcina coronata **(Quatrefages, 1844)**

Recorded living from a rock pool, Killard, 1944, near mid-tide (Williams, 1954) and from the Dorn (as *Pelta coronata*) (Boaden *et al.*, 1975).

Order Acochlidioidea

Superfamily Hedylopsacea

Hedylopsidae

Hedylopsis brambelli **Swedmark, 1968 (Fig. 42)**

Recorded living from five sites in the Narrows: in fine shell gravel, 3m, Strangford Harbour; in coarse shell gravel, shore low water, Angus Rock; shell gravel bank low water, north and south-east sides of Black Island, Ballyquintin (Boaden, 1966); Granagh Bay (south) and Cloghy Rocks (Poizat, 1979). These are the only records for Ireland, and this species has been recorded from only two other areas in Great Britain (Seaward, 1991).

Superfamily Philinoglossacea

Philinoglossidae

Philinoglossa helgolandica **Hertling, 1932 (Fig. 43)**

Recorded living from fine shell gravel, 3m, Strangford Harbour and Black Island (Boaden, 1966) and Cloghy Rocks (Poizat, 1979). These are the only records for Ireland. This species is only found elsewhere in the south-west of England (Seaward, 1991).

Order Sacoglossa

Superfamily Elysiacea

Elysidae

Elysia viridis **(Montagu, 1804) (Fig. 43)**

Widely recorded living on its food *Codium* spp. from both the shore and the shallow sublittoral. The majority of specimens are a glossy green colour, camouflaged on their food. Specimens found by the author (not on *Codium* sp.) on Lees wreck on sublittoral algae,

were a pale beige colour. Similar specimens were found (abundant) off North Rock, on the outer Ards peninsula, where *Codium* spp. were absent. *E. viridis* is particularly abundant on shores in the mid and north areas amongst small stones and muddy gravel at low water, e.g. Millhouse, where there were more than 40 specimens on one piece of *Codium* sp.

Stiligeridae

Placida dendritica **(Alder and Hancock,1843)**

Several living specimens found at Bar Hall Bay, 6.4.1967 (Marine Biology Station).

Alderiidae

Alderia modesta **(Lovén, 1844)**

Abundant, living on salt marsh at Ardkeen, May 1974. Most specimens were 6-8mm long and up to 10mm (Gascoigne and Platts, 1974). A single specimen was found by author on Ballyhenry Island (south) in 1986 (det. BEP).

Hermaeidae

Hermaea bifida **(Montagu, 1815)**

Found living at two sites, Bird Island Passage in 8.5m (1980, UM) and 'Pins' wreck in 8m, 18.9.1994 (author).

Limapontidae

Limapontia capitata **(Müller, 1774)**

Recorded living from Ballyhenry Bay in 1945 (Williams, 1954); Doctors Bay (pers comm. SMS, 1976); Horse Island (HW).

Limapontia depressa **Alder and Hancock, 1862**

Abundant, living on salt marsh, on damp mud above tide level and flat expanse of wet mud left by receding tide at Ardkeen, May 1974 (Gascoigne and Platts, 1974).

Limapontia senestra **(Quatrefages, 1844)**

Recorded living from the Dorn (Boaden *et al.*, 1975).

Order Anaspidea
Superfamily Aplysiacea
Akeridae
***Akera bullata* Müller, 1776**
Taken occasionally living in dredge, muddy grounds, Killyleagh, 1939 and Castleward Bay, 1941 (Williams, 1954). Old records: rare, living, centre of SL, 15-25f (Dickie, 1857); as *Acera bullata*, living abundant, on *Zostera* sp. banks of SL (Praeger, 1889); seven live collected specimens as *Acera bullata*, SL, Reg. No. 22.1893 (NMI).
Aplysiidae
***Aplysia punctata* Cuvier, 1803**
Not common, small specimens, Ringhaddy Sound (Williams, 1954); four large specimens off Killyleagh, beam trawl, 12m, August 1964; four specimens, Ballywhite Bay, L.W.N.T., April 1968 (Marine Biology Station); east of Black Rock, 6m (UM).
Order Notaspidea
Superfamily Pleurobranchacea
Pleurobranchidae
***Pleurobranchus membranaceus* (Montagu, 1815) (Fig. 44)**
Recorded living from many sublittoral sites in SL, mainly along the sheltered west side, but excluded from the Narrows. Common when found. Four large specimens found on shore, L.W.S.T., Portaferry, 1952 (Williams, 1954). Spawning at Jane's Rock and west of Long Sheelagh (12.5.1990).
***Berthella plumula* (Montagu, 1803) (Fig. 44)**
Recorded living from the shore around SL (principally the Narrows and northern part of mid-lough), and one sublittoral site (Jane's Rock, 18m) (author). Not common, single specimens usually found.
Order Nudibranchia
Superfamily Dendronotacea
Tritoniidae
***Tritonia hombergii* Cuvier, 1803 (Fig. 45)**
Recorded mainly living from the sublittoral Narrows, principally

at the north entrance, e.g. Ballyhenry Point, Audley's Point, Lees Wreck. Sublittoral species, depth range 10 - 35m, on *Alcyonium digitatum* L.

Tritonia plebeia Johnston, 1828

Recorded living from four sites in SL; Granagh Bay, beyond L.W.S.T. together with its food, orange *Alcyonium digitatum*, 1947 (Williams, 1954), Lees Wreck, Stork Shoal (UM) and from Ballyhenry Point, 25m (author).

Lomanotidae

Lomanotus genei Verany, 1846

Recorded living east of Black Rock, 20m (1975, BEP).

Lomanotus marmoratus (Alder and Hancock, 1845) (Fig. 45)

Recorded living from three sites by UM and a further six sites by the author on *Nemertesia antennina* (L.). Sublittoral species, range 10-30m+. Absent from the Narrows and northern lough.

Dendronotidae

Dendronotus frondosus (Ascanius, 1774) (Fig. 46)

Recorded living from many sublittoral sites, but generally confined to the Narrows. Also recorded from Granagh Rocks, low water, one specimen 9.1cm long, 1948 (Williams, 1954) and from the shore, one specimen, 3cm long, Angus Rock, 1957 (Marine Biology Station). Depth range 0 - 40m+. Old record: as *Tritonia lactea*, one specimen at entrance to SL in dredgings, on *Laminaria digitata* (Hudson) Lamouroux (Thompson, 1856).

Dotidae

Doto coronata (Gmelin, 1791) (Fig. 46)

Recorded living, usually common where found, from many sites in SL, mainly in the Narrows, but also the southern basin. Principally found in the sublittoral, but also on the shore at L.W.S.T., Killard, 1941 and 1943 (Williams, 1954); the Dorn (Platts, 1973; Boaden *et al.*, 1975); Swan Island, Angus Rock, Salt Rock, Garter Rock (author). The shore specimens were on hydroids attached to kelp e.g. *Obelia* spp., *Dynamena* sp. Reported to be spawning on hydroids on 12.4.1972 (Platts, 1973). Depth range

0-30m+.

Doto cuspidata **Alder and Hancock, 1862 (Fig. 47)**

Recorded living from six sites in SL; Bird Island Passage, north-west of Long Rock, south of Inishanier Island, east of Roe Island (UM); Ringhaddy Harbour (1986, BEP); west of Long Sheelagh (author), all in the mid-west. Depth range 8-25m+.

Doto dunnei **Lemche, 1976 (Fig. 47)**

Recorded living from many sublittoral sites by UM and the author, mainly in the south and mid-lough. Depth range 3-30m+.

Doto fragilis **(Forbes, 1838) (Fig. 48)**

Recorded living, common, on *Nemertesia* spp., from many sublittoral sites, principally in the southern half of the lough, depth range 8-30m+. Apart from records from west of Carrstown Point (UM) and Killard Point, July 1947 (Williams, 1954), appears to be confined to the main body of the lough.

Doto koenneckeri **Lemche, 1976**

Found living at the Dorn 15.4.1978 with its spawn (BEP).

Doto maculata **(Montagu, 1804)**

A single living record from east-south-east of Pawle Island in 28.5m (UM).

Doto millbayana **Lemche, 1976**

Found living from Bird Island Passage in 8.5m, north-east of 17 fathom plateau off Ballyhenry Point (UM) and Ringhaddy Harbour, 20m (1986, BEP).

Doto pinnatifida **(Montagu, 1804)**

Recorded living from Marlfield Bay, south-west of Dunnyneill Island, Walter Rocks, east side of Neil Reef and Ballyhenry Point (8-26m, UM). Reported also from the shore at the Dorn (Boaden *et al.*, 1975).

Embletonia pulchra **(Alder and Hancock, 1844)**

A single specimen was found at Abbey Rock, 15m, 28.5.1985 (UM). Recorded as juvenile, ***Embletonia*** sp., from Angus Rock in coarse shell gravel, 12.10.1962, and on a second visit (no details) (P. J. S. Boaden, pers. comm.). Only one species of this genus is

recognised to occur in north-east Europe (Smith and Heppell, 1991), so the record presumably is of this species.

Superfamily Onchidoridacea

Goniodorididae

Goniodoris castanea **Alder and Hancock, 1845**

There is a brief report of this species being found in SL (Morrow *et al.*, 1993).

Goniodoris nodosa **(Montagu, 1808) (Fig. 48)**

Recorded living, common, under rock and stones at low water from many shore sites in SL and from the sublittoral down to 30m+. Reported spawning at Granagh Bay (south) on 3.5.1970 and 11.3.1972 (Platts, 1973). Also spawning at Sleitch Rocks (1.3.1990) and `The Pins' (8.4.1990).

Okeniidae

Ancula gibbosa **(Risso, 1818) (Fig. 49)**

Recorded from six sublittoral sites in SL; east of Roe Island and Holm Bay (UM); Audley Point, Lees Wreck, Verde Rocks, Jane's Rock (author); reported from the shore at Ringhaddy, 1941 and Killard, 1947, at low water (Williams, 1954), and from Beardy Rocks (author). Depth range 0-30m+.

Onchidoridae

Onchidoris bilamellata **(L., 1767) (Fig. 49)**

Recorded living from many scattered sites in SL. Absent from the exposed end of the Narrows. Common where found, but can be locally abundant when spawning, e.g. Ringhaddy Harbour, 15-20m. Depth range 0-30m+. Found on the lower shore under rocks and stones, particularly in the *Fucus serratus* zone. Spawning Ringhaddy Harbour, 20m (January 1987), Sleitch Rocks (1.3.1990), Moore's Point (31.3.1990), Stonedyke Bank (23.2.1992).

Onchidoris muricata **(Müller, 1776) (Fig. 50)**

Recorded living from many sites in SL. Common where found, but often abundant on *Fucus serratus*. Usually the white form. Depth range 0-20m+. Old record: as *Doris muricata*, dredged, SL on *Laminaria digitata* (Thompson, 1856).

Onchidoris oblonga (Alder and Hancock, 1845)
A single living record from north of Chapel Island, 35m on bryozoans on coarse sandy gravel (author).
Diaphorodoris luteocincta (M. Sars, 1870) (Fig. 50)
Recorded living from four sites in SL; one specimen, near Kilclief in low tide pool, 1955 (Marine Biology Station); Marlfield Bay, 23m on boulder slope (BEP, 1974); Ballywhite Bay and 'The Pins', Ballyhenry Bay (author). This species was common when found in 10m on 'The Pins' in Ballyhenry Bay in July 1990, but absent at other times of year.
Acanthodoris pilosa (Abildgaard in Müller, 1789) (Fig. 51)
Recorded living from many sites in the southern half of SL, both shore and sublittoral. Depth range 0-33m+.
Adalaria proxima (Alder and Hancock, 1854) (Fig. 51)
Recorded living from 10 sites scattered around SL. Can be locally common on *Laminaria* sp. (e.g. Ringhaddy Sound (Marine Biology Station) or *Fucus serratus* (Darragh Causeway (author)). Usually the yellow form.
Superfamily Polyceracea
Aegiretidae
Aegires punctilucens (Orbigny, 1837) (Fig. 52)
Recorded living from Granagh Bay (Platts, 1973; Marine Biology Station), Lees Wreck, Angus Rock, Outer Chapel Island and Gransha Point (author). In general, only one or two specimens found at a site, living amongst encrusting sponges. However, numerous specimens (25-32mm) were spawning under rocks and on the surface of kelps on 8.5.1971, Granagh Bay (south) (Platts, 1973).
Polyceridae
Polycera faeroensis Lemche, 1929 (Fig. 52)
Recorded living from the sublittoral in the mid and south part of SL (UM, author). Apparently not found in the Narrows. Depth range 10-23m+.
Polycera quadrilineata (Müller, 1776) (Fig. 53)
Recorded living from the shore and the sublittoral (UM, author) in

the southern part of SL, and the Narrows. Depth range 0-25m+. Old records: three specimens, entrance SL dredged, on *Laminaria digitata*, October, with Hyndman (Thompson, 1856); as *Polcera typica*, two specimens, SL, Hyndman and Thompson, January, 1835 (Nichols, 1900).

Limacia clavigera **(Müller, 1776) (Fig. 53)**

Recorded living mainly from the Narrows and the south-east of the SL, from the shore and sublittoral (UM, author). Found on the shore at Green Island, Quoile estuary. Depth range 0-25m+. Old record: as *Euplocamus claviger*, dredged SL on *Laminaria*, Jan 1835, Hyndman and Thompson (Thompson, 1856).

Palio nothus **(Johnston, 1838)**

Recorded living from Kilclief; one specimen under stone, 1939 (Williams, 1954) and one specimen low water pool, 1955 (Marine Biology Station). Also recorded from Ballyhenry on *Cliona* sp., L.W.S.T., March, 1973 (Marine Biology Station). There is a specimen in the UM collection labelled *Palio dubia* 1974 Killard Point shore, collected by E.Platts. This is likely to be *P. nothus*.

Superfamily Doridacea

Cadlinidae

Cadlina laevis **(L., 1767) (Fig. 54)**

Recorded living from 10 sites scattered around SL, from the shore and the sublittoral. Depth range 0-25m+. Found in diverse habitats; sublittoral bedrock (Ballyhenry Point), *Modiolus modiolus* bed (Black Rock), current swept bedrock shore (the Dorn), sheltered rock, boulders, sand (Doctors Bay).

Rostangidae

Rostanga rubra **(Risso, 1818)**

Recorded living from one site in SL *viz.* Caskin Bay near the south-west entrance to the Narrows. A single specimen was found under a boulder close to low water. Although not found on its food sponge *Microciona atrasanguinea* Bowerbank, this sponge was present under several other boulders nearby. Anecdotal evidence suggests

that *R. rubra* may also have been found by a student on a field course, but the specimen was lost before it could be identified by the appropriate expert (BEP, pers. comm.). It is possible to confuse this species with a bright red variety (`*flammea* ') of *Archidoris pseudoargus*.

Archidorididae

Archidoris pseudoargus **(Rapp, 1827) (Fig. 54)**

Recorded living, and very common, at many sites and habitats in the Narrows and southern half of SL, both on the shore and the sublittoral. Depth range 0-30m+. Spawning Carrstown Point (26.3.1990), Moore's Point (31.3.1990), Black Rock (30.4.1990).

Discodorididae

Geitodoris planata **(Alder and Hancock, 1846)**

Recorded living from one site only in SL *viz.* Lees Wreck (author). On two occasions a single specimen has been seen attached to the east side of the wreck in about 8m.

Kentrodorididae

Jorunna tomentosa **(Cuvier, 1804) (Fig. 55)**

Recorded living from 12 sites mainly around the south of SL, and the Narrows. Spawn was reported from Granagh Bay on 2.5.1970 (Platts, 1973). All the records are from the shore except for one from west of Rue Point in 32.5m (UM).

Superfamily Arminacea

Arminidae

Armina loveni **(Bergh, 1860)**

Recorded living from two sites in SL; the Quoile estuary, 9m (UM) and Killyleagh Reefs, 8-12m (BEP). At the latter site, a single specimen was seen part buried in mud at the base of its prey, the sea pen *Virgularia mirabilis* (Müller).

Superfamily Heroacea

Janolidae

Janolus cristatus **(delle Chiaje, 1841) (Fig. 55)**

Recorded living from eight sites in the southern part of SL and north entrance to the Narrows (UM, author). Depth range 10-30m+.

Heroidae

Hero formosa (Lovén, 1841)

Two large specimens (approx. 25mm long) dredged in 10m off Island Taggart, on weed, September 1954; two specimens off Killyleagh, 12m, August 1964; one specimen off Island Taggart, March 1966 (Marine Biology Station). Not seen more recently, although a specimen was seen in 1987, by the author in 30m on the wreck of the 'Bangor' off the outer Ards peninsula. These are the only records for Ireland.

Superfamily Aeolidiacea

Coryphellidae

***Coryphella browni* Picton, 1980 (Fig. 56)**

Recorded living by the author from Ballyhenry Point (25m), Sunk Rock (17m) and the shore at Walter's Rocks and Garter Rock. On *Tubularia* sp. Depth range 0-30m+.

***Coryphella gracilis* (Alder and Hancock, 1844)**

Found living on Strangford Old Pier 7.6.1976 (UM).

***Coryphella lineata* (Lovén, 1846) (Fig. 56)**

Recorded living from many sites around SL, principally the Narrows and south basin, from the shore (Garter Rock, author) and sublittoral (UM, author). Depth range 0-40m+. On *Tubularia* sp.

***Coryphella verrucosa* (M. Sars, 1829) (Fig. 57)**

Recorded living from the shore (Ringhaddy Sound, L.W.S.T., 1946, (Williams, 1954); Big Rock, L.W.S.T., 1965, Marine Biology Station; Angus Rock, common (author)) and the sublittoral to 40m, mainly the Narrows and south basin. Observed feeding on *Tubularia* sp. (Angus Rock, author) and on *Cerianthus* sp. (Big Rock, Marine Biology Station).

Flabellinidae

***Flabellina pedata* (Montagu, 1815) (Fig. 57)**

Recorded living, and occasionally common, from the Narrows and south basin in the sublittoral (UM, author), and from the shore in the Narrows (Angus Rock, Garter Rock, Cloghy Rocks, Walter's Rocks; author). Depth range 0-32m+.

Tergipedidae

Tergipes tergipes (Forsskl, 1775)

Recorded living (as *Tergipes despectus*) from the Dorn, grazing on hydroids amongst kelp, M.L.W., 1972 (Platts, 1973). Also recorded from the shallow sublittoral, east of Walter's Rocks, north-east Angus Rock, south-east of Stork Shoal, Strangford Old Ferry Pier 8-32m (UM).

Catriona gymnota (Couthouy, 1838) (Fig. 58)

Recorded living on *Tubularia* sp. from Lees Wreck, south of Dunnyneill Island, north-east Angus Rock (UM, author) and from east of Walter's Rocks (BEP). Depth range 10-28m+.

Cuthona amoena (Alder and Hancock, 1845) (Fig. 58)

Recorded living from three sites: north of Chapel Island (UM), Verde Rocks and Inner Lees Wreck (author). Depth range 5-25m+.

Cuthona caerulea (Montagu, 1804)

Recorded from east edge of Neil Reef (1976, UM) and from Ballyhenry Bay on the wreck 'the Pins' (Graham Day, author).

Cuthona concinna (Alder and Hancock, 1843) (Fig. 59)

Recorded living from five sites in SL - Rue Point, north of Audley's Point, south-east of Stork Shoal (UM); Lees Wreck (BEP), Ballyhenry Point, Audley Point and Castleward Bay (author). Confined to the Narrows and the north entrance to the Narrows. Depth range 7-25m+. Boreo-arctic species.

Cuthona foliata (Forbes and Goodsir, 1839) (Fig. 59)

Recorded living only from the north entrance to the Narrows at four sites *viz.* Audley's Point (north), 27m, east edge of Neil Reef (UM), Ballyhenry Point, 25m (author) and a single specimen from the shore at Ballyhenry Island (BEP).

Cuthona viridis (Forbes, 1840)

Recorded living from two sites *viz.* south of Abbey Rock, 12m, 1976 on mud, large boulders with hydroids, polyzoa etc. (BEP) and south-east of Stork Shoal, 1976, 32m (UM).

Eubranchidae

Eubranchus cingulatus **(Alder and Hancock, 1847)**

A single specimen recorded from Killyleagh Reefs, 8-12m (author).

Eubranchus exiguus **(Alder and Hancock, 1847) (Fig. 60)**

Recorded living from five sites *viz.* off Killyleagh, 9m, 1944, (Williams, 1954), Old Strangford Pier, Lees Wreck (UM), the Dorn, 1972 (Platts, 1973), Marlfield Bay, 20m (author). Usually found on hydroids attached to *Laminaria* sp. fronds, occasionally with *Tergipes tergipes*.

Eubranchus farrani **(Alder and Hancock, 1844)**

Found on the shore at the Dorn on 16.12.1976 (Pat Boaden).

Eubranchus pallidus **(Alder and Hancock, 1842) (Fig. 60)**

Recorded living from six sites in SL, all from the north entrance to the Narrows *viz.* Ballyhenry Point, Audley's Point, Lees Wreck, Castleward Bay (author) and south-east of Stork Shoal, the 'Alisdair' in Ringhaddy Sound (UM). Depth range 5-30m+.

Eubranchus tricolor **Forbes, 1838 (Fig. 61)**

Widely recorded living from mainly the mid and southern parts of SL. Depth range 8-25m+.

Facelinidae

Facelina auriculata **(Müller, 1776)**

Recorded living from Killard Point, 1946, and Killard Rocks, L.W.S.T., 1947 (Williams, 1954), and from Lees Wreck, 12m (author).

Facelina bostoniensis **(Couthouy, 1838) (Fig. 61)**

Widely recorded living from around SL, both on the shore and the sublittoral. Specimens from the shore tend to be much larger (typically 30mm+), and are found on the sandy/silty sites in the north-east and west. The sublittoral form is smaller (typically 10-15mm), and found in more current swept areas (e.g. Ballyhenry Point). The latter form is not an error for ***Facelina auriculata*** (Müller, 1776), as great care was taken to ensure a clear separation of these two species. Spawning was observed at Cunningburn Milltown (6.6.1989). This species is rare on the open

coast, and only occurs in SL in Northern Ireland.

Facelina elegans **(Alder and Hancock, 1845)**

Recorded at Ringhaddy, dredged *Laminaria*, one specimen, March 1963 (Marine Biology Station). The name *F. elegans* is synonymous with *Caloria elegans*. The species recorded is very unlikely to be *C. elegans*, as it is very rare and has only been found in Ireland in Lough Swilly (BEP, pers. comm.) and one other site. In the absence of specimens, no further identification is possible, although it could be one of the above two *Facelina* spp.

Favorinidae

Favorinus blianus **Lemche and Thompson, 1974**

There is a brief report of this species being found in SL (Morrow *et al.*, 1993).

Favorinus branchialis **(Rathke, 1806)**

Found north of Green Island, Quoile Estuary, 14.5.1977 (UM).

Aeolidiidae

Aeolidia papillosa **(L., 1761) (Fig. 62)**

Recorded living, common, from the shore, mainly from the east side and Narrows (HW, UM, author). Williams (1954) found it commonly at Kilclief, Killard and Bar Hall.

Aeolidiella glauca **(Alder and Hancock, 1845) (Fig. 62)**

Recorded living from six sites *viz.* north-east of Mahee Island, 24m, north of Town Rock, east of Reagh Island, north of Green Island (UM), Verde Rocks, 18m and the shore at Big Rock (author).

Order Archaeopulmonata

Superfamily Ellobiacea

Ellobiidae

Leucophytia bidentata **(Montagu, 1808) (Fig. 63)**

Recorded living from Walter Rock near high water, 1948 (Williams, 1954); Ballyhenry Island, Darragh Causeway, and Sketrick Island (north) (author). Found below upper shore zone under small slatey stones partly set in damp gravelly sediment.

Ovatella myosotis **(Draparnaud, 1801)**

Recorded living from Doctors Bay and Ballywaddon, July 1976 (SMS,

pers. comm.).

Class SCAPHOPODA

Order Dentalioida

Dentaliidae

Antalis entalis (L., 1758)

The most recent living record from SL is of two specimens dredged off Dunnyneill Island, 13m, 1951 (Williams, 1954). Old records: common, living, Castleward Bay; rare, dead, Wellstream Bay; common, dead, Upper Wellstream Bay, by Dickie (1858); six specimens, Portaferry (Thompson, UM).

Class PELECYPODA

Order Nuculoida

Superfamily Nuculacea

Nuculidae

Nucula hanleyi Winckworth, 1931

Radiate forms from 15m, Killyleagh, 1938 (Williams, 1954). It is not known if these specimens were found living.

Nucula nitidosa Winckworth, 1930

A single specimen recorded living from Ballyhenry Point, 20-25m, by author. Old records: as *Nucula nitida*, three specimens, Dickie (Hyndman, UM); as *Nucula nitida*, very rare, living, Castleward Bay and centre of SL, and rare, living from Upper Wellstream Bay and Wellstream Bay (Dickie, 1858).

Nucula nucleus (L., 1758) (Fig. 63)

Recorded living from many sites around SL, from the shore (Braddock Island, Hare Island, Dogtail Point, Monaghan Bank (author)) and the sublittoral to 30m+ (author, UM). Generally absent from the Narrows and the northern basin. Often found in clumps of muddy shell debris associated with the *Modiolus modiolus* community. Old records: common, living, Wellstream Bay, Bay off Killyleagh, centre of SL, and common, dead from Upper Wellstream Bay (Dickie, 1858).

Nucula sulcata Bronn, 1831

Recorded living from Granagh Bay, 1970 (P. J. S. Boaden, pers.

comm.) and Black Neb (HW). Dead shells from Jane's Rock (author).

Nuculoma tenuis **(Montagu, 1803)**

Recorded living by Hiscock and Mitchell (1980) from SL, but no locality published.

Superfamily Nuculanacea

Nuculanidae

Jupiteria minuta **(Müller, 1776)**

Not seen recently living in SL. Old record: as *Leda caudata*, very rare, living, Castleward Bay (Dickie, 1858).

Order Arcoida

Superfamily Arcacea

Arcidae

Arca tetragona **Poli, 1795**

One specimen, living, dredged off Killyleagh, 15m, 1938 (Williams, 1954).

Barbatia barbata **(L., 1758)**

Old record: as *Arca barbata*, alive, adhering to an oyster from Killinchy, by Dr McGee of Belfast (Brown, 1818). Fisher (1935), suggests that as this is a common Mediterranean species, there has been some mistake, probably not with the identification, but with the locality.

Superfamily Limopsacea

Glycymerididae

Glycymeris glycymeris **(L., 1758)**

Recorded living from Ballyhenry Point, 41m, and Ballywhite Bay, 34m (UM). Dead shells from Ballyquintin Point (UM), north of Chapel Island and Dunnyneill Island (author). All records are sublittoral at 25m+. Old records: as *Pectunculus pilosus*, dredged very sparingly from about 8-10f (sandy gravel) in SL (Thompson, 1856); 10+ specimens, as *Pectunculus glycimeris* off Strangford Bar, Waller Collection, Reg. No. 93.1889 (NMI).

Order Mytiloida
Superfamily Mytilacea
Mytilidae
Mytilus edulis L., 1758 (Fig. 64)
Recorded living, abundant in some cases, from most sites in SL. Most abundant on the muddy-sand flats in the north. Depth range 0-35m+. Small `juvenile' forms found in the sublittoral. Extensive sublittoral bed off the north-east of Angus Rock, lying on steep bedrock and gullies from surface to 30m+. *M. galloprovincialis* Lamarck (considered to be a good species by Smith and Heppell, 1991) was searched for in a suitable habitat, but none found at Greyabbey (Seed, 1974). Old record: common, living, Castleward Bay (Dickie, 1858).
Modiolus adriaticus (Lamarck, 1819)
Not seen living in SL (?). Old records: two specimens, SL, (Thompson, UM) and two specimens, September 1839 (Thompson and Hyndman, UM). It is not known if these specimens were living or dead.
Modiolus barbatus (L., 1758)
Recorded living from Audley's Castle Rocks (HW). This record should be treated as dubious. This species can be confused with juvenile *Mytilus edulis* or *Modiolus modiolus*.
Modiolus modiolus (L., 1758) (Fig. 64)
Recorded living, common, from many sublittoral sites around SL, principally from the centre (UM, author). Also found on the shore, usually one or two specimens (e.g. Angus Rock, Ballyhenry Island, Rainey Island (author)). A scattered bed of *Modiolus modiolus* lies at low water at Islandbane Point (author). Depth range 0-42m+. This species is one of the most important in SL. Clumps support (as an `oasis') in an otherwise comparatively barren muddy substrate a huge range of other species, including acting as a nursery ground for the commercially important `queenie' (*Aequipecten opercularis*). This habitat is easily destroyed by dredging, and may take many years to regenerate, as *M. Modiolus* is

slow to reach reproductive maturity (Brown, 1976). Old records: as *Modiola modiolus*, common, living, centre of SL, Bay off Killyleagh, Castleward Bay, and common, dead, from Upper Wellstream Bay (Dickie, 1858).

Modiolula phaseolina **(Philippi, 1844)**

Recorded living from Ballyhenry Point, 36m, 1976 in coarse shelly gravel (BEP). Also recorded as common in rock clefts, mid tide to low water, at Ballywhite Bay, Beardy Rocks, Isle O'Valla and Black Islands (Wiliams, 1954). Old records: as *Modiola phaseolina*, rare living, from Castleward Bay and Upper Wellstream Bay (Dickie, 1858).

Crenella decussata **(Montagu, 1808) (Fig. 65)**

Recorded living from 12 sites in the south basin and north entrance to the Narrows (author). The species is normally sublittoral (to 20m+), but found on the shore at one site (Selk Rock). These are the only live records from Ireland. Dead shells were found north of Audley's Point (UM). Old records: a few odd valves dredged in rather deep water, shelly bottom, in SL, August 1837 (Thompson, 1856); five specimens, SL, Thompson, and a single valve from Portaferry, August 1837 (Hyndman, UM).

Modiolarca tumida **(Hanley, 1843) (Fig. 65)**

Widely recorded living from the shore and sublittoral. Absent only from the Quoile Estuary and the extreme north-west of the lough. Depth range 0-37m+. Found to be commensal with *Ascidia conchilega* Müller (most common), *Ascidiella aspersa* (Müller), *Ciona intestinalis* (L.) and *Ascidia mentula* Müller. Also found with *Ascidia sordida* Alder and Hancock, *Phallusia mammilata* (Cuvier), and free living among *Laminaria* sp. holdfasts. Its preferred niche appears to be the outer body wall of ascidians (Donohoe, 1986). In general, this species seems to be free living in sublittoral habitats, as it has frequently been recorded in samples which do not contain any suitable ascidians. Old records: as *Modiola marmorata*, SL, by Brown (Thompson, 1856); as *Modiola marmorata*, rare, living, Upper Wellstream Bay (Dickie, 1858).

Musculus discors (L., 1767) (Fig. 66)
Widely recorded living around SL, but absent from the Quoile Estuary and the north-west. Depth range 0-33m+. Occasionally abundant on extreme lower shore. Old record: `*Mytilus discors* - plentiful in Lough Strangford' (Brown, 1818).

Order Limoida

Superfamily Limacea

Limidae

Limaria hians (Gmelin, 1791)
One living specimen recorded from a `nest', Long Sheelagh, April, 1955 (Marine Biology Station).

Limaria loscombi (G. B. Sowerby, 1823)
Found living dredged from a single site 22m, The Limestone 5.8.1969 (UM). Old records: `dredged very sparingly alive in deeper portions of SL on sandy and shelly ground' (Thompson, 1856); rare, dead, Castleward Bay, and very rare, dead, Upper Wellstream Bay (Dickie, 1858); one specimen, SL (unknown origin) and two specimens, as *Lima fragilis*, SL, Thompson and Hyndman (UM).

Limatula subauriculata (Montagu, 1803) (Fig. 66)
Recorded living from off Ballyhenry Point, coarse shelly gravel, 41m, 1976, and from west of Ballywhite Bay, 34m, 1976 (UM). One live specimen in dredged *Laminaria* sp. holdfast, Chapel Island, September, 1966 (Marine Biology Station). Dead shells from Lees Wreck, Dunnyneill Island, Ballyhenry Point, north of Chapel Island, Castleward Bay (author) and Ballyquintin Point (BEP). All these records were sublittoral, 10-35m, and the only recent living ones for Ireland. Old records: `two odd valves dredged from about 8f - sand - in SL', in 1837 by Hyndman and Thompson. `In the course of a days dredging in the following year, I obtained a single valve in the same Lough' (Thompson, 1856); very rare, dead, Upper Wellstream Bay (Dickie, 1858); six specimens, Hyndman, SL, one specimen, Thompson, SL and a single valve, Portaferry as *Lima*

suborbicularis (UM).

Limatula sulcata (Brown, 1827)

Not seen living in SL. Dead but fresh shells have been found at Portaferry (Fisher, 1933). Old record: a single valve, Portaferry, August 1837, found among *L. subauriculata*, as *L. elliptica*, coll. E. Forbes (UM).

Order Ostreoida

Superfamily Ostreacea

Ostreidae

Ostrea edulis **L., 1758 (Fig. 67)**

Recorded living from the sublittoral off Whiterock (Williams, 1954), at Ringhaddy Harbour (author), off Taggart Island, Bird Island Passage, south-east of Inishanier Island, north of North Rock and west-south-west of Pig Island (UM). Recorded from the shore at Cunningburn Milltown and Launches Little (author). Depth range 0-22m+. There were formerly extensive oyster beds in SL, which declined to near extinction in the 19th century. Many worn dead shells around the lough, which can be confused with worn shells of *Crassotrea gigas*, which is farmed in SL. Dead shells could also be subfossil, revealed by erosion of beaches. Old records: SL (Brown, 1818); common, living, centre of SL; rare, dead, Castleward Bay and Upper Wellstream Bay (Dickie, 1858).

Crassostrea gigas (Thunberg, 1793)

This imported species is farmed at Castleward Bay, Sketrick Island, east of Skate Rock, Ardmillan Bay, and Paddy's Point. It apparently does not spawn in the lough, as the maximum temperature does not reach the required 22-24°C (Briggs, 1983a). Single free living specimens were found at Drum Hill (near Paddy's Point), and Sleitch Rocks in Castleward Bay (author).

Superfamily Pectinacea

Pectinidae

Chlamys distorta (da Costa, 1778) (Fig. 67)

Recorded living from the shore and sublittoral around SL. Absent from the Quoile Estuary and north-west. Not common where found,

generally one or two specimens. Depth range 0-30m+. Old records: as *Ostrea sinuosa*, not uncommon (Brown, 1818); common, living, centre of SL (Dickie, 1858); as *Pecten pusio* (Hyndman, UM); one specimen, SL, as *Pecten pusio* (Hyndman, UM).

Chlamys varia (L., 1758) (Fig. 68)

Recorded living, and occasionally abundant (e.g. Braddock Island), in most parts of the lough, from the shore and sublittoral. Absent only from the extreme north-west. Depth range 0-42m+. This species is associated with the *Modiolus modiolus* community, particularly in the mid and north of SL. It is particularly common on boulder shores in the north east, near South Island and Greyabbey Bay. It is rare on the open coast, and common only in SL from Northern Ireland. Old records: as *Ostrea varia*, 'very fine and perfect specimens are common on the Lough Strangford oysters' (Brown, 1818); two specimens, Hyndman, SL (UM); as *Pecten varius*, common, living, centre of SL (Dickie, 1858)

Pecten maximus (L., 1758) (Fig. 68)

Recorded living, and very common in places, from many sites around SL (UM, author). Generally found in the sublittoral, but also on the shore at Church Point and Selk Rock (author). Absent from the northern part. Depth range 0-41m+. Not as abundant as formerly, due to overfishing by dredging and illegal commercial diving, and destruction of the sublittoral habitat by dredging and trawling e.g. Ballywhite Bay. Old records: as *Ostrea maxima*, common in SL (Brown, 1818); rare, live, centre of SL and common, dead, Castleward Bay (Dickie, 1858).

Aequipecten opercularis (L., 1758) (Fig. 69)

Recorded living and common around most of SL, particularly the centre, where it can be abundant (UM, author). Absent from the Quoile Estuary and the north-west. Found usually in the sublittoral, but also on the shore e.g. Greyabbey, Darragh Causeway, Cloghy Rocks. Depth range 0-40m+. Commercial species. Fishing for 'queen scallops' is destructive of the *Modiolus modiolus* communities which are its nursery ground in the centre of

the lough. Old records: six specimens, Thompson (UM); as *Pecten opercularis*, common SL (Thompson, 1856); as *Pecten opercularis*, common, living, Castleward Bay; very common, living, centre of SL and common, dead, Bay off Killyleagh (Dickie, 1858).

Palliolum striatum **(Müller, 1776) (Fig. 69)**

Recorded living from Ballyhenry Island (S) (shore), Lees Wreck (12m) and west of Limestone Pladdy (8-13m) (author). Old records: as *Pecten striatus*, 'a single specimen dredged in 1837 by Mr Hyndman and myself' (Thompson, 1856); as *Pecten striatus*, very rare, dead, centre of SL and Castleward Bay (Dickie, 1858); one specimen, Hyndman, SL (UM).

Palliolum tigerinum **(Müller, 1776) (Fig. 70)**

Recorded living from the sublittoral at Black Rock (Roberts, 1975), Marlfield Bay (UM), Ballyhenry Point, Castleward Bay, McLaughlin Rock, west of Limestone Pladdy and Ballywhite Bay (author). Also found on the shore at Beardy Rocks and Selk Rock (author). Depth range 0-25m+. Old records: rare, dead, Castleward Bay (Dickie, 1858); as *Pecten tigrinus*, SL, living (Praeger, 1889); seven specimens as *Pecten tigrinus*, Strangford, Waller Collection, Reg. No. 89.1893 (NMI).

Pseudamussium septemradiatum **(Müller, 1776)**

A single specimen found in Northern Ireland Aquarium, Portaferry, summer 1990. This was discovered in the settlement tanks, and is therefore assumed to have grown up from spat in the water from SL. This species has never been recorded, even as a shell, from SL, and is probably not living in the Irish Sea (Seaward, 1991). The species is rare, but locally common on the west coast of Scotland in the sublittoral.

Superfamily Anomiacea

Anomiidae

Anomia ephippium **L., 1758 (Fig. 70)**

Recorded living and common from SL, particularly on boulder shores in the centre and north-east. Absent from the north-west, and generally from the Narrows. The two records from there are close

to silty/sandy conditions (Granagh Bay (south), Millquarter Bay). This species can be confused with the two following species, and for this reason unchecked records should be treated as dubious. Roberts (1975) suggested that reports of *A. ephippium* on *Modiolus modiolus* were probably misidentifications of *Pododesmus patelliformis*. Normally a littoral species, but found to depths of 32m+. Old records: 'in great plenty on oysters from Lough Strangford' (Brown, 1818); common, living, Castleward Bay, Upper Wellstream Bay, centre of SL, and common, dead, Bay off Killyleagh (Dickie, 1858).

Heteranomia squamula (L., 1758) (Fig. 71)

Recorded living, and common in many sites from the shore and sublittoral, mainly in the Narrows and south basin. Depth range 0-50m+.

Pododesmus patelliformis (L., 1761) (Fig. 71)

Recorded living and locally common, mainly from the Narrows and the south basin. Depth range 0-35m+. Generally found in areas of faster current than *Anomia ephippium*, under rocks. Spawning reported at Ballyhenry Point in May, and August to September (Seed, 1982). Old records: as *Anomia undulata*, Rathgarmont (Brown, 1818); one and a half specimens, SL, 1839 (UM); as *Anomia striata*, rare, dead, Castleward Bay and near centre of SL (Dickie, 1858).

Order Veneroida

Superfamily Lucinacea

Lucinidae

Myrtea spinifera (Montagu, 1803)

One specimen, valves only, 22m, off Limestones, 1943 (Williams, 1954).

Lucinoma borealis (L., 1758) (Fig. 72)

Recorded living from many scattered sites in SL, from the shore and sublittoral. Depth range 0-38m+. Dead shells are widespread. Old records: six specimens, Portaferry, Thompson (UM); as *Lucina radula*, dredged from about 6-12f on sand, SL (Thompson, 1856); as *Lucina borealis*, common, living, Castleward Bay; rare, living,

Wellstream Bay and centre of SL (Dickie, 1858).

Thyasiridae

Thyasira flexuosa **(Montagu, 1803) (Fig. 72)**

Recorded living from Black Rock, Bird Island Passage, south-east of Inishanier Island, 9-12m, south-east of Abbey Rock, 38m (UM) and Town Rock, 9m (author). Old records: as *Lucina flexuosa*, dredged in SL, 1846 (Thompson, 1856); as *Lucina flexuosa*, rare, dead, Castleward Bay, Upper Wellstream Bay and centre of SL (Dickie, 1858).

Superfamily Galeommatacea

Kelliidae

Kellia suborbicularis **(Montagu, 1803) (Fig. 73)**

Recorded living, rare (usually one or two specimens) from 13 sites in the Narrows and south basin. Depth range 0-35m+. Old records: rare, living, Castleward Bay and very rare, living, centre of SL (Dickie, 1858); one and a half specimens, Strangford, Waller Collection, Reg. No. 89.1893 (NMI).

Lasaea adansoni **(Gmelin, 1791) (Fig. 73)**

Recorded living from the upper shore from many sites, mainly in the Narrows or close to current swept areas (the Dorn, Sketrick Island, Darragh Island Causeway). Generally found in crevices, or on the sheltered side of large boulders, or rockfaces with the black lichen *Lichina pygmaea* (Lightfoot). Very often found in this habitat with *Littorina neglecta* and *Melarhaphe neritoides*, although not with the latter in SL.

Montacutidae

Tellimya ferruginosa **(Montagu, 1803)**

Recorded with *Echinocardium cordatum* (Pennant) at Big Rock, L.W.S.T., muddy sand, 1941 and 1944. Also recorded from Kilclief (Williams, 1954). Presumably these are live records.

Mysella bidentata **(Montagu, 1803) (Fig. 74)**

Recorded living from many sites in SL, from the shore and the sublittoral. Depth range 0-35m+.

Superfamily Astartacea

Astartidae

Astarte sulcata **(da Costa, 1778) (Fig. 74)**

Recorded living from the sublittoral, depth range 4-41m+ (UM, author). Absent from the northern lough and the Narrows. Old records: as *Venus danmonia*, found among Killinchy oysters, from catalogue of Irish Marine Shells by John Templeton (Fisher, 1935); as *Astarte danmoniensis*, dredged sparingly from about 8-25f on mud and sand (Thompson, 1856); rare, living, Castleward Bay and Wellstream Bay, common, living, Upper Wellstream Bay (Dickie, 1858); from UM - Portaferry, August 1837, three specimens, also as *Astarte scotica*, one specimen, Hyndman; Portaferry, `var. *Scotica*', one specimen, Thompson; Portaferry, three specimens, Thompson; as *Astarte danmoniensis*, eight specimens, Thompson and Hyndman; 1839, var. *Scotica*, one specimen, Thompson and Hyndman.

Goodallia triangularis **(Montagu, 1803)**

Recorded dead from north-east of 17f plateau, north of Ballyhenry Point, 36m, 1976, in coarse shelly gravel (BEP). Old records: dredged once in shell sand from about 10f near Portaferry, Hyndman and Thompson (Thompson, 1856); as *Astarte triangularis*, very rare, living, Castleward Bay (Dickie, 1858); as *Astarte triangularis*, growth series and open valves of 45+ specimens on card from Belfast and Strangford Loughs, Waller Collection (NMI).

Tridonta elliptica **(Brown, 1827)**

Recorded living from Verde Rocks, 16m (author), with dead shells dredged from Colin Rock (author). Five specimens collected by D. Roberts, 1978, are in UM, but there is no indication of their status, or exact location of site.

Superfamily Cardiacea

Cardiidae

Acanthocardia echinata **(L., 1758) (Fig. 75)**

Recorded living from off Rawreagh Point (author), Ringhaddy Harbour (author; Williams, 1954), off Kircubbin (Williams, 1954), south and south-east of Town Rock, north-east of Jackdaw Island

and Quoile estuary (UM). Sublittoral species normally, depth range 9-20m+. Old records: as *Cardium echinatum*, dead, dredged from oozy sand, SL, Hyndman and Thompson (Thompson, 1856); as *Cardium echinatum*, common, dead, Castleward Bay and rare, dead from Wellstream Bay and Upper Wellstream Bay (Dickie, 1858).

Parvicardium exiguum (Gmelin, 1791) (Fig. 75)

Recorded living from the shore (Doctors Bay, 1976, SMS, and six other scattered sites, author) and the sublittoral to 29m+. Old records: as *Cardium exiguum* in `Newtown Lough', Mr Cleland, from *Catalogue of Irish Marine Shells* by John Templeton (Fisher, 1935); as *Cardium exiguum*, dredged SL, common (Thompson, 1856); as *Cardium pygmaeum*, rare, living, Castleward Bay (Dickie, 1858).

Parvicardium minimum (Philippi, 1836)

Not seen living in SL. Old record: as *Cardium suecicum*, very rare, dead, Castleward Bay (Dickie, 1858).

Parvicardium ovale (G. B. Sowerby II, 1840) (Fig. 76)

Recorded living from south-east of Ballyquintin Point, 25m, Bird Island to Drummond Island, 35m, and east of Buckley Rock, 24m, (UM). Dead shells from Lees Wreck and Ballywhite Bay (author). Old record: very rare, dead, Castleward Bay (Dickie, 1858).

Parvicardium scabrum (Philippi, 1844) (Fig. 76)

Recorded living from the sublittoral, depth range 2-30m+ (author, UM). One specimen dredged off Kilclief, 1939 (Williams, 1954). Old records: as *Cardium nodosum*, SL (Thompson, 1856); common, living (abundant, dead), Castleward Bay and rare, living, Wellstream Bay (Dickie, 1858); two specimens, SL, Thompson (UM).

Laevicardium crassum (Gmelin, 1791)

Recorded living from west-south-west of Pig Island, 2.3m (UM), and dredged off Kilclief, 1941 and 1943, 22m. Old record: as *Cardium laevigatum*, dredged SL, sparingly, Hyndman and Thompson (Thompson, 1856).

Cerastoderma edule (L., 1758) (Fig. 77)

Recorded living, abundant, from around the whole lough, particularly on the north flats. Found in the sublittoral at 10m,

Audley Point. It is an important food resource for many birds of the lough (Brown and Connor, 1974). Old records: common, SL (Thompson, 1856); as *Cardium edule*, common, dead, Castleward Bay (Dickie, 1858).

Superfamily Mactracea

Mactricidae

Mactra stultorum (L., 1758)

Dead shells from Castleward Bay, 1940 (Williams, 1954).

Spisula elliptica (Brown, 1827)

Recorded living from only one site, Castleward Bay (author). Dead shells from south-east of Ballyquintin Point, 25m, 1976 (UM). Old records: as *Mactra solida* var. *elliptica*, dead, SL (Thompson, 1856); as *Mactra elliptica*, rare, living, Castleward Bay (Dickie, 1858).

Spisula solida (L., 1758) (Fig. 77)

Recorded living from Greyabbey, four specimens, 1978 by D. Roberts (UM); Reagh Island and Granagh Bay (HW); Castleward Bay (author). Dead shells from Selk Rock (author).

Spisula subtruncata (da Costa, 1778) (Fig. 78)

Recorded living from Greyabbey Bay (HW); Ragheries; the Quoile off Salt Island, 11m; Town Rock, 9m (author). Dead shells from many sites (author). Not extinct, as reported in Fisher (1931), from north-east Ireland. Old records: as *Mactra subtruncata*, dredged, SL, Hyndman and Thompson (Thompson, 1856); var. *striata*, SL, (Brown) (Praeger, 1889); var. *inaequivalvis*, SL, Adair (Jeffreys, 1865); as *Mactra subtruncata*, one specimen, W. Thompson, ex. Hyndman Collection (UM).

Lutraria lutraria (L., 1758)

In sand at L.W.S.T., Kilclief, very large specimens, 1942 (Williams, 1954).

Superfamily Solenacea

Cultellidae

Ensis arcuatus (Jeffreys, 1865) (Fig. 78)

Recorded living from Big Rock (Marine Biology Station); Strangford

Old Pier, north of Audley's Point, south-west of Dunnyneill Island, south-east of Strangford, south-east of Gowland Rocks, Lady's Port, Marlfield Bay (UM) and Castleward Bay (author). Depth range 0-16m+. Dead shells common scattered around the lough.

Ensis ensis (L., 1758)

Common at L.W.S.T. at Kilclief and in the vicinity of Big Rock; taken abundantly each year (Williams, 1954). Old record: as *Solen ensis*, common, dead, Castleward Bay (Dickie, 1858).

Ensis siliqua (L., 1758)

Recorded as common in most sandy bays near low water (Williams, 1954). Dead shells from Kircubbin Harbour and Cloghy Rocks (author).

Phaxas pellucidus (Pennant, 1777)

Recorded living from Skate Rock, 9m, 1982 and Marlfield Bay, 24m (UM). Shell from Castleward Bay, 1941 (Williams, 1954). Old records: as *Solen pellucidus*, dredged, SL, Hyndman and Thompson (Thompson, 1856); rare, living, Castleward Bay and Wellstream Bay and very rare, living, Upper Wellstream Bay (Dickie, 1858).

Superfamily Tellinacea

Tellinidae

Angulus tenuis (da Costa, 1778) (Fig. 79)

Recorded living from many sandy shore sites in the lough (HW), and south of Big Rock, 2m (UM).

Arcopagia crassa (Pennant, 1777)

Fairly common in slightly muddy sand, Kilclief, 1940, 1941 (Williams, 1954). Old record: as *Tellina crassa*, dead, SL (Praeger, 1889).

Fabulina fabula (Gmelin, 1791) (Fig. 79)

Recorded living on *Modiolus modiolus* bed off Black Rock (Roberts, 1975), from SL (Hiscock and Mitchell, 1980), and five shore sites (HW).

Moerella donacina (L., 1758)

Dead shells only from Salt Rock and Bar Hall Bay (author). Old records: as *Tellina donacina*, rarely dredged SL, Hyndman and

Thompson (Thompson, 1856); very rare, dead, Upper Wellstream Bay (Dickie, 1858); two specimens, dredged, SL, 1832 (Hyndman, UM).

Macoma balthica (L., 1758) (Fig. 80)

Recorded living from many muddy sand shores around the lough, principally in the north basin and Quoile Estuary (HW, author).

Psammobiidae

Gari depressa (Pennant, 1777)

Not seen living in SL. Old record: as *Psammobia vespertina*, a single valve, SL (Nichols, 1900).

Gari tellinella (Lamarck, 1818)

Recorded living from two sites, Castleward Bay, 10-12m (author) and Stork Shoal, 29m, 1977 (UM). Dead shells from Granagh Bay (author). Old records: as *Psammobia tellinella*, rare, living, Castleward Bay (Dickie, 1858); dredged very rarely (Praeger, 1889).

Gari fervensis (Gmelin, 1791)

At low water Kilclief, one living specimen, 1944 (Williams, 1954). Dead shells from off Limestones and Castleward, 1939, 1942 (Williams, 1954), Ballywhite Bay and Cloghy Rocks (author). Old records: as *Psammobia ferroensis*, common, dead, Wellstream Bay, Castleward Bay and Bay off Killyleagh, and very rare, dead, Upper Wellstream Bay (Dickie, 1858).

Solecurtus scopula (Turton, 1822)

Recorded living from one site only *viz.* the Quoile estuary, 9m, 1980 (UM). Old record: as *Solenocurtus candidus*, SL, one pair, Waller Collection (NMI) (Nichols, 1900). The label states `outside Bar'.

Azorinus chamasolen (da Costa, 1778) (Fig. 80)

Recorded living from south-east of Town Rock, 19m; north-east of Jackdaw Island, 16m; Quoile Estuary, 9m, west of Barrel Rock, 12m (UM), South Holm Bay, dredged 6-24m (author). Old records: as *Solecurtus antiquatus*, SL, Thompson (Thompson, 1856); as *Solecurtus coarctatus*, rare, dead, Wellstream Bay, Bay off Killyleagh and centre of SL, and very rare, dead, Castleward Bay

and Upper Wellstream Bay (Dickie, 1858); as *Solecurtus antiquatus*, one specimen, Portaferry (Thompson, ex. Belf. Nat. Hist. Phil. Soc., UM); one specimen and four valves as *Solecurtus antiquatus*, SL, Waller Collection, Reg. No. 89.1893 (NMI).

Semelidae

Abra alba **(W. Wood, 1802) (Fig. 81)**

Recorded living, uncommon, in muddy sites in SL, mainly south Basin and north entrance to Narrows. Depth range 0-22m+. Old records: as *Amphidesma boysii*, dredged sparingly 8-10f (Thompson, 1856); rare, living, bay off Killyleagh and Castleward Bay (Dickie, 1858); as *Scrobicularia alba*, two specimens, SL, W. Thompson, and 20+ specimens, Hyndman and Thompson, SL October 1834, 1837, 1839 (UM); var. *curta*, SL, Waller (Jeffreys, 1865).

Abra nitida **(Müller, 1776) (Fig. 81)**

Recorded living from the shore at Mid Island Bay (HW), south-east of Inishanier Island, 9-12m, south-west of Chapel Island Point, 17m (UM), and eight other sublittoral sites (author). Confined to south and mid-lough. Depth range 0-25m+. Old records: as *Amphidesma intermedia*, two specimens dredged from about 6f near Portaferry, August 1837 by Hyndman and Thompson (Thompson, 1856); rare, living, Wellstream Bay (Dickie, 1858); three specimens, Thompson and Hyndman, Co. Down, SL, October 1834, 1837, 1839 (UM).

Abra prismatica **(Montagu, 1803) (Fig. 82)**

Recorded living from off Salt Island, Quoile estuary, 11m; Town Rock, 9m and west/south-west Skate Rock, 2m (author). Old record: as *Syndosmya prismatica*, very rare, living Castleward Bay (Dickie, 1858).

Scrobicularia plana **(da Costa, 1778)**

Recorded living from sediment in Granagh Bay (HW). Dead shells from the same site and Ringbane, Quoile Estuary (author).

Superfamily Arcticacea

Arcticidae

Arctica islandica **(L., 1767) (Fig. 82)**

Recorded living on *Modiolus modiolus* bed near Black Rock (Roberts,

1975), south-west of Green Island, north-west of Dunnyneill Island, south-east of Town Rock, north-east of Jackdaw Island and north-west of Long Rock (UM). Old records: as *Cyprina islandica*, dredged living, SL (Thompson, 1856); as *Cyprina islandica*, rare, dead, Wellstream Bay and Upper Wellstream Bay, common, living, centre of SL, very common, dead, Castleward Bay (Dickie, 1858); one and a half specimens, SL in sublittoral mud (UM).

Superfamily Glossacea

Glossidae

Glossus humanus **(L., 1758)**

Not recorded living in SL. Old record: as *Isocardia cor*, very rare, dead, Upper Wellstream Bay on mud, 4-8f (Dickie, 1858).

Superfamily Veneracea

Veneridae

Circomphalus casina **(L., 1758) (Fig. 83)**

Recorded living from the shore and the sublittoral (UM, author, HW, SMS). Found generally in coarse sand, in the Narrows and the south-east part of the lough. Old records: as *Venus casina*, dredged on soft sand (Thompson, 1856); as *Venus casina*, rare, living, Castleward Bay, rare, dead, Bay off Killyleagh and centre of SL (Dickie, 1858).

Chamelea gallina **(L., 1758) (Fig. 83)**

Recorded living from the shore at Granagh Bay, 1976 (SMS), Ballywhite Bay, Portaferry (author), Launches Little (HW, author) and eight sublittoral sites (UM), mainly in the southern basin, and north entrance to the Narrows. Depth range 0-37m+. Old records: as *Venus pennanti*, SL, not common (Thompson, 1856); as *Venus striatula*, very rare, living (abundant, dead), Castleward Bay and common, dead, Upper Wellstream Bay (Dickie, 1858).

Clausinella fasciata **(da Costa, 1778) (Fig. 84)**

Recorded living from Kilclief, 1941 and Ringhaddy Sound, 1942 (Williams, 1954), near Black Rock (Roberts, 1975), Ballyhenry Bay, off Island Taggart, off The Limestone, 300m north-west of South Dunnyneill Island (UM), Ballyhenry Point, Castleward Bay and

Ballywhite Bay (author). Old records: as *Venus fasciata*, dredged occasionally living on sandy ground, SL (Thompson, 1856); as *Venus fasciata*, common, dead, Upper Wellstream Bay and common, living, Castleward Bay (Dickie, 1858); four specimens, Portaferry, 1837, Hyndman (UM).

Timoclea ovata **(Pennant, 1777) (Fig. 84)**

Recorded living, common from many sites in the sublittoral, mainly in the mid and south parts of the lough (UM, author). Depth range 3-36m+. Old records: as *Cytherea ovata*, dredged living, SL (Thompson, 1856); as *Venus ovata*, very common, living (abundant, dead) Castleward Bay and centre of SL, common, living, Upper Wellstream Bay, rare, living, Wellstream Bay (Dickie, 1858); 12 specimens, Hyndman and Thompson, SL, 1839 (UM).

Tapes aurea **(Gmelin, 1791) (Fig. 85)**

Recorded living from sand at Doctors Bay (1970, R. Anderson; 1976, SMS), Kircubbin Harbour, common at LW, and Greyabbey (Dunlop, 1980). Old records: as *Venus aurea*, SL (Thompson, 1856); as *Tapes aurea*, rare, dead, Castleward Bay (Dickie, 1858); three and a half specimens (one with some residue of animal), SL, Reg. No. 22.1893, purchased from R. L. Praeger for £8 0s 6d (NMI); seven pairs (several 'alive'), 'commonly fresh, SL, June 1890', Praeger Collection (NMI).

Tapes rhomboides **(Pennant, 1777) (Fig. 85)**

Recorded living, common, from many sites around SL. Absent from the Quoile Estuary and the north/north-west. Depth range 0-41m+. Old records: as *Pullastra virginea*, dredged in SL (Thompson, 1856); as *Tapes virginea*, common, living (abundant, dead), Castleward Bay and centre of SL, rare, living, Wellstream Bay, common, dead, Upper Wellstream Bay (Dickie, 1858).

Tapes decussatus **(L., 1758) (Fig. 86)**

Recorded living from Greyabbey (1974, P. J. S. Boaden; Dunlop, 1980), Kircubbin (Dunlop, 1980), Doctors Bay (1970, R. Anderson) Horse Island, Black Neb, South Island (HW), Ragheries, Gransha Point (author). Farmed at Paddys Point (author). Old records:

fresh looking single valves (Praeger, 1889); summer ?1919, while staying at Newtownards, plentiful at about half tide mark (Fisher, 1929). one valve + one piece of valve, dead, SL, June 1890, Praeger Collection (NMI).

Venerupis senegalensis **(Gmelin, 1791) (Fig. 86)**

Recorded living, common, from many shore and sublittoral sites in SL (author, HW). Depth range 0-25m+. Dead shells common. Old records: as *Tapes pullastra*, rare, living (abundant, dead), Castleward Bay (Dickie, 1858); var. *perforans*, two specimens, SL, (Thompson, ex. Belf. Nat. Hist. Phil. Soc., UM).

Dosinia lupinus **(L., 1758) (Fig. 87)**

Recorded living from east of Town Rock, north-east of Jackdaw Island, Quoile Estuary, north of Audley's Point, south-east of Abbey Rock (UM). Depth range 9-29m. Old records: as *Artemis lincta*, common, living, Wellstream Bay, common, dead, Upper Wellstream Bay, and as *Cytherea lincta*, dead, abundant, Castleward Bay (Dickie, 1858).

Dosinia exoleta **(L., 1758) (Fig. 87)**

Recorded living from Black Rock on *Modiolus modiolus* bed (Roberts, 1975), Marlfield Bay, 25m (author), west of Ballyhenry Bay, 41m, and west of Ballywhite Bay, 34m, Killyleagh, 9m and 400m north of Green Island, 14m (UM). Old records: as *Artemis exoleta*, dredged on sand, SL (Thompson, 1856); as *Artemis exoleta*, rare, dead, Wellstream Bay and Upper Wellstream Bay (Dickie, 1858).

Turtoniidae

Turtonia minuta **(Fabricius, 1780) (Fig. 88)**

Recorded living, common, from many sites around SL (author, HW). Absent from the Quoile Estuary and the north-west. Abundant at Craiglee Rocks (8.8.1990). Depth range 0-35m.

Mysia undata **(Pennant, 1777)**

Recorded living from Quoile Estuary, 9m, 1980 and 400m north of Green Island, 14m (UM). Dead shells from off Killyleagh (Williams, 1954), east of Black Rock (BEP) and Verde Rocks (author).

Order Myoida
Superfamily Myacea
Myidae
Mya truncata L., 1758 (Fig. 88)
Recorded living from many sites around the lough, principally the south basin and the north entrance to the Narrows (author, UM). Depth range 0-39m+. Old records: rare, dead, Bay off Killyleagh, Castleward Bay and Upper Wellstream Bay (Dickie, 1858).
Mya arenaria L., 1758 (Fig. 89)
Recorded living from muddy sites around SL, mainly in areas which exclude the above species. Depth range 0-3m+.
Sphenia binghami Turton, 1822
Recorded living, Audley's Rocks (HW). This species can easily be confused with juvenile *Mya* spp. so must be regarded as doubtful.
Corbulidae
Corbula gibba (Olivi, 1792) (Fig. 89)
Recorded living from sublittoral sites around SL (author, UM). Absent from the Narrows and the northern part. Old records: SL, common on muddy ground (Thompson, 1856); as *Corbula nucleus*, common, living, Castleward Bay, Wellstream Bay, Upper Wellstream Bay, Bay off Killyleagh and centre of SL (Dickie, 1857); five valves, SL, Thompson, ex Belf. Nat. Hist. Phil. Soc. (UM).
Superfamily Hiatellacea
Hiatellidae
Hiatella arctica (L., 1758) (Fig. 90)
Recorded living, common, from the shore and sublittoral (UM, HW, author). Absent from the Quoile Estuary and the north-west. Depth range 0-37m+. Old records: as *Saxicava arctica*, rare, living, Castleward Bay and Upper Wellstream Bay (Dickie, 1858); as *Saxicava rugosa* var. *arctica*, 10+ specimens, SL, Waller Collection, Reg. No. 89.1893 (NMI).

Superfamily Pholadacea

Pholadidae

Pholas dactylus L., 1758

Dead shells recorded from Granagh Bay (south) and Greyabbey (D. Roberts, pers. comm.).

Barnea candida (L., 1758)

Dead shells dredged at Limestones, 1940, Castleward Bay, 1941 (Williams, 1954). Old record: rare, dead, Castleward Bay (Dickie, 1858).

Order Pholadomyoida

Superfamily Thraciacea

Thraciidae

Thracia convexa **(W. Wood, 1815) (Fig. 90)**

Recorded living from nine sublittoral sites around SL, depth range 9-34m+. Old records: SL (Thompson, 1856); rare, dead, centre of SL, very rare, dead, Wellstream Bay and Upper Wellstream Bay (Dickie, 1858); two and a half specimens, SL, Waller Collection, Reg. No. 89.1893 (NMI); single valve, SL (Thompson, UM); two valves, Portaferry (Hyndman, UM).

Thracia phaseolina **(Lamarck, 1818)**

Recorded living from Lees Wreck, 12m (author) and 600m east of Woman's Rock, 16m (UM). Dead shells from off Killyleagh, 13-18m, 1939, 1941 (Williams, 1954), Paddys Point, Cockle Rock, Drum Hill (author). Old records: as *Thracia declivis*, SL (Thompson, 1856); as *Thracia papyracea*, rare, dead, Castleward Bay and Wellstream Bay (Dickie, 1858).

Thracia villosiuscula **(Macgillivray, 1818)**

Recorded living from Mid Island Bay (HW) (although it is not clear that the identification was confirmed) and Abbey Rocks, 29m (author).

Thracia distorta **(Montagu, 1803)**

Shells only, in rocks bored by other molluscs, 1942, 1944, off Limestones (Williams, 1954).

Lyonsiidae

Lyonsia norwegica (Gmelin, 1791)

Valves only, off Limestones, 27m, 1941 (Williams, 1954). Old records: very rare, dredged SL, 6-12f, amongst sea weed (Thompson, 1856); very rare, living, centre of SL and very rare, dead, Upper Wellstream Bay (Dickie, 1858).

Pandoridae

Pandora obtusa

Recorded dredged from SL, Hyndman and Thompson (Thompson, 1856). This is a Mediterranean-Biscay species (SMS, pers. comm.). Four and a half specimens as *Pandora inaequivalvis* var. *obtusa* Strangford, Waller Collection, Reg. No. 89.1893 (NMI).

Pandora pinna (Montagu, 1803)

Dredged off Killyleagh, 1938, 1941, 13-27m (Williams, 1954). Old records: one specimen, Thompson and Hyndman, Portaferry, August 1837, and one specimen (no collector recorded), Portaferry, September, 1908 (UM).

Class CEPHALOPODA

Order Sepioidea

Sepiidae

Sepia officinalis L., 1758

On *Modiolus modiolus* bed near Black Rock (Roberts, 1975). Eggs were dredged off The Limestones, 22m, 18.8.1971 (UM).

Sepiolidae

Rossia macrosoma (delle Chiaje, 1826)

Recorded living from south-east of Inishanier Island, 9m (UM) and Ringhaddy Harbour, 20m (author).

Sepiola atlantica Orbigny in Ferussac and Orbigny, 1840 (Fig. 91)

Recorded living from east of Black Rock (UM), Ringhaddy Harbour and Castle Hill (shore) (author). Egg masses recorded from the vicinity of Limestones (Williams, 1954), Doctors Bay, Greyabbey and on *Modiolus modiolus* beds (Marine Biology Station). The eggs hatch in early April (Williams, 1954).

Order Teuthoidea

Loliginidae

Alloteuthis media **(L., 1758)**

Old record: as *Loligo media*, SL, Templeton MSS (Nichols, 1900).

Alloteuthis subulata **(Lamarck, 1798)**

Old record: as *Loligo subulata*, SL, Templeton MSS (Thompson, 1856).

Ommastrephidae

Todaropsis eblanae **(Ball, 1841)**

Old record: Lough Strangford (Jeffreys, 1869).

Order Octopoda

Octopodidae

Eledone cirrhosa **(Lamarck, 1798) (Fig. 91)**

Recorded living from off Killyleagh, two specimens, 12m, August 1964 and 1967 (Marine Biology Station); north of Dunnyneill Island, 15m, muddy sand (Hartnoll, 1967); east of Taggart Island, 17m, south-east of Abbey Rock, 4.5m and off Selk Rock, 1976 (UM), Ballyhenry Point, 25m and Cunningburn Milltown (author). The specimen at Cunningburn Milltown was persistently trying to swim towards the shore and beach itself.

Acknowledgements

I would like to thank the following people for their help in making it possible for me to complete this work:- the many landowners, especially the National Trust, who gave me permission to cross their land; Shelagh Smith, John Baxter and Bernard Picton for help with identification of the more difficult species, and their encouragements; the Ulster Museum, N. I. Aquarium (now 'Exploris') and the National Museum of Ireland for access to their records and specimens; the many divers, especially Graham Day who gave diving support during the period 1986 to 1992; Queen's University, Belfast, for its financial support,March to August 1992, while this work was completed, and its many members of staff

for helpful discussions and boat support; the Department of the Environment (NI) for permission to use records, to collect Mollusca in SL, and for generously refunding part of my expenses incurred during this work; finally, my thanks go to my supervisor for my M.Sc., Pat Boaden (Marine Biology Station, Queen's University, Belfast) for help and support in initiating and carrying out this project.

References

(a) Mollusca of Strangford Lough

Anwar, N. A., Richardson, C. A. and Seed, S. (1990) Age determination, growth rate and population structure of the horse mussel *Modiolus modiolus*. *J. mar. biol. Ass. U.K.* 70: 441-457.

Boaden, P. J. S. (1966) Interstitial fauna from Northern Ireland. *Veroffenlichungen des Instituts für Meeresforschung in Bremerhaven* 2: 125-130.

Boaden, P. J. S. (1982) Estuarine and inshore waters. *In* Cruickshank, J. G. and Wilcock, D. N. (eds) *Northern Ireland: Environment and Natural resources*. Queen's University of Belfast and New University of Ulster, Coleraine.

Boaden, P. J. S. and Dring, M. T. (1980) A quantitative evaluation of the effects of *Ascophyllum* harvesting on the littoral ecosystem. *Helgolander Meeresuntersuchungen* 33: 700-710.

Boaden, P. J. S. and Elhag, A. G. E. (1984) Meiobenthos and the oxygen budget of an intertidal sand beach. *Hydrobiologia* 118: 39-47.

Boaden, P. J. S., O'Connor, R. J. and Seed, R. (1975) The composition and zonation of a *Fucus serratus* community in Strangford Lough, Co. Down. *J. exp. mar. Biol. Ecol.* 17: 111-136.

Briggs, R. P. (1979) Aspects of oyster culture in Strangford

Lough, Northern Ireland. *Aquaculture* 15: 307-318.

Briggs, R. P. (1983a) Meat condition of the Pacific oyster *Crassostrea gigas* Thunberg grown in Strangford Lough, Northern Ireland. *J. Life Sci. R. Dubl. Soc.* 4: 225-230.

Briggs, R. P. (1983b) Experimental cultivation of the palourde, *Venerupis decussata* L. in two Northern Ireland sea loughs. *J. Life Sci. R. Dubl. Soc.* 4: 219-224.

Brown, R. A. (1976) The ecology of *Modiolus modiolus* (L.) and *Cerastoderma* (= *Cardium*) *edule* (L.) in Strangford Lough, N. Ireland. Unpublished Ph.D. thesis, Queen's University of Belfast.

Brown, R. A. (1984) Geographical variation in the reproduction of the horse mussel, *Modiolus modiolus* (Mollusca: Bivalvia). *J. Mar. Biol. Assoc. U.K.* 64: 751-770.

Brown, R. A. (1990) *Strangford Lough: the wildlife of an Irish Sea lough*. Institute of Irish Studies, Queen's University of Belfast.

Brown, R. A. and O'Connor, R. J. (1974) Some observations on the relationships between oyster catchers *Haematopus ostralegus* L. and cockles *Cardium edule* L. in Strangford Lough. *Ir. Nat. J.* 18: 73-80.

Brown, R. A. and Seed, R. (1977) *Modiolus modiolus* (L.) - an autecological study. p.p. 93-100. *In* Keegan, B. F., O'Ceidigh, P. and Boaden, P. J. S. (eds) *Biology of Benthic Organisms*. Pergammon Press, Oxford.

Brown, R. A., Seed, R. and O'Connor, R. J. (1976) A comparison of relative growth in *Cerastoderma* (=*Cardium*) *edule* (L.), *Modiolus modiolus* (L.) and *Mytilus edulis* L. (Mollusca: Bivalvia) *J. Zool., London* 179: 297-315.

Brown, T. (1818) Account of the Irish Testacea. *Memoirs of the Wernerian Natural History Society* 2: 501-536.

Crisp, D. J. (1989) The influence of tidal fronts on the distribution of intertidal fauna and flora. *Topics in Marine Biology: Scient. Mar.* 53: 283-292.

Dickie, F. (1858) Report on the marine zoology of Strangford Lough and corresponding parts of the Irish Channel. *Rep. Brit. Assoc. Adv. Sci. for 1857*. p.p. 104-112.

Donohoe, M. P. M. (1986) Levels and patterns of infection of *Modiolarca tumida* (Hanley, 1843) (Bivalvia: Mytilidae) in sea squirts from Strangford Lough, Northern Ireland. Unpublished B.Sc. Hons. thesis, Queen's University of Belfast.

Dunlop, D. (1980) A comparative study of two genera of venerid bivalves: *Venerupis* from Northern Ireland and *Katelysia* from Western Australia. Unpublished B.Sc. Hons. thesis, Queens' University of Belfast.

Erwin, D. G., Picton, B. E., Connor, D., Howson, C., Gilleece, P. and Bogues, M. J. (1986) *The Northern Ireland Sublittoral Survey*. Report for Dept. of Environment (NI).

Fisher, N. (1929) Living *Tapes decussatus* (L.) in Ulster. *Ir. Nat. J.* 2: 162.

Fisher, N. (1931) Local extinction of a recently abundant mollusk. *J. Conch.* 19:152-153.

Fisher, N. (1933) Marine recorders' report. *J. Conch.* 19: 346.

Fisher, N. (ed.) (1935) Catalogue of Irish marine shells by John Templeton. *Ir. Nat. J.* 5: 168-170, 235-237, 264-265, 287-288, 312-314.

Forbes, E. and Hanley, S. (1853) *A history of British Mollusca, and their Shells*. 1-4. van Voorst, London.

Gascoigne, T. and Platts, E. (1974) *Alderia modesta* (Loven) and *Limapontia depressa* Alder and Hancock in Down and Antrim: the latter species new to Ireland. *Ir. Nat. J.* 18: 123.

Gotto, R. V. (1951) Some plankton records from Strangford Lough, Co. Down. *Ir. Nat. J.* 10: 162-164.

Hartnoll, R. G. (1967) An investigation of the movement of the scallop. *Helgolander Wissenschaftliche Meeresunterschungen* 15: 523-533.

Hazlett, W. A. (1975) A study of *Fucus spiralis* and its associated fauna at the Dorn, Co. Down. Unpublished B.Sc. Hons. thesis,

Queen's University of Belfast.

Hiscock, K. and Mitchell, R. (1980) The description and classification of sublittoral epibenthic systems. p.p. 323-370 *In* Price, J. H., Irvine, D. E. G. and Farnham, W. E. (eds) *'The Shore Environment' 2: Ecosystems*. The Systematics Association. Special volume no. 17 (a), Academic Press.

Hollywood, P. T. (1975) A study of the major epiphytic fauna of the macroalgae at the Dorn, Strangford Lough, Co. Down. Unpublished B.Sc. Hons. thesis, Queen's University of Belfast.

Jeffreys, J. G. (1863-1869) *British Conchology*. van Voorst, London.

Kell, V. (1986) Polymorphism in *Calliostoma zizyphinum*. Unpublished B.Sc. Hons. thesis, Queen's University of Belfast.

Matthews, P. M. and Montgomery, W.I. (1987) The identification and distribution of littorinid species in Northern Ireland with particular reference to *Littorina nigrolineata* in Strangford Lough. *Ir. Nat. J.* 22: 290-296.

Moore, H. M. (1988) Damage scars on gastropods. Unpublished B.Sc. Hons. thesis, Queen's University of Belfast.

Morrow, C. C., Picton, B. E. and Bishop, J. D. D. (1993) A sublittoral survey of the Calf of Man. The Calf Marine Trust, Isle of Man.

Murdock, E. A., Ferguson, A. and Seed, R. (1975) Geographical variation in Leucine aminopeptidase in *Mytilus edulis* L. from the Irish coasts. *J. Exp. Mar. Biol. Ecol.* 19: 33-41.

Nichols, A. R. (1900) A list of the marine Mollusca of Ireland. *Proc. R. Ir. Acad.* 3rd Ser. 5: 477-662.

Nunn, J. D. (1991) Recording Mollusca in Ireland: Ballyhenry Bay, Strangford Lough, Co. Down. *Conchologists' Newsletter* 116: 349-352.

Nunn, J. D. (1993a) Recording Mollusca in Ireland: the Molluscan fauna associated with maerl. *Conchologists' Newsletter* 125: 161-167.

Nunn, J. D. (1993b) Recording Mollusca in Ireland: Castleward Bay,

Strangford Lough. *Conchologists' Newsletter* 126: 201-209.

Nunn, J. D. and McGrath, D. (1989) *Rissoella globularis* (Jeffreys) (Mollusca: Gasteropoda) in Ireland. *Ir. Nat. J.* 23: 161.

O'Connor, R. J. and Brown, R. A. (1977) Prey depletion and foraging strategy in the oystercatcher *Haematopus ostralegus* (Strangford Lough). *Oecologia* 27: 75-92.

O'Loughlin, E. F. M. (1988) Notes on the distribution of *Calliostoma zizyphinum* (L.) on the shores and shallow waters of the Irish coast. *Bull. Ir. biogeog. Soc.* 12: 22-30.

O'Loughlin, E. F. M. and Aldrich, J. C. (1987a) An analysis of shell shape variation in the painted topshell *Calliostoma zizyphinum* (L.) (Prosobranchia: Trochidae) *J. Moll. Stud.* 53: 62-68.

O'Loughlin, E. F. M. and Aldrich, J. C. (1987b) Morphological variation in the painted topshell, *Calliostoma zizyphinum* (L.) (Prosobranchia: Trochidae), from intertidal rapids on the Irish coast. *J. Moll. Stud.* 53: 267-272.

Parsons, J. (1971) Preliminary notes on the cultivation of the Pacific oyster (*Crassostrea gigas*) in Northern Ireland. *Fish. Lab. Leaflet* MANI No. 2.

Parsons, J. (1972) Growth rates and mortality of hatchery-reared Pacific oysters (*Crassostrea gigas*) in Strangford Lough, Northern Ireland. *ICES Shellfish committee Document* 32.

Parsons, J. (1974) Advantages in tray cultivation of Pacific oysters (*Crassostrea gigas*) in Strangford Lough, Northern Ireland. *Aquaculture* 3: 221-229.

Picton, B. E. and Morrow, C. C. (1994) *A field guide to the nudibranchs of the British Isles*. Immel Publishing, London.

Platts, E. (1973) Notes on some Irish intertidal nudibranchs collected off the coast of County Down. *Ir. Nat. J.* 17: 382-386.

Poizat, C. (1979) Gastéropodes mésopsammiques de la Mer d'Irlande (Portaferry, Northern Ireland). cologie et distibution. *Haliotis* 9: 11-20.

Praeger, R. L. (1889) The marine shells of the north of Ireland. *Proc. Rep. Belf. Nat. Hist. Phil. Soc.* 2 (1887-1888). Appendix, p.p. 55-110.

Preston, S. J. (1990) Damage scarring in *Calliostoma zizyphinum*. Unpublished B.Sc. Hons. thesis, Queen's University of Belfast.

Preston, S. J., Roberts, D. and Montgomery, W. I. (1993) Shell scarring in *Calliostoma zizyphinum* (Prosobranchia: Trochidae) from Strangford Lough, Northern Ireland. *J. Moll. Stud.* 59: 211-222.

Reid, W. (1980) The comparative biology of *Anomia ephippium* and *Pododesmus patelliformis* (Bivalvia: Anomidae). Unpublished B.Sc. Hons. thesis, Queen's University of Belfast.

Roberts, C. D. (1975) Investigations into a *Modiolus modiolus* (L.) (Mollusca: Bivalvia) community in Strangford Lough, Northern Ireland. *Rep. Underwater Assoc.* 1: 27-49.

Roberts, D. and Breen, J. P. (1985) The biology and functional anatomy of *Modiolarca tumida* (*Musculus marmoratus*) Bivalvia: Mytilidae. *J. Zool., London* 205: 435-443.

Roberts, D. and Kell, G. V. (1987) Shell colour in *Calliostoma zizyphinum* (L.) from Strangford Lough. *J. Moll. Stud.* 53: 273-283.

Seed, R. (1973) Reproduction in *Mytilus* (Mollusca: Bivalvia) in European waters. *8th European Marine Biology Symposium.* Publication Staz., Zool. Napoli 39: Suppl. p.p. 317-334.

Seed, R. (1974) Morphological variations in *Mytilus* from the Irish coasts in relation to the occurence and distribution of *Mytilus galloprovincialis* Lmk. *Cahiers de Biologie Marine* 15: 1-25.

Seed, R. (1976) Distribution and shell characteristics of the painted topshell *Calliostoma zizyphinum* (L.) (Prosobranchia: *Trochidae*) in County Down, Northern Ireland. *J. Moll. Stud.* 45: 12-18.

Seed, R. (1977) A curious association - periwinkles and saddle-oysters (Strangford Lough). *Ir. Nat. J.* 19: 8-9.

Seed, R. (1980) Reproduction and growth in *Anomia ephippium* (L.) (Anomiidae: Bivalvia) in Strangford Lough. *J. Conch.* 30: 239-245.

Seed, R. (1982) A note on the reproductive cycles of *Pododesmus* (= *Monia*) *patelliformis* and *Anomia ephippium* (Bivalvia: Anomiidae) in Strangford Lough, Northern Ireland. *Ir. Nat. J.* 20: 395-398.

Seed, R. and Brown, R. A. (1975) The influence of reproductive cycle, growth and mortality on population structure in *Modiolus modiolus* (L.), *Cerastoderma edule* (L.) and *Mytilus edulis* L. (Mollusca: Bivalvia). *Proc. 9th European Marine Biology Symposium*. p.p. 257-274. Aberdeen University Press, Aberdeen.

Seed, R. and Brown, R. A. (1977) A comparison of the reproductive cycles of *Modiolus modiolus* (L.), *Cerastoderma* (= *Cardium*) *edule* (L.) and *Mytilus edulis* (L.) in Strangford Lough, Northern Ireland. *Oecologia* 30: 173-188.

Seed, R. and Brown, R. A. (1978) Growth as a strategy for survival in two marine bivalves, *Cerastoderma edule* (L.) and *Modiolus modiolus* (L.). *J. Anim. Ecol.* 47: 283-292.

Seed, R. and Harris, S. (1980) The epifauna of the fronds of *Laminaria digitata* Lamour in Strangford Lough, Northern Ireland. *Proc. R. Ir. Acad.* 80B: 91-106.

Seed, R. and Lowry, B. J. (1973) The intertidal macrofauna of seven sandy beaches of County Down. *Proc. R. Ir. Acad.* 73B: 217-230.

Seed, R. and Roberts, D. (1976) A study of three populations of saddle-oysters (family Anomiidae) from Strangford Lough, Northern Ireland. *Ir. Nat. J.* 18: 317-321.

Southward, A. J. and Crisp, D. J. (1954) The distribution of certain intertidal animals around the Irish coast. *Proc. R. Ir. Acad.* 57B: 1-29.

Thompson, W. (1840) Additions to the fauna of Ireland. *Ann. Mag. Nat. Hist.* 5: 6-14.

Thompson, W. (1844) Additions to the fauna of Ireland. *Ann. Mag. Nat. Hist.* 13: 430-440.

Thompson, W. (1856) *The Natural History of Ireland.* 4. Reeve, Benham and Reeve, London.

Went, A. E. J. (1962) Historical notes on the oyster fisheries of Ireland. *Proc. R. Ir. Acad.* 62C: 195-223.

Wilkinson, M., Fuller, I. A., Telfer, T. C., Moore, C. G. and Kingston, P. F. (1988) *Northern Ireland Littoral Survey: a conservation-oriented survey of the intertidal seashore of Northern Ireland.* Report for the Department of the Environment (NI).

Williams, G. (1954) Fauna of Strangford Lough and neighbouring coasts. *Proc. R. Ir .Acad.* 56B: 29-133.

(b) General

Briggs, J. C. (1974) *Marine zoogeography.* McGraw-Hill, New York.

Brown, G. H. and Picton, B. E. (1979) *Nudibranchs of the British Isles.* Marine Conservation Society, Ross-on-Wye.

Davison, A. and Boaden, P. J. S. (1990) *The management of Strangford Lough: a study of the marine environment, its conservation and its exploitation.* A report for the Department of the Environment (NI).

Department of the Environment (NI) (1991) *Strangford Lough: a consultation paper.* Department of the Environment (NI).

Department of the Environment (NI) (1994) *Strangford Lough: proposed marine nature reserve: guide to designation.* Department of the Environment (NI).

Erwin, D. G. (1977) A diving survey of Strangford Lough: the benthic communities and their relation to substrate - a preliminary account. *Biology of Benthic Organisms* 11th Eur. Symp. on Mar. Biol. p.p. 215-224. Pergammon Press, Oxford.

Fretter, V. and Graham, A. (1976-86) The Prosobranch Molluscs of Britain and Denmark. *J. Moll. Stud.* suppl. 1, 3, 5, 6, 7, 9,

11, 15, 16.

Gault, N. F. S., Tolland, E. L. C. and Parker, J. E. (1983) Spatial and temporal trends in heavy metal concentrations in mussels from Northern Ireland coastal waters. *Marine Biology* 77: 307-316.

Gubbay, S. (1988) *A coastal directory for marine nature conservation*. Marine Conservation Society, Ross-on-Wye.

Irish Sea Study Group Report (1990) *Part 1. Nature Conservation. Part 3. Exploitable Living Resources*. Liverpool University Press, Liverpool.

Jones, A. M. and Baxter, J. (1987) Molluscs: Caudofoveata, Solenogastres, Polyplacophora and Scaphopoda. *Synopses Br. Fauna* 37.

Lewis, J. R. (1964) *The ecology of rocky shores*. English Universities Press, London.

McCloy, A. (1986) Strangford Lough: a bibliography. Institute of Irish Studies, Queen's University of Belfast.

Norton, T. A. (1978) Mapping species distributions as a tool in marine ecology. *Proc. R. Soc. Edin.* 76B: 201-213.

Nunn, J. D. (1990) The molluscan fauna of Loch Broom and Little Loch Broom, Scotland. *Conchologists' Newsletter* 113: 276.

Reid, D. G. (1993) Barnacle-dwelling ecotypes of three British *Littorina* species and the status of *Littorina neglecta* Bean. *J. Moll. Stud.* 59: 51-62.

Seaward, D. (1982) *Sea area atlas of the marine molluscs of Britain and Ireland*. Nature Conservancy Council, Cambridge.

Seaward, D. (1991) *Distribution of the marine molluscs of NW Europe*. Nature Conservancy Council, Cambridge.

Smith, S. M. and Heppell, D. (1991) *Checklist of the British Mollusca*. Information series no. 11. Royal Museum of Scotland, Edinburgh.

Tebble, N. (1966) *British bivalve seashells*. British Museum (Natural History), London.

Thompson, T. E. and Brown, G. H. (1984) *Biology of Opisthobranch*

molluscs. 2. The Ray Society, London.

Author's address
Cherry Cottage,
11 Ballyhaft Road,
Newtownards,
Down BT22 2AW,
NORTHERN IRELAND.

TABLE 1. Littoral sites in Strangford Lough.

No.	Site name	Date of Visit	Species (live/dead)	Latitude/Longitude
	North Strangford Lough			
	(A) West			
1.	North-West Newtownards	25.5.1990	(6,5)	54°33.75'N. 05°41.20'W.
2.	Rough Island	30.1.1990	(5,4)	54°32.75'N. 05°41.20'W.
3.	Castle Espie	5.10.1990	(9,4)	54°31.90'N. 05°41.07'W.
4.	Drum Hill	27.4.1990	(14,11)	54°31.60'N. 05°39.92'W.
5.	Cockle Rock	26.4.1990	(13,7)	54°31.45'N. 05°39.38'W.
6.	Paddys Point	26.4.1990	(16,4)	54°31.25'N. 05°39.13'W.
7.	Duck Rock, Reagh Island	3.10.1989	(32,7)	54°30.85'N. 05°37.90'W.
8.	Mahee Island Point	29.4.1990	(36,1)	54°30.40'N. 05°37.00'W.
9.	Inner Mahee Island	16.10.1989/ 30.3.1990	(28,1)	54°29.70'N. 05°38.60'W.
10.	Rainey Island	26.7.1990	(26,1)	54°29.71'N. 05°38.61'W.
11.	Sketrick Island (north)	8.12.1986	(10,1)	54°29.37'N. 05°38.65'W.
12.	Sketrick Island (narrows)	24.7.1990	(35,0)	54°29.42'N. 05°38.50'W.
13.	Trasnagh Island	26.7.1990	(20,1)	54°29.15'N. 05°37.63'W.
14.	Braddock Island	11.3.1989	(40,8)	54°28.90'N. 05°38.40'W.
15.	Conly Island	21.2.1988/ 4.8.1989	(31,5)	54°28.15'N. 05°38.15'W.
16.	Darragh Causeway	22.3.1987	(42,2)	54°27.88'N. 05°37.65'W.
17.	Ringhaddy Harbour	9.4.1989	(27,6)	54°27.10'N. 05°37.80'W.
18.	Islandbane Point	2.10.1989	(30,4)	54°26.70'N. 05°37.82'W.
19.	Ringhaddy Rapids	2.10.1989	(19,5)	54°26.78'N. 05°38.25'W.
20.	Newtownards (head)	23.1.1988	(6,3)	54°34.65'N. 05°40.04'W.
21.	Butterlump Stone	26.2.1988	(13,3)	54°34.00'N. 05°39.00'W.

No.	Site name	Date of Visit	Species (live/dead)	Latitude/Longitude
(B)	East			
22.	Cunningburn Milltown	6.6.1989	(15,7)	54°33.65'N. 05°38.30'W.
23.	Pig Island	26.2.1988/ 12.1.1989/26.1.1989	(20,6)	54°33.30'N. 05°37.25'W.
24.	Mount Stewart	8.7.1989	(16,9)	54°32.88'N. 05°36.30'W.
25.	Peggy's Island	8.7.1989	(12,4)	54°32.48'N. 05°36.25'W.
26.	Turley's Rock	8.7.1989	(13,2)	54°32.22'N. 05°36.40'W.
27.	Whaup Rock	8.7.1989	(34,3)	54°31.80'N. 05°36.85'W.
28.	Hare Island	20.8.1989	(32,2)	54°31.65'N. 05°36.28'W.
29.	Chapel Island Point	20.8.1989	(39,6)	54°31.30'N. 05°36.15'W.
30.	Ragheries, South Island	7.5.1989	(40,3)	54°30.92'N. 05°34.70'W.
31.	Greyabbey	31.7.1988	(31,5)	54°31.25'N. 05°34.55'W.
32.	Millhouse	17.10.1989	(28,5)	54°31.18'N. 05°33.28'W.
33.	Herring Bay	9.7.1989	(42,7)	54°30.61'N. 05°33.20'W.
34.	Stonedyke Bank	23.2.1992	(26,1)	54°30.35'N. 05°32.95'W.
35.	Downey's Rock	10.8.1990	(26,1)	54°30.37'N. 05°35.60'W.
36.	Newton Rock	10.8.1990	(24,2)	54°29.61'N. 05°35.25'W.
37.	White bank, Kircubbin	5.8.1989	(33,1)	54°29.65'N. 05°32.70'W.
38.	Kircubbin Bay	26.2.1988	(17,6)	54°29.55'N. 05°32.30'W.
39.	Monaghan Bank	27.1.1989/ 2.9.1989	(32,1)	54°29.13'N. 05°32.60'W.
40.	Bird Island	27.7.1990	(23,3)	54°28.70'N. 05°34.85'W.
41.	Doctors Bay	8.5.1989	(8,1)	54°28.98'N. 05°32.12'W.
42.	Black Neb	8.5.1989	(35,2)	54°28.75'N. 05°32.44'W.
43.	Rawreagh Point	7.10.1990	(28,4)	54°28.50'N. 05°32.35'W.
44.	Horse Island	23.1.1988	(24,3)	54°28.10'N. 05°32.45'W.
45.	Gransha Point	19.8.1989	(43,3)	54°27.38'N. 05°33.50'W.

No. Site name	Date of Visit	Species (live/dead)	Latitude/Longitude
South Strangford Lough			
(A) West			
46. Finyan Point, Islandmore	25.7.1990	(34,1)	54°26.85'N. 05°36.84'W.
47. Pawle Island	25.7.1990	(26,1)	54°26.53'N. 05°36.80'W.
48. Black Rock	30.4.1990	(23,1)	54°25.74'N. 05°37.22'W.
49. Simmy Island	24.5.1989	(30,1)	54°25.65'N. 05°38.10'W.
50. Limestone Rock	8.10.1990	(29,2)	54°25.25'N. 05°36.18'W.
51. Dunnyneill Island (north)	2.3.1990	(33,4)	54°24.70'N. 05°36.80'W.
52. Dunnyneill Island (south)	3.5.1989	(28,3)	54°24.55'N. 05°37.00'W.
53. Holm Bay (north)	26.5.1990	(26,3)	54°24.61'N. 05°38.35'W.
54. Holm Bay (south)	26.5.1990	(28,1)	54°24.25'N. 05°38.40'W.
55. Long Rock	21.8.1989	(29,1)	54°24.32'N. 05°37.20'W.
56. North Point, Killyleagh	29.3.1990	(31,4)	54°23.82'N. 05°38.52'W.
57. Moore's Point	31.3.1990	(21,6)	54°22.90'N. 05°39.15'W.
58. Gibb's Island	31.3.1990	(6,2)	54°22.30'N. 05°40.60'W.

No.	Site name	Date of Visit	Species (live/dead)	Latitude/Longitude
	(B) South			
59.	Rat Island	30.5.1990	(15,5)	54°22.60'N. 05°39.40'W.
60.	Ringbane, near Gore's Island	19.9.1990	(7,5)	54°21.90'N. 05°39.00'W.
61.	Launches Little	19.9.1990	(9,8)	54°22.67'N. 05°37.62'W.
62.	Green Island, Quoile	30.5.1990	(27,2)	54°23.30'N. 05°38.08'W.
63.	Skate Rock	9.8.1990	(28,1)	54°23.42'N. 05°37.40'W.
64.	Outer Jackdaw Island	29.9.1986/ 7.7.1989	(34,1)	54°23.12'N. 05°36.30'W.
65.	Outer Chapel Island	9.5.1989	(31,1)	54°23.25'N. 05°35.80'W.
66.	Chapel Island Causeway	28.4.1990	(36,10)	54°23.00'N. 05°35.80'W.
	(C) East			
67.	Mid Island Bay	6.10.1990	(20,5)	54°27.29'N. 05°32.48'W.
68.	Craiglee Rocks	8.8.1990	(25,3)	54°26.95'N. 05°32.64'W.
69.	Castle Hill	7.9.1990	(19,4)	54°26.38'N. 05°32.85'W.
70.	The Dorn	16.7.1988/7.9.1990	(38,2)	54°26.10'N. 05°32.80'W.
71.	Round Island	29.5.1990	(36,0)	54°26.10'N. 05°34.23'W.
72.	North of Ladys Port	18.8.1989	(33,4)	54°25.85'N. 05°33.80'W.
73.	Ringburr Point	24.8.1990	(25,3)	54°25.50'N. 05°34.65'W.
74.	North Marlfield	3.9.1989	(22,2)	54°24.50'N. 05°34.70'W.
75.	Marlfield Bay	26.2.1989	(21,1)	54°24.35'N. 05°34.65'W.
76.	Ballywhite Bank	25.2.1989	(14,1)	54°24.10'N. 05°34.70'W.
77.	Ballywhite Bay	25.5.1989	(15,10)	54°23.75'N. 05°34.40'W.

No.	Site name	Date of Visit	Species (live/dead)	Latitude/Longitude
	The Narrows			
	(A) West			
78.	Audley's Rocks	28.3.1990	(18,3)	54°22.95'N. 05°34.30'W.
79.	Castleward Bay (Head)	28.5.1990	(4,2)	54°21.92'N. 05°33.92'W.
80.	Sleitch Rocks, Castleward Bay	1.3.1990	(24,7)	54°22.58'N. 05°33.95'W.
81.	Church Point	18.9.1989	(42,2)	54°22.60'N. 05°33.60'W.
82.	Church Point: Beacon	9.4.1992	(35,0)	54°22.60'N. 05°33.33'W.
83.	Swan Island	12.3.1989/ 23.8.1990	(30,1)	54°22.45'N. 05°33.05'W.
84.	Strangford	22.5.1990	(12,1)	54°22.82'N. 05°33.29'W.
85.	Strangford Point	22.5.1990	(12,0)	54°22.22'N. 05°33.00'W.
86.	Black Islands	13.10.1989	(40,2)	54°21.80'N. 05°32.80'W.
87.	Salt Rock	21.5.1990	(36,3)	54°21.45'N. 05°32.60'W.
88.	Cloghy Rocks	5.5.1989	(39,6)	54°21.18'N. 05°33.15'W.
89.	Cloghy Point	10.3.1990	(30,6)	54°21.10'N. 05°32.70'W.
90.	Kilclief (Football Ground)	8.4.1990	(19,0)	54°20.60'N. 05°32.50'W.
91.	Kilclief Point	8.4.1990	(20,2)	54°20.46'N. 05°32.31'W.
92.	Castle Flannan	26.2.1990	(20,1)	54°20.10'N. 05°32.45'W.
93.	Mullog Point	11.3.1990	(27,1)	54°19.82'N. 05°32.30'W.
94.	Craigadarkin	12.3.1990	(25,1)	54°19.35'N. 05°32.35'W.
95.	Caskin Bay	28.5.1990	(31,2)	54°19.18'N. 05°32.00'W.
96.	Craigthomas	27.3.1990	(32,4)	54°19.08'N. 05°31.50'W.
97.	Angus Rock	4.4.1989	(60,2)	54°19.88'N. 05°31.45'W.
98.	Garter Rock	23.5.1990	(31,0)	54°19.62'N. 05°31.35'W.

No.	Site name	Date of Visit	Species (live/dead)	Latitude/Longitude
(B) East				
99.	Selk Rock	17.9.1989	(36,3)	54°23.55'N. 05°34.70'W.
100.	Ballyhenry Point	10.4.1989	(20,0)	54°23.50'N. 05°34.60'W.
101.	Ballyhenry Island (south)	18.6.1986/18.4.1987/5.4.1989	(63,3)	54°23.50'N. 05°34.50'W.
102.	Near John's Rocks	11.8.1990	(30,1)	54°23.38'N. 05°34.40'W.
103.	Ballyhenry Bay	7.8.1990	(22,0)	54°23.40'N. 05°33.80'W.
104.	Walter's Rock	2.5.1989	(26,1)	54°22.98'N. 05°33.45'W.
105.	Portaferry	22.8.1990	(13,2)	54°22.86'N. 05°32.88'W.
106.	Big Rock	12.8.1990	(25,1)	54°22.31'N. 05°32.50'W.
107.	Bankmore Hill	4.5.1989	(36,2)	54°21.95'N. 05°32.42'W.
108.	Islandacorr	19.4.1987	(28,5)	54°21.75'N. 05°32.25'W.
109.	Beardy Rocks	14.10.1989	(37,2)	54°21.68'N. 05°31.95'W.
110.	Gowland Rocks	6.4.1990	(25,0)	54°21.55'N. 05°32.15'W.
111.	Granagh Bay (south)	9.3.1990	(26,7)	54°21.41'N. 05°31.77'W.
112.	Dogtail Point	7.6.1989	(41,2)	54°20.80'N. 05°31.75'W.
113.	Carrstown Point	26.3.1990	(33,1)	54°20.38'N. 05°31.20'W.
114.	Bar Hall Bay	24.5.1990	(27,6)	54°20.48'N. 05°30.92'W.
115.	Ballyquintin: Green Isle	20.4.1987/8.4.1989	(46,3)	54°20.15'N. 05°30.75'W.
116.	Ballyquintin: Black Isle	7.4.1990	(25,1)	54°20.17'N. 05°30.08'W.
117.	Ballyquintin: Pool	15.10.1989	(27,3)	54°19.95'N. 05°30.45'W.
118.	Ballyquintin Point	25.4.1990	(22,0)	54°19.84'N. 05°30.25'W.

Bull. Ir. biogeog. Soc. No. 17

Table 2. Sublittoral sites in Strangford Lough.

No.	Site name	Date of Visit	Depth Range	Species no. (live/dead)	Latitude/Longitude
(A)	**Dive Sites**				
1.	Mahee Roads	9.6.1990	5-7m	(11,9)	54°29.46'N. 05°37.02'W.
2.	West of Round Skart Rock	9.6.1990	12-20m	(20,1)	54°29.10'N. 05°35.27'W.
3.	Ringhaddy Harbour	4.7.1986-11.3.1990	0-23m	(36,3)	54°27.06'N. 05°37.75'W.
4.	Jane's Rock	12.5.1990	16-18m	(29,4)	54°27.03'N. 05°35.95'W.
5.	West of Long Sheelagh	12.5.1990	13-18m	(15,1)	54°26.99'N. 05°35.88'W.
6.	West of Long Island	9.6.1990	4-35m	(20,2)	54°26.65'N. 05°34.41'W.
7.	Verde Rocks (north)	12.5.1990	8-18m	(16,4)	54°26.26'N. 05°36.78'W.
8.	Verde Rocks (north-east)	12.5.1990	14-16m	(12,6)	54°26.24'N. 05°36.81'W.
9.	West of Round Island (1)	16.9.1989	24-31m	(17,0)	54°26.20'N. 05°36.11'W.
10.	West of Round Island (2)	30.9.1989	17-27m	(15,3)	54°26.10'N. 05°34.47'W.
11.	Sunk Rock (north-east)	8.6.1989	16.8m	(11,4)	54°26.15'N. 05°36.17'W.
12.	Brown Rock (south)	15.11.1987	30.4m	(7,5)	54°26.12'N. 05°37.35'W.
		1.3.1988	16.9m		
13.	Black Rock	21.6.1987	22.4m	(6,1)	54°25.70'N. 05°37.00'W.
14.	Abbey Rocks	6.7.1988	28.5m	(17,4)	54°25.55'N. 05°35.10'W.
15.	Ringburr Point	24.1.1988	18.1m	(0,2)	54°25.55'N. 05°34.90'W.

No.	Site name	Date of Visit	Depth Range	Species no. (live/dead)	Latitude/Longitude
16.	Limestone Rock	13.9.1987	19.1m	(11,4)	54°25.10'N. 05°36.10'W.
17.	West of Limestone Pladdy	9.6.1990	8-13m	(38,7)	54°24.81'N. 05°37.02'W.
18.	Dunnyneill Island (south-east)	15.9.1988	27.6m	(23,6)	54°24.45'N. 05°36.85'W.
19.	Channel north of Long Rock	9.2.1992	10-12m	(11,6)	54°24.45'N. 05°37.05'W.
20.	Kate's Pladdy	30.9.1989	6-13m	(18,4)	54°24.50'N. 05°34.78'W.
21.	Marlfield Bay	21.6.1987-26.2.1989	10-40m	(45,5)	54°24.30'N. 05°35.15'W.
22.	Barrel Rock	16.9.1989	2-9m	(19,12)	54°23.91'N. 05°37.49'W.
23.	McLaughlin Rock	30.9.1989	6-8m	(17,1)	54°23.82'N. 05°36.78'W.
24.	South of McLaughlin Rock	30.9.1989	12-15m	(4,0)	54°23.76'N. 05°36.77'W.
25.	Killyleagh Reefs (2)	12.5.1990	4-10m	(6,7)	54°23.52'N. 05°37.68'W.
26.	Killyleagh Reefs (1)	12.5.1990	8-12m	(13,3)	54°23.51'N. 05°37.62'W.
27.	North of Chapel Island	17.11.1988	35.1m	(22,3)	54°23.58'N. 05°36.04'W.
28.	Off Shark Island	30.9.1989	6-11m	(2,6)	54°22.93'N. 05°36.81'W.
29.	Ballywhite Bay (1)	9.6.1990	6-15m	(24,8)	54°23.65'N. 05°34.79'W.
		2.2.1992	14.6m	(8,2)	
30.	Ballywhite Bay (2)	18.3.1990	2.8m	(3,0)	54°23.75'N. 05°34.55'W.
31.	Ballyhenry Point	15.2.1987-19.11.1989	5-45m	(68,8)	54°23.44'N. 05°34.80'W.

No.	Site name	Date of Visit	Depth Range	Species no. (live/dead)	Latitude/Longitude
32.	Lees Wreck				
		12.10.1986-14.10.1990	0-21m	(75,3)	54°23.36'N. 05°34.35'W.
33.	'The Pins'				
		8.11.1987-24.7.1989	0-16m	(43,4)	54°23.40'N. 05°33.80'W.
34.	East of Chapel Island				
		16.9.1989	13-24m	(17,5)	54°23.10'N. 05°34.48'W.
35.	Audley Point				
		19.9.1987-1.1.1991	10-37m	(32,3)	54°22.98'N. 05°34.21'W.
36.	Castleward Bay				
		19.2.1989	15.1m	(16,13)	54°22.66'N. 05°33.61'W.
		16.9.1989	12-15m	(25,30)	
		12.5.1990	10-16m	(38,14)	
37.	The Pier, Strangford				
		18.6.1987	9.3m	(8,0)	54°22.42'N. 05°33.23'W.
38.	The Slip, Strangford				
		14.2.1988	8.7m	(0,2)	54°22.28'N. 05°33.20'W.
39.	Angus Rock (north-east)				
		7.5.1989	31m	(6,0)	54°19.95'N. 05°31.35'W.

No.	Site name	Date of Visit	Depth Range	Species no. (live/dead)	Latitude/Longitude
(B)	**Dredge/Grab sites**				
1.	Bird Island passage				
		dredge 27.7.1990	6-24m	(9,4)	54°28.60'N. 05°34.50'W.
2.	Off Rawreagh Point				
		dredge 27.7.1990	9-15m	(4,4)	54°28.50'N. 05°33.04'W.
3.	South Rock-Sand Rock				
		dredge 27.7.1990	10-25m	(8,7)	54°27.98'N. 05°34.50'W.
4.	Channel, west of Slave Rock				
		dredge 27.7.1990	7-30m	(10,4)	54°27.77'N. 05°35.50'W.
5.	Colin Rock				
		dredge 30.4.1990	18-22m	(12,10)	54°25.55'N. 05°36.00'W.
6.	Limestone Rock (north-east)				
		dredge 8.10.1990	10-25m	(11,4)	54°25.35'N. 05°35.50'W.
7.	Limestone Rock (south-east)				
		dredge 8.10.1990	19-24m	(1,0)	54°24.88'N. 05°35.65'W.
8.	East of Neil Reef				
		dredge 8.10.1990	16-50m	(3,2)	54°24.37'N. 05°35.96'W.
9.	North Holm Bay				
		dredge 30.4.1990	11-18m	(11,7)	54°24.40'N. 05°37.70'W.
10.	South Holm Bay				
		dredge 30.4.1990	6-24m	(7,6)	54°24.00'N. 05°37.90'W.
11.	Town Rock				
		grab 30.4.1990	9m	(8,9)	54°23.55'N. 05°38.35'W.
12.	West/south-west Skate Rock				
		grab 30.4.1990	2m	(5,14)	54°23.30'N. 05°37.65'W.
13.	Skate Rock-Chapel Island				
		dredge 30.4.1990	3-26m	(4,7)	54°23.20'N. 05°36.80'W.
14.	Quoile, off Salt island				
		grab 30.4.1990	11m	(5,1)	54°22.85'N. 05°38.85'W.
15.	Castleward Bay				
		dredge 30.4.1990	3-9m	(7,3)	54°22.75'N. 05°33.80'W.

TABLE 3 (A-D). Molluscan records from Strangford Lough.

(A) Species of unknown status

Hanleya hanleyi; *Dikoleps nitens*; *Skenea serpuloides*; *Caecum imperforatum*; *Polinices montagui*; *Aclis gulsonae*; *Raphitoma purpurea*; *Melanella alba*; *Modiolus adriaticus*; *Pandora pinna*.

(B) Not seen since 19th century

Hanleya hanleyi; *Jujubinus montagui*; *Alvania beanii*; *A. cancellata*; *Caecum imperforatum*; *Polinices catena*; *P. fuscus*; *P. montagui*; *Epitonium turtonis*; *Haedropleura septangularis*; *Turbonilla rufescens*; *Cylichna cylindracea*; *Jupiteria minuta*; *Modiolus adriaticus*; *Limatula sulcata*; *Parvicardium minimum*; *Gari depressa*; *Glossus humanus*; *Lyonsia norvegica*; *Alloteuthis media*; *Alloteuthis subulata*; *Todaropsis eblanae* (all living); *Eulima bilineata*; *Goodallia triangularis* (all dead).

(C) New since 19th century (author's records)

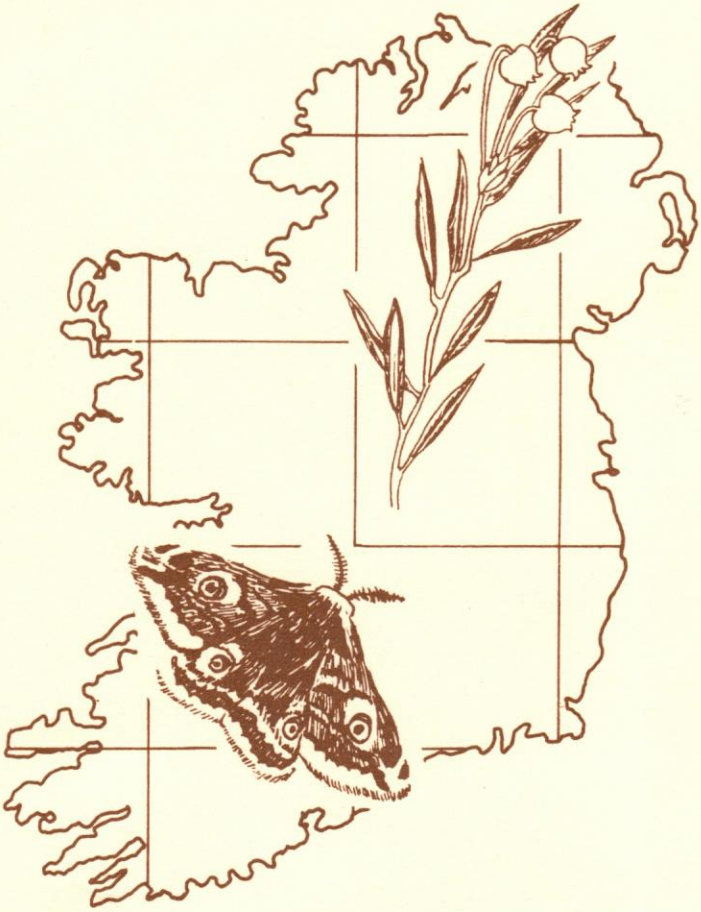
Ischnochiton albus; *Rissoa lilacina*; *Alvania punctura*; *Raphitoma linearis*; *Odostomia plicata*; *Odostomia unidentata*; *Brachystomia eulimoides*; *Chrysallida indistincta*; *Nucula nitidosa*; *Crenella decussata*; *Spisula elliptica*; *Abra prismatica*; *Thracia phaseolina*.

(D) New to Strangford Lough (author's records)

Rissoa lilacina var. *porifera*; *R. l.* var. *rufilabrum*; *Eatonina fulgida*; *Pusillina sarsi*; *P. inconspicua*; *Hyala vitrea* (dead); *Cerithiopsis tubercularis*; *Mangelia coarctata*; *Rissoella opalina*; *Odostomia turrita*; *Brachystomia carrozzai*; *Jordaniella nivosa*; *Partulida spiralis*; *Tragula fenestrata*; *Retusa truncatula*; *Onchidoris oblonga*; *Rostanga rubra*; *Geitodoris planata*; *Coryphella browni*; *Eubranchus cingulatus*; *Palliolum striatum*; *Heteranomia squamula*; *Tridonta elliptica*.

Fodhla Printing

IRISH BIOGEOGRAPHICAL SOCIETY



Bulletin No. 17(2): 123-223

THE 1993-1994 COMMITTEE OF THE IRISH BIOGEOGRAPHICAL SOCIETY

Chairman: S. Wistow, L.R.A.M.
Deputy Chairman: P. Ashe, B.Sc., Ph.D.
Secretary: J. M. Lynch, B.Sc., Ph.D.
Treasurer: M. J. Keatinge, B.A.(Mod.), Dip.Stats.
Field Meetings Secretary: C. F. Byrne, B.Sc., Ph.D.
Editor: J. P. O'Connor, B.Sc., Ph.D.
Executive Members: T. M. Bolger, B. Sc., Ph.D., M. J. Costello, B.Sc., Ph.D., R. Dolan, B.C.L., H. F. Fox, B.A. (Mod.), J. M. C. Holmes, B.A. (Mod.), M.Sc., S. L. Parr, B.Sc., Ph.D., C. Ronayne, B.Sc.

LIST OF SPONSORS
Allied Irish Banks PLC
Electricity Supply Board
The National Museum of Ireland
The Office of Public Works
Premier Finance Company Limited
Premier Periclase
Salmara

Bulletin of The Irish Biogeographical Society
Number 17

ISSN 0032-1185
Abbreviation: *Bull. Ir. biogeog. Soc.*

Editor: J. P. O'Connor

DATE OF PUBLICATION: 10 December 1994

The Irish Biogegraphical Society desires it to be understood that it is not answerable for any opinion, representation of facts, or train of reasoning that may appear in the following papers. The authors of the various articles are alone responsible for their contents and for the correctness of references.

Bull. Ir. biogeog. Soc. No. 17

FIGURE 1: the location of Strangford Lough.

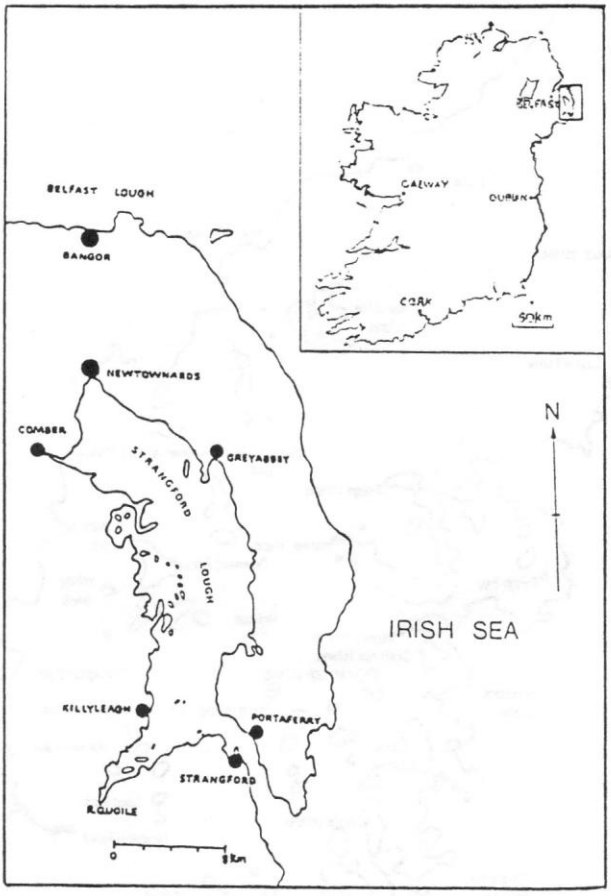
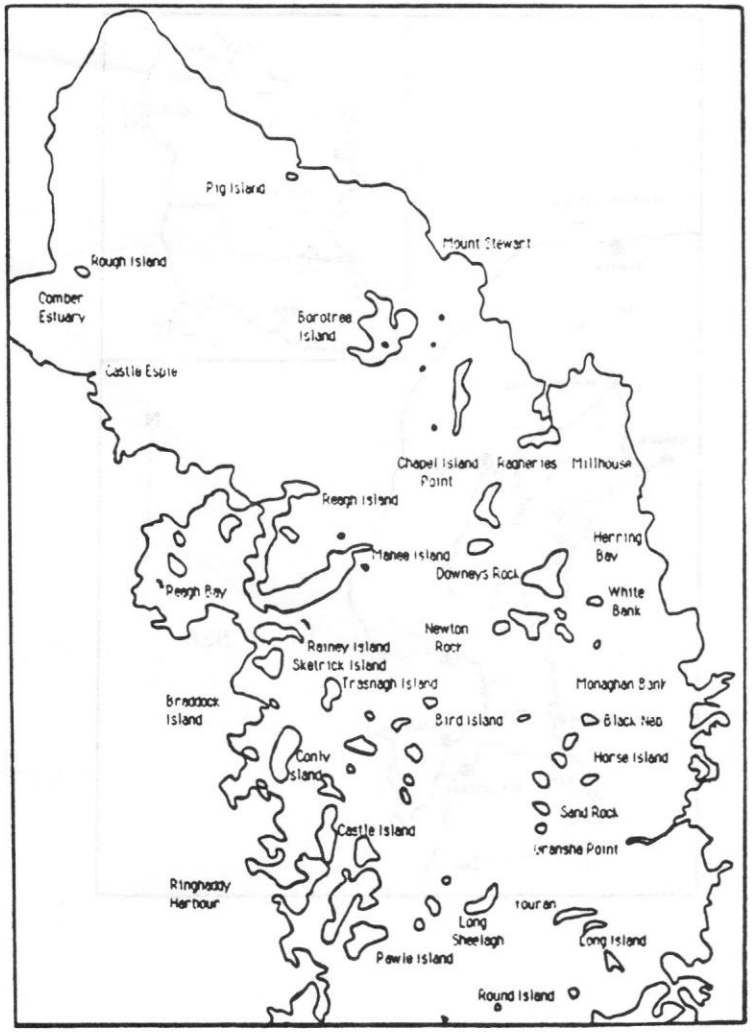
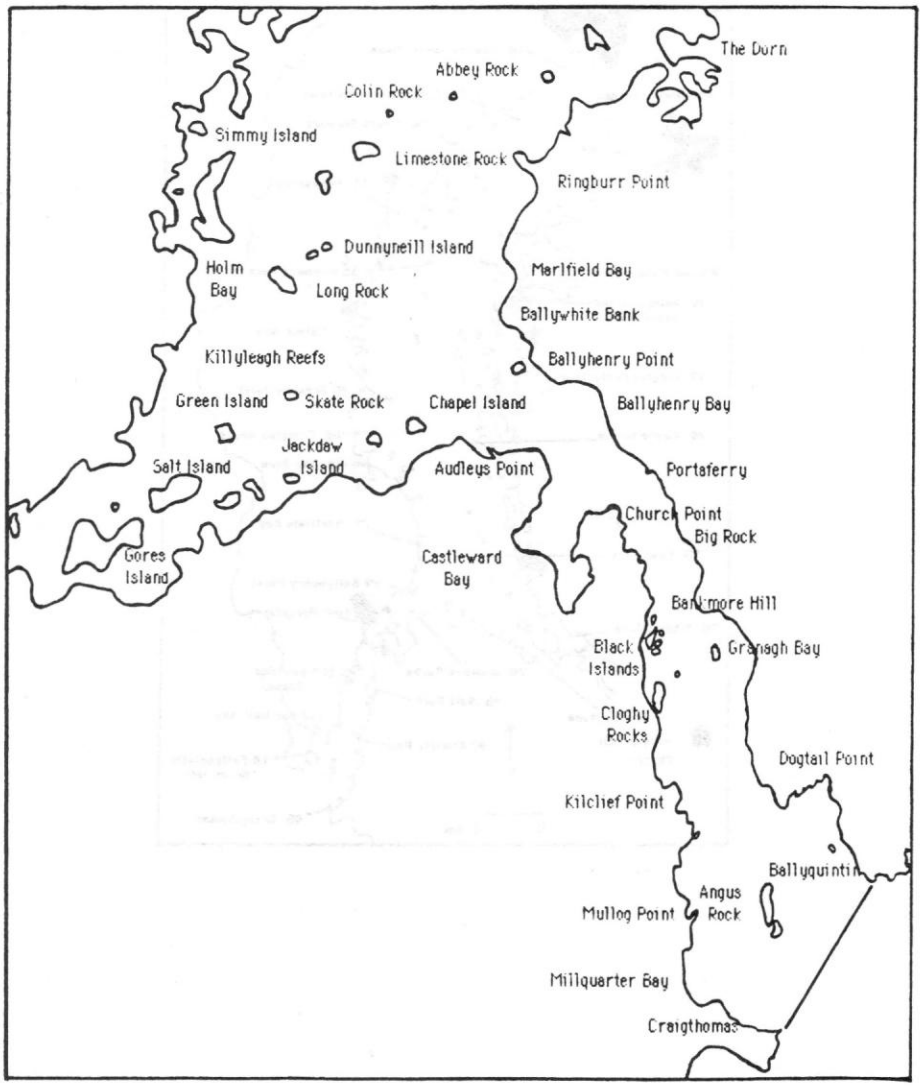


FIGURE 2A: North Strangford Lough.



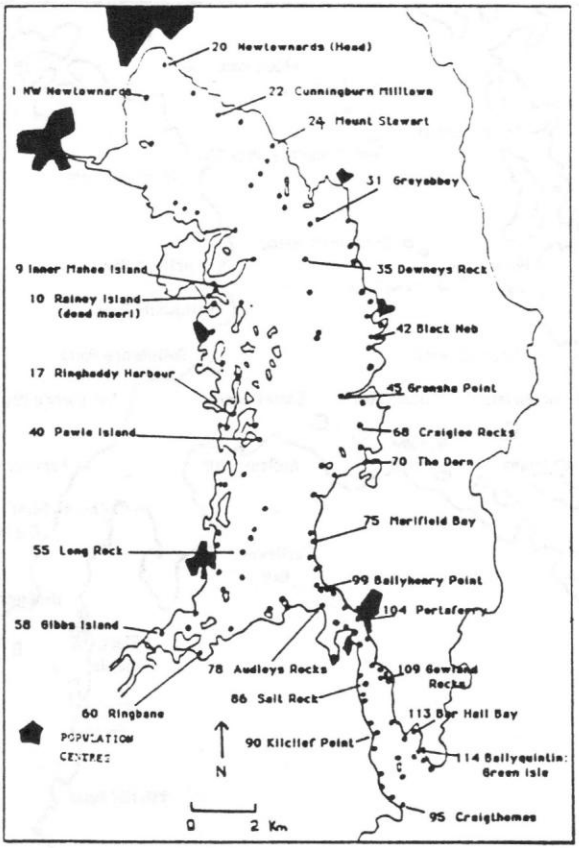
Bull. Ir. biogeog. Soc. No. 17

FIGURE 2B: South Strangford Lough.



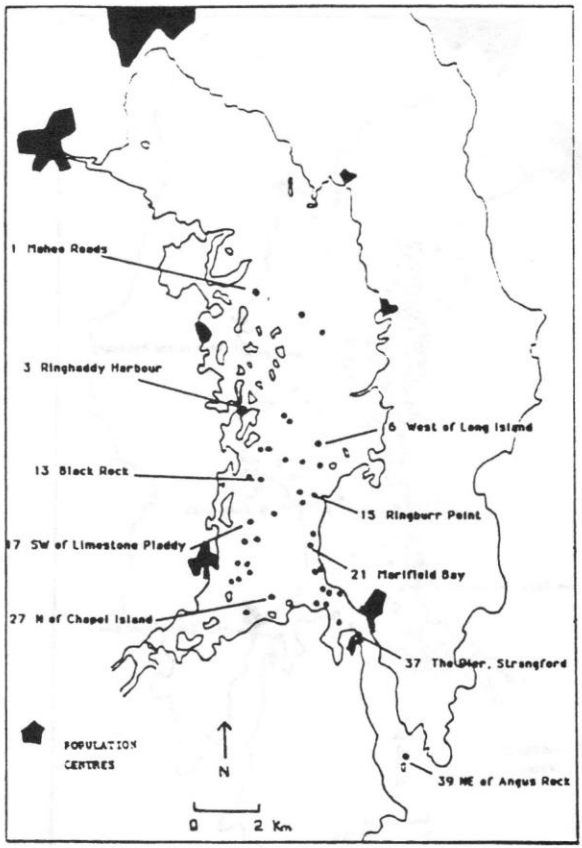
Bull. Ir. biogeog. Soc. No. 17

FIGURE 3: littoral sites in Strangford Lough.



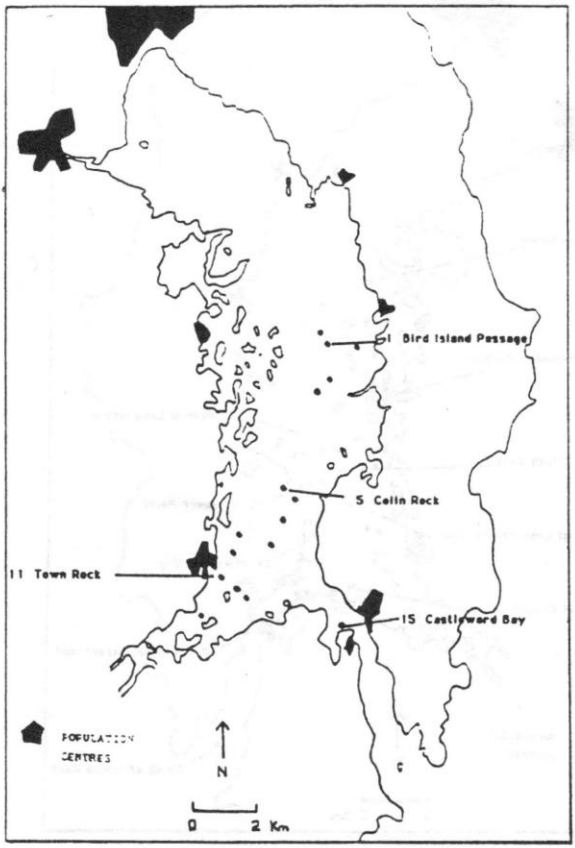
Bull. Ir. biogeog. Soc. No. 17

FIGURE 4: dive sites in Strangford Lough.



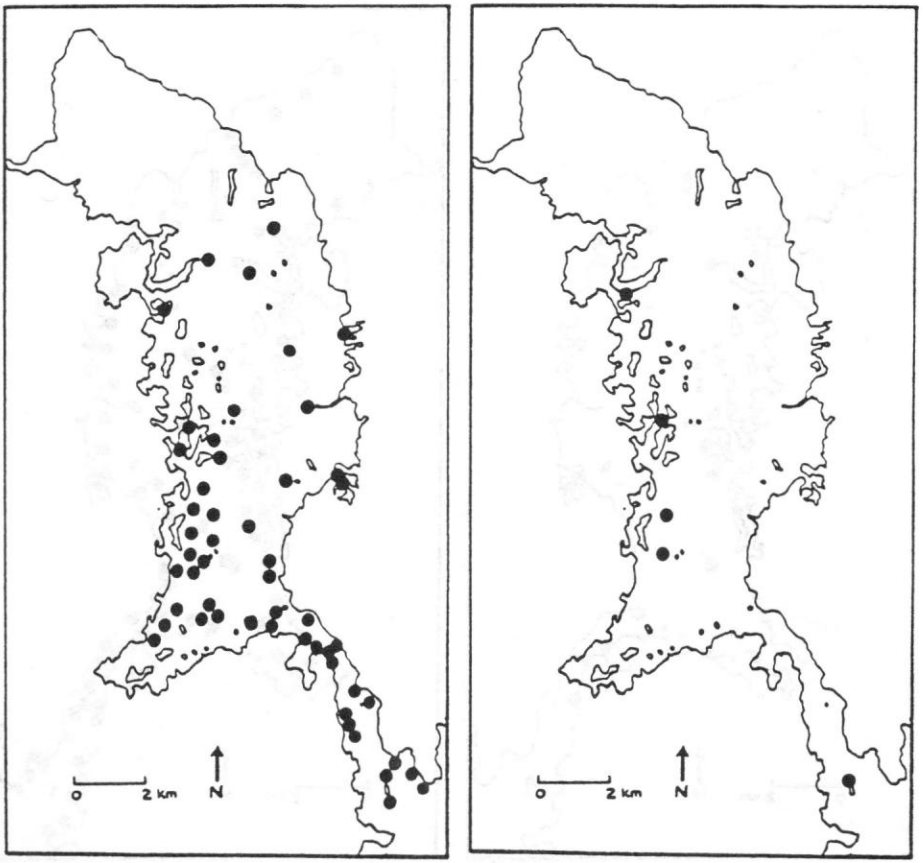
Bull. Ir. biogeog. Soc. No. 17

FIGURE 5: dredge sites in Strangford Lough.



Bull. Ir. biogeog. Soc. No. 17

FIGURE 6: distribution maps of *Leptochiton asellus* and *L. cancellatus*.

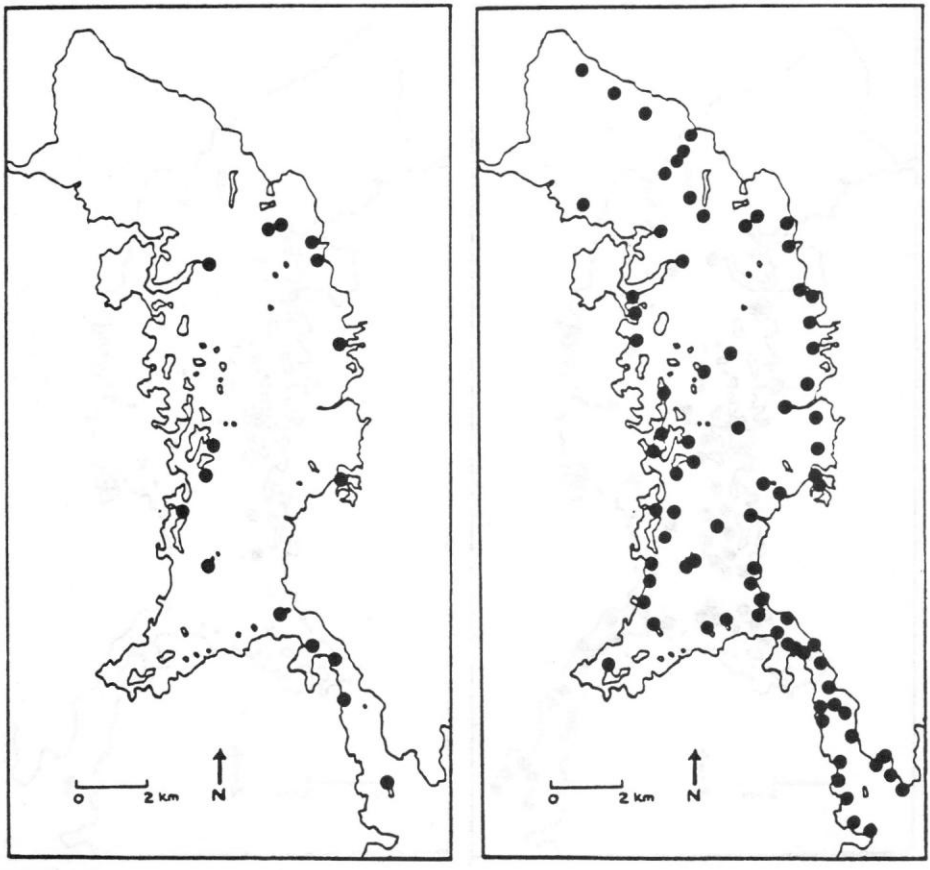


Leptochiton asellus

Leptochiton cancellatus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 7: distribution maps of *Callochiton septemvalvis* and *Lepidochitona cinereus*.

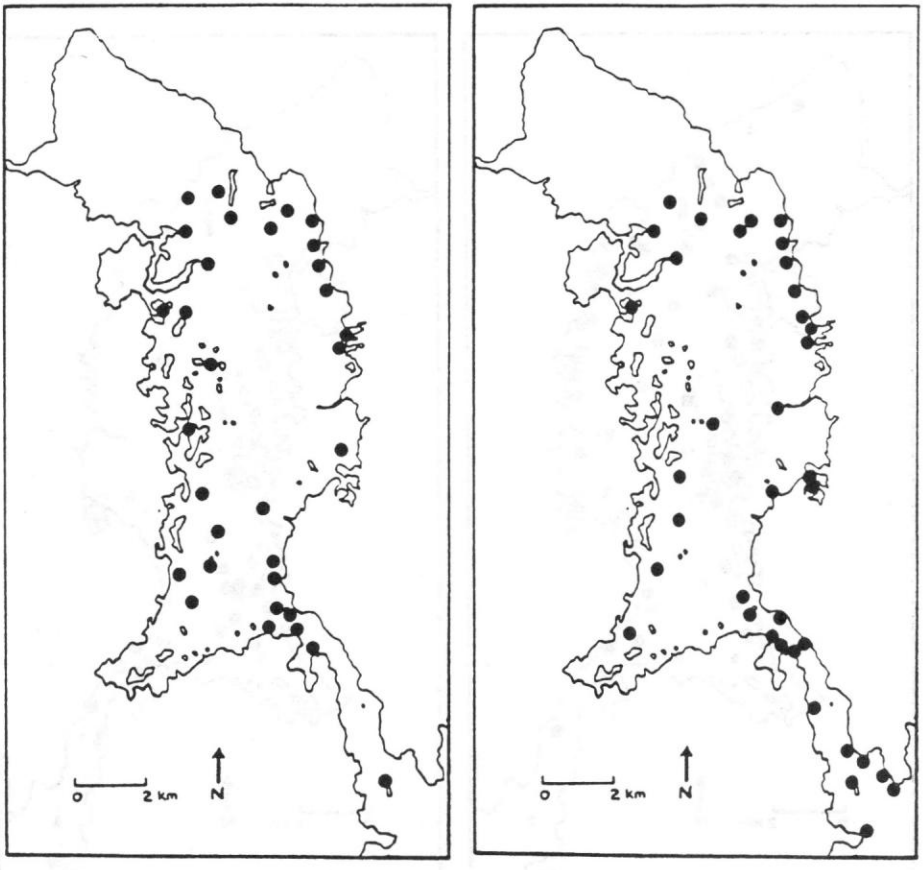


Callochiton septemvalvis

Lepidochitona cinereus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 8: distribution maps of *Tonicella marmorea* and *T. rubra*.

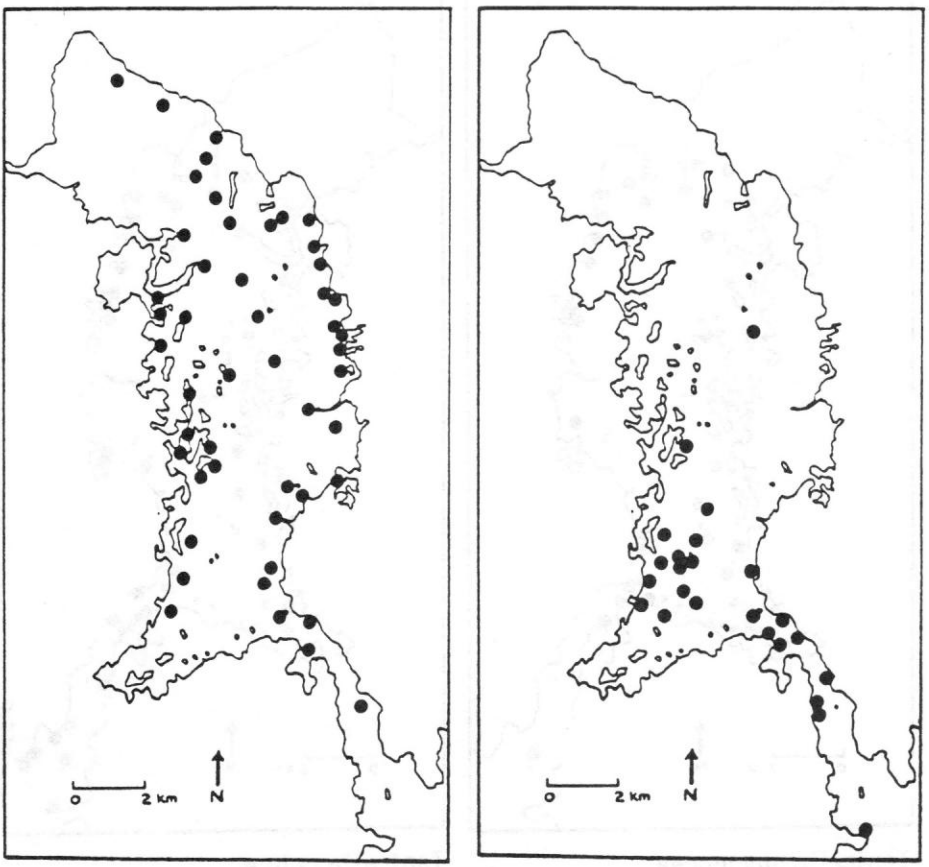


Tonicella marmorea

Tonicella rubra

Bull. Ir. biogeog. Soc. No. 17

FIGURE 9: distribution maps of *Acanthochitona crinitus* and *Emarginula fissura*.

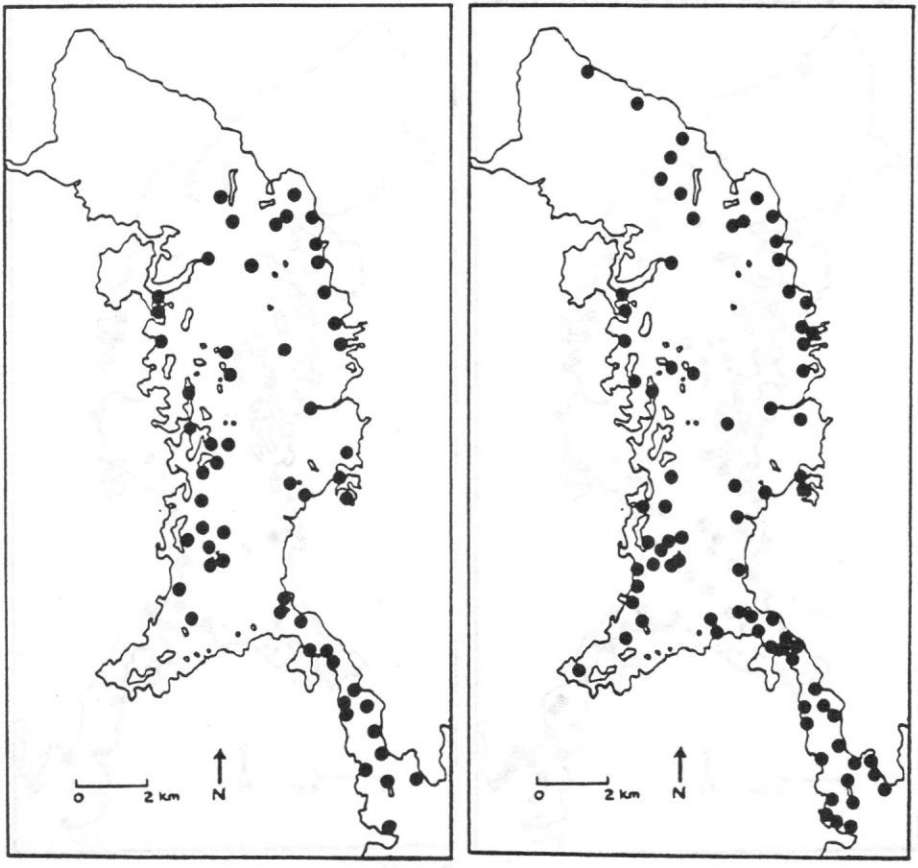


Acanthochitona crinitus

Emarginula fissura

Bull. Ir. biogeog. Soc. No. 17

FIGURE 10: distribution maps of *Diodora graeca* and *Tectura testudinalis*.

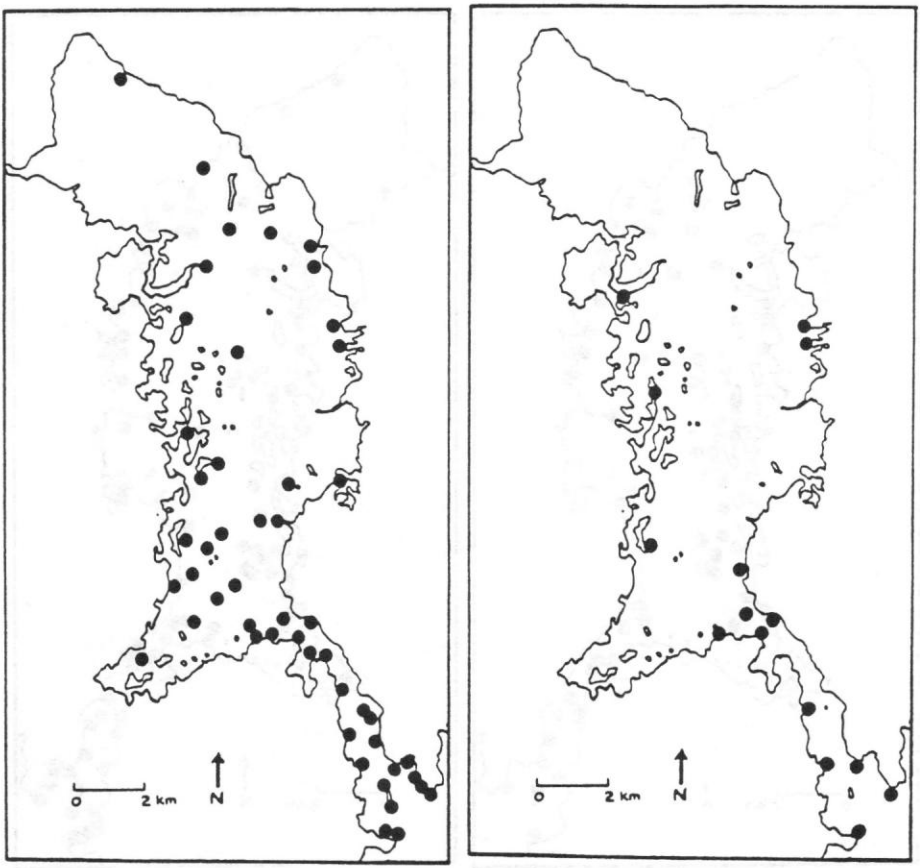


Diodora graeca

Tectura testudinalis

Bull. Ir. biogeog. Soc. No. 17

FIGURE 11: distribution maps of *Tectura virginea* and *Patella ulyssiponensis*.

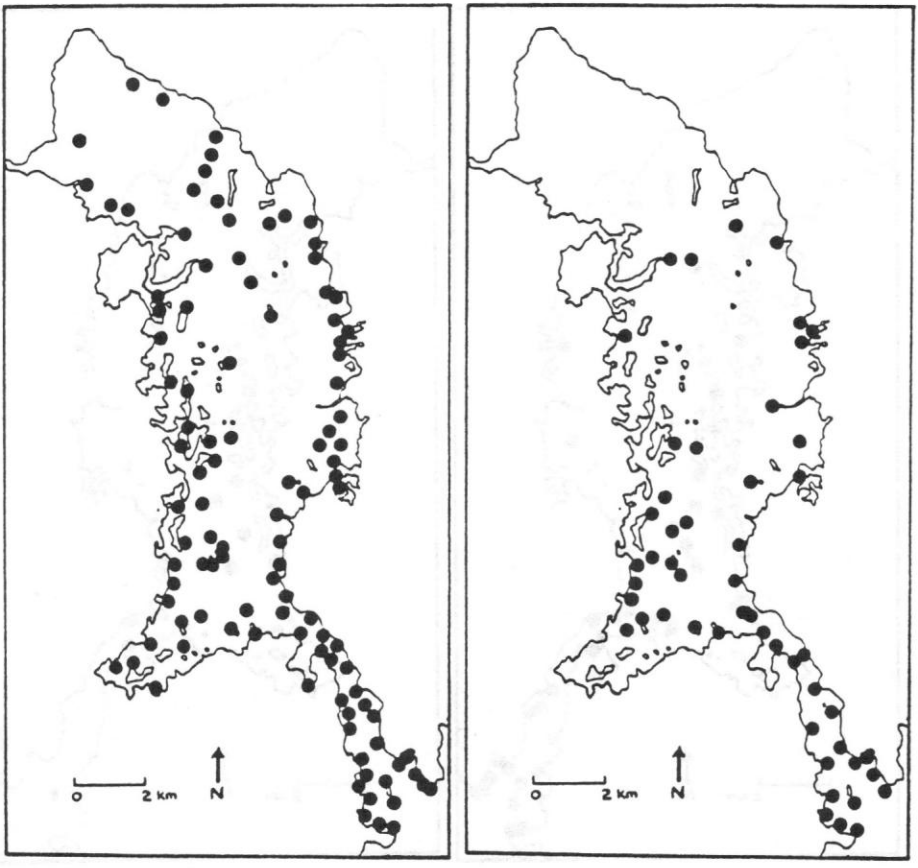


Tectura virginea

Patella ulyssiponensis

Bull. Ir. biogeog. Soc. No. 17

FIGURE 12: distribution maps of *Patella vulgata* and *Helcion pellucidum*.

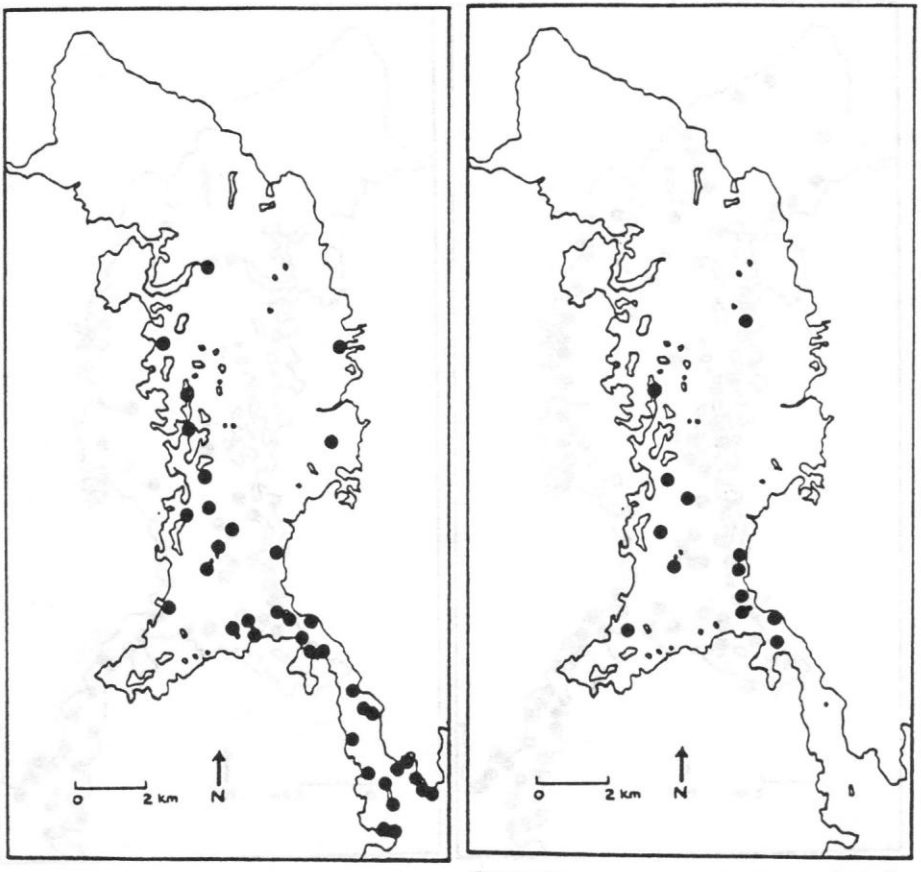


Patella vulgata

Helcion pellucidum

Bull. Ir. biogeog. Soc. No. 17

FIGURE 13: distribution maps of *Margarites helicinus* and *Gibbula magus*.

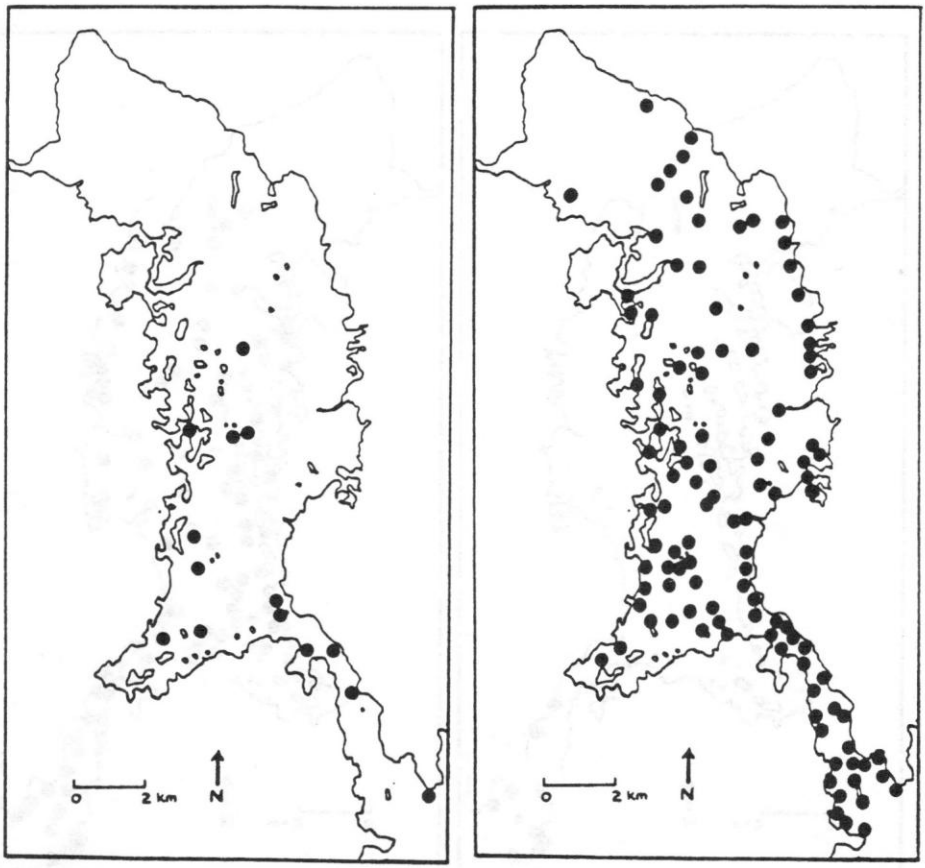


Margarites helicinus

Gibbula magus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 14: distribution maps of *Gibbula tumida* and *G. cineraria*.

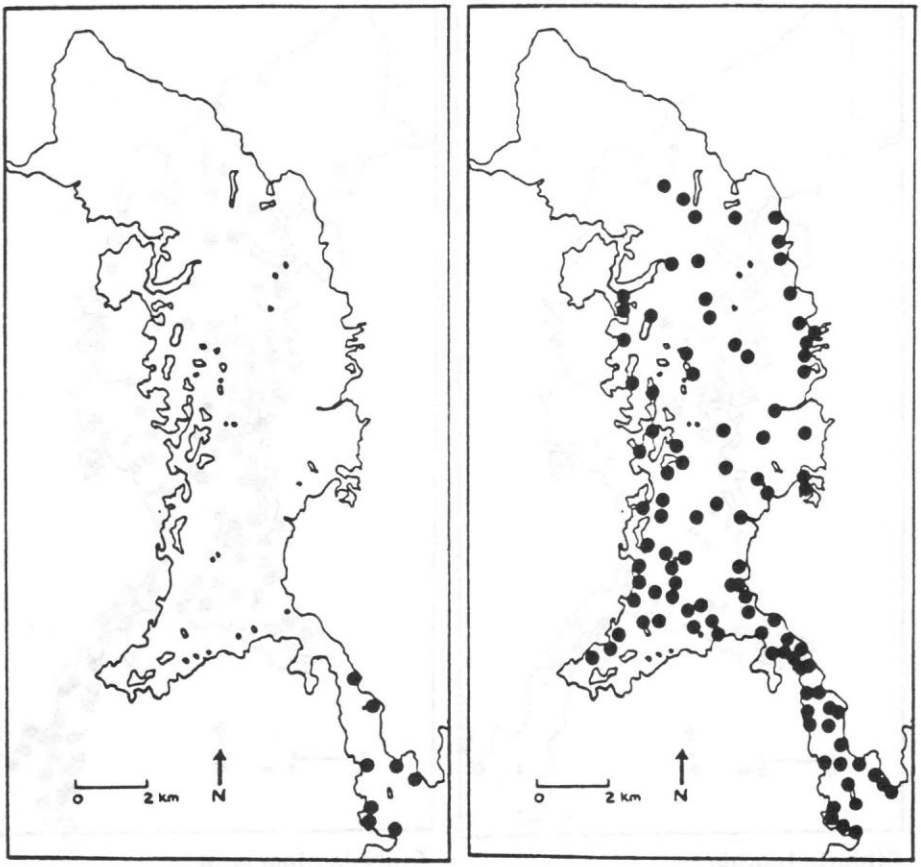


Gibbula tumida

Gibbula cineraria

Bull. Ir. biogeog. Soc. No. 17

FIGURE 15: distribution maps of *Gibbula umbilicalis* and *Calliostoma zizyphinum*.

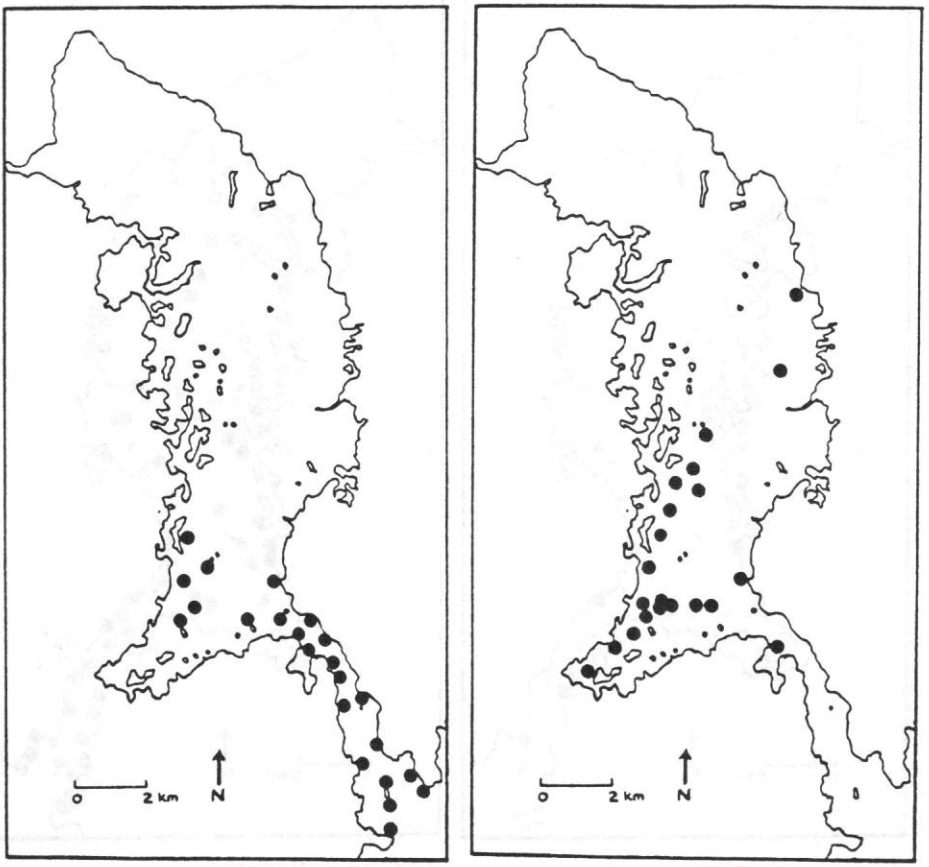


Gibbula umbilicalis

Calliostoma zizyphinum

Bull. Ir. biogeog. Soc. No. 17

FIGURE 16: distribution maps of *Tricolia pullus* and *Turritella communis*.

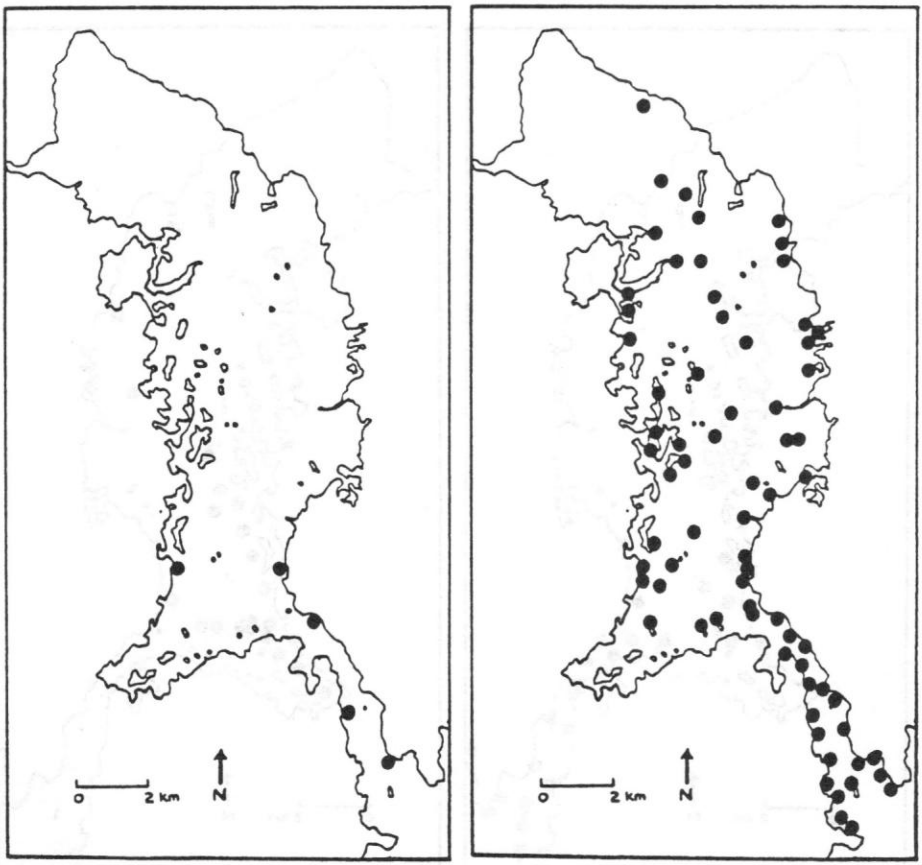


Tricolia pullus

Turritella communis

Bull. Ir. biogeog. Soc. No. 17

FIGURE 17: distribution maps of *Lacuna crassior* and *L. pallidula*.

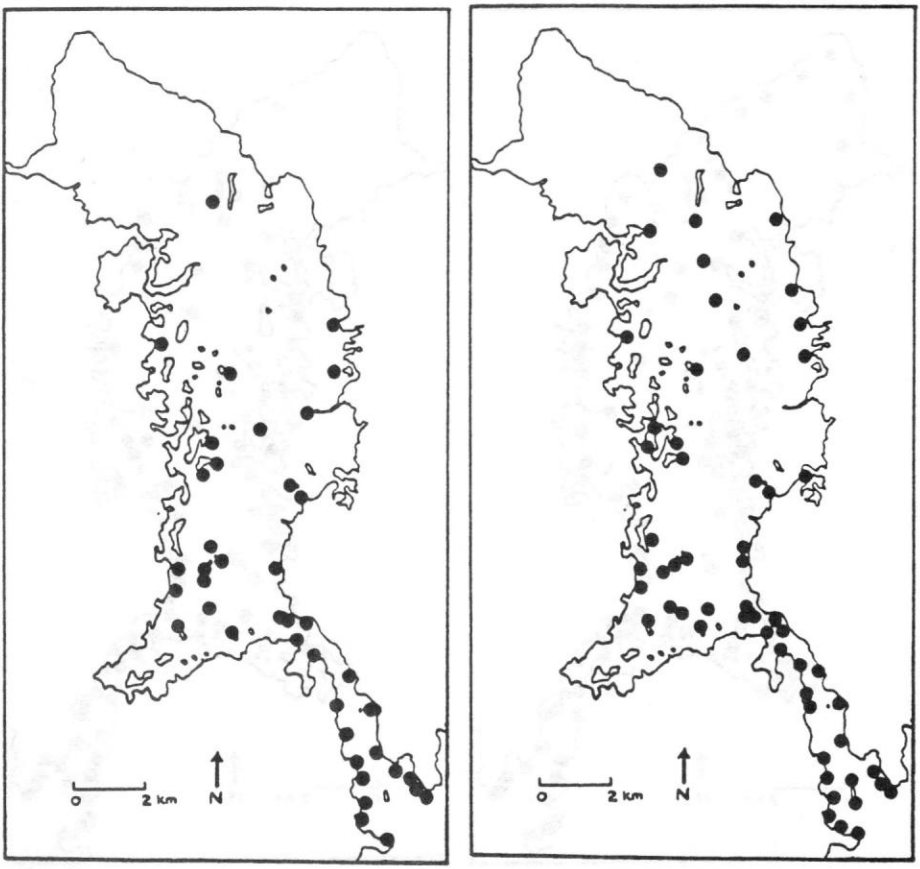


Lacuna crassior

Lacuna pallidula

Bull. Ir. biogeog. Soc. No. 17

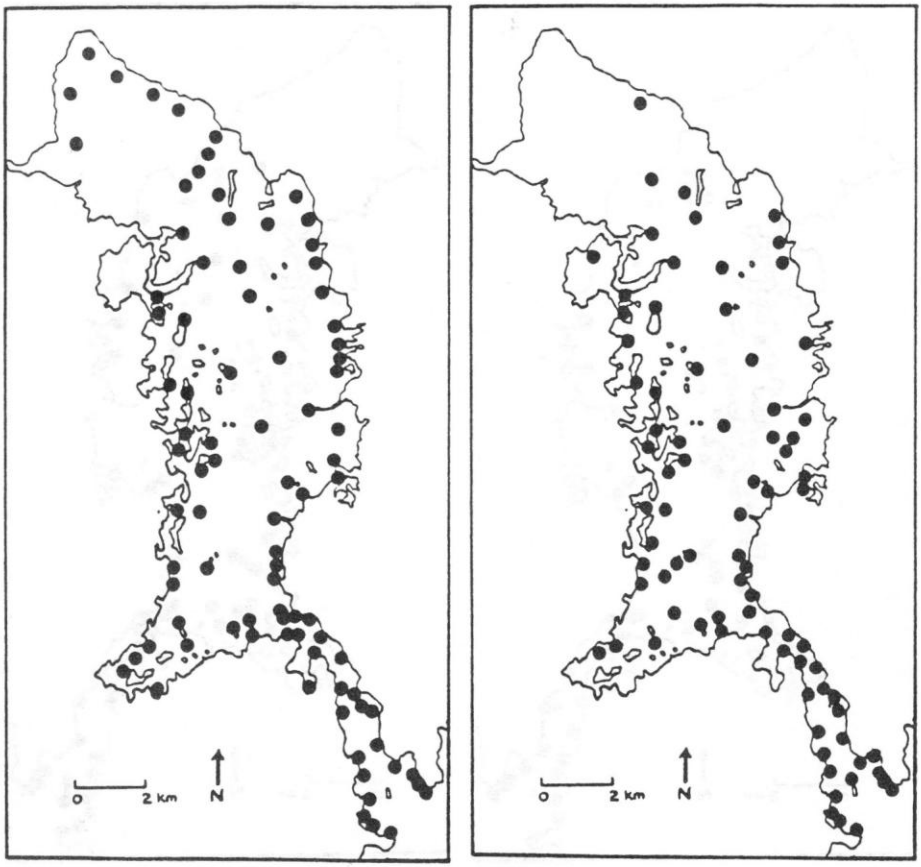
FIGURE 18: distribution maps of *Lacuna parva* and *L. vincta*.



Lacuna parva

Lacuna vincta

FIGURE 19: distribution maps of *Littorina littorea* and *L. mariae*.

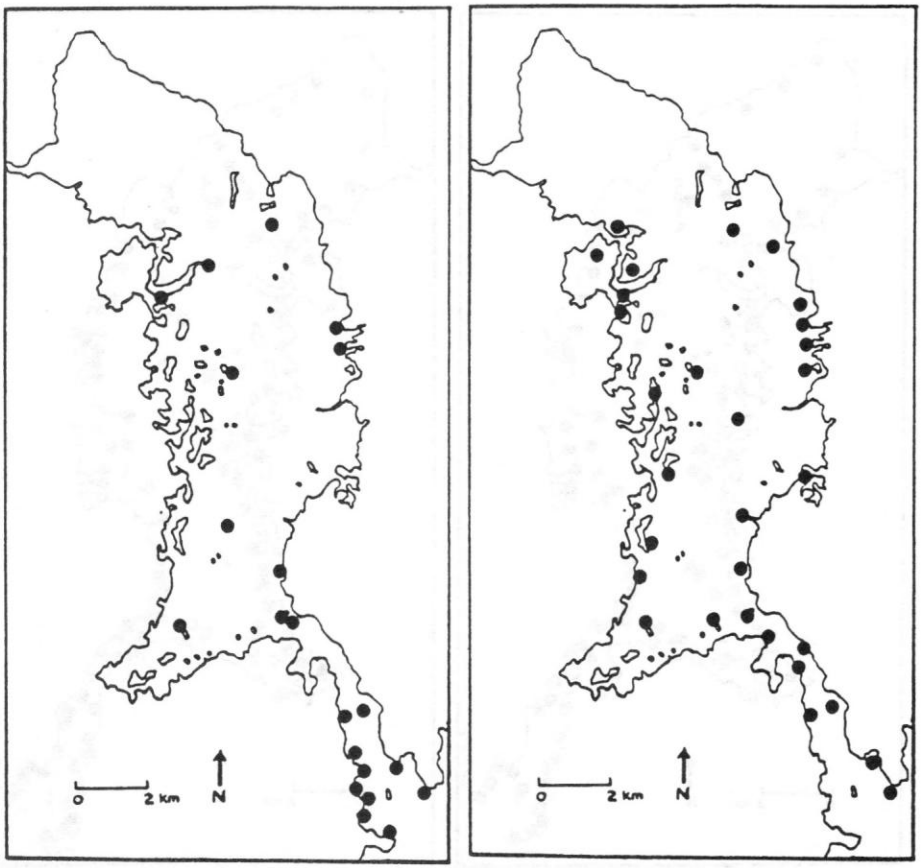


Littorina littorea

Littorina mariae

Bull. Ir. biogeog. Soc. No. 17

FIGURE 20: distribution maps of *Littorina neglecta* and *L. nigrolineata*.

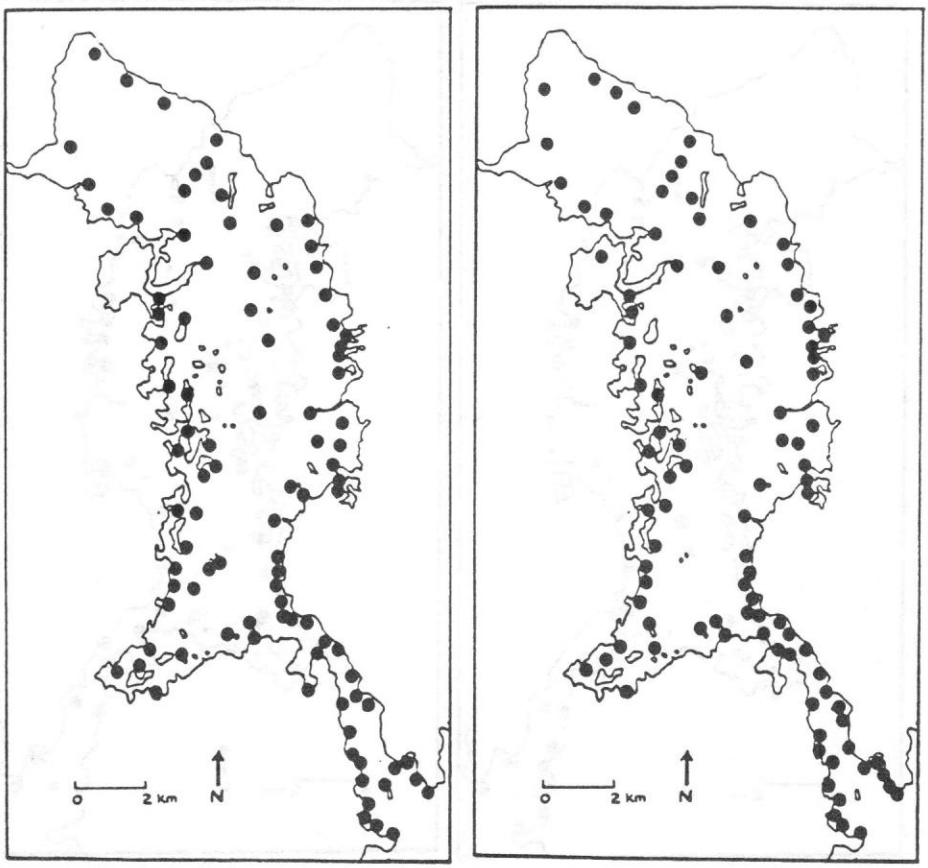


Littorina neglecta

Littorina nigrolineata

Bull. Ir. biogeog. Soc. No. 17

FIGURE 21: distribution maps of *Littorina obtusata* and *L. saxatilis*.

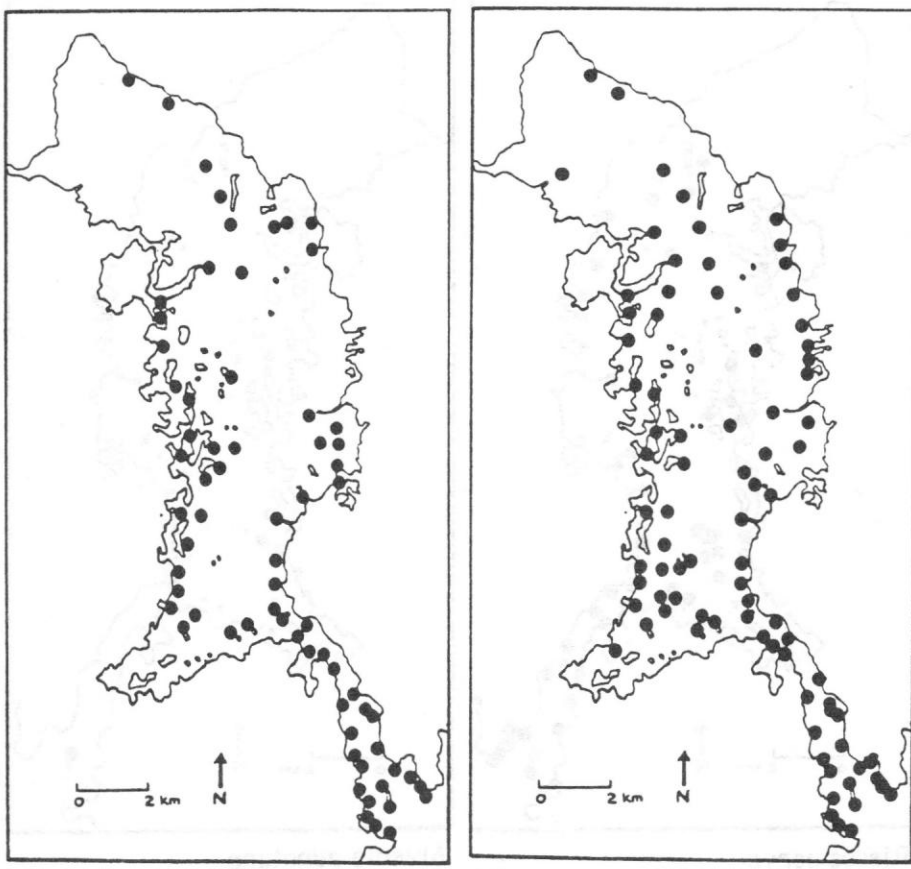


Littorina obtusata

Littorina saxatilis

Bull. Ir. biogeog. Soc. No. 17

FIGURE 22: distribution maps of *Skeneopsis planorbis* and *Rissoa interrupta*.

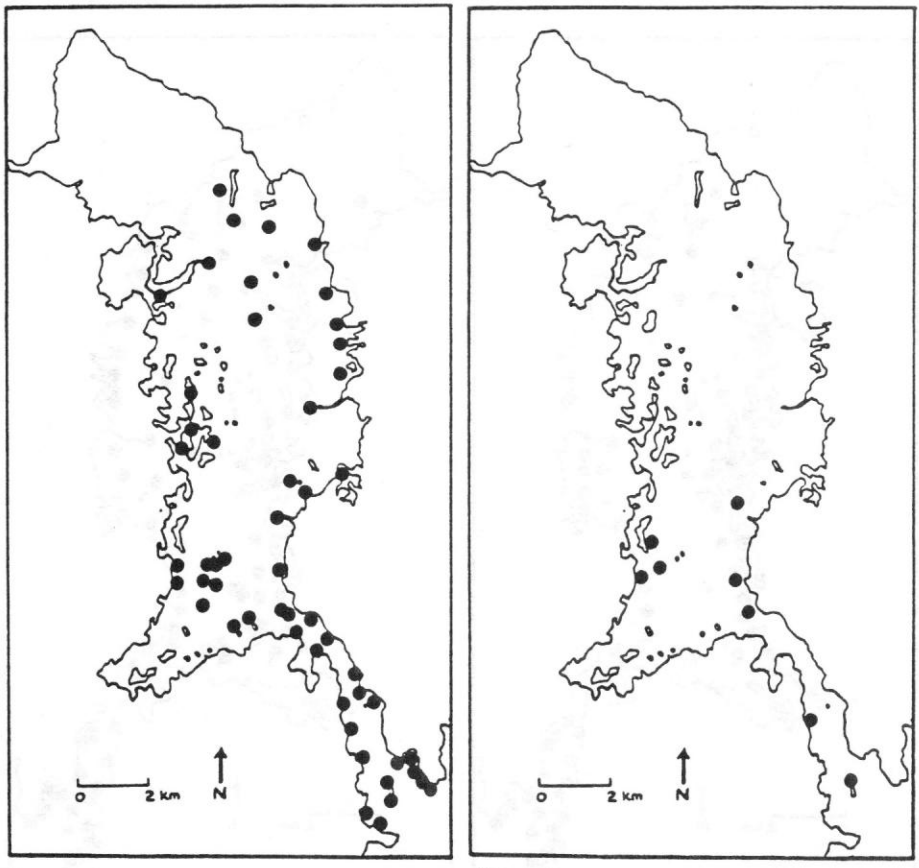


Skeneopsis planorbis

Rissoa interrupta

Bull. Ir. biogeog. Soc. No. 17

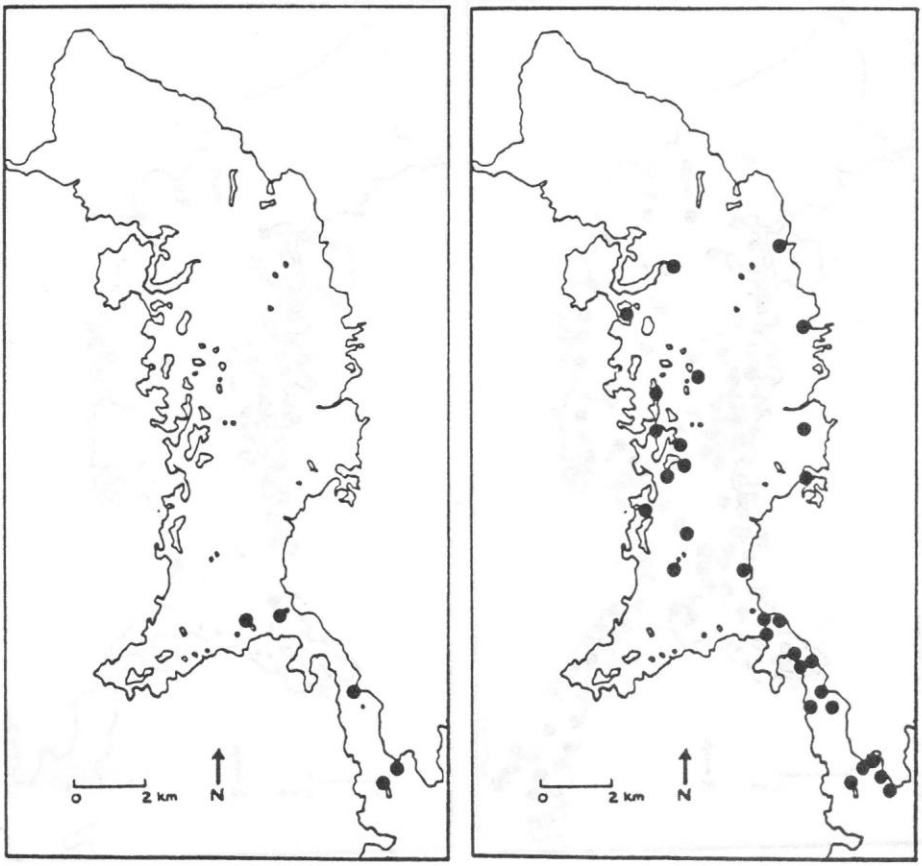
FIGURE 23: distribution maps of *Rissoa parva* and *Alvania punctura*.



Rissoa parva

Alvania punctura

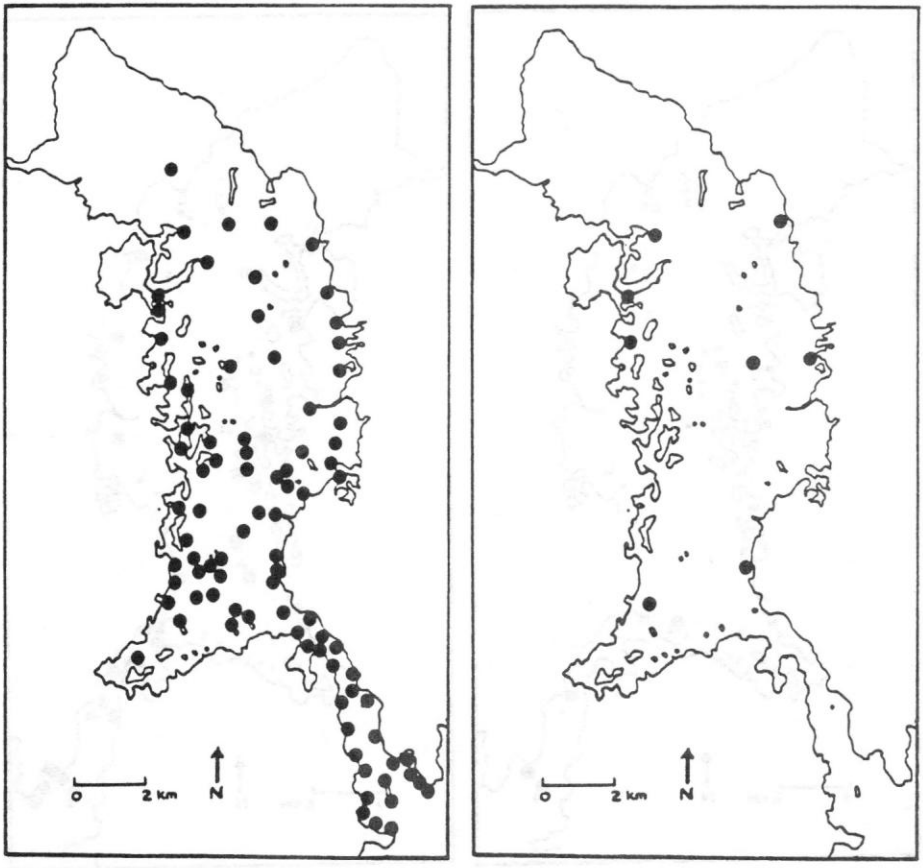
FIGURE 24: distribution maps of *Alvania semistriata* and *Cingula trifasciata*.



Alvania semistriata

Cingula trifasciata

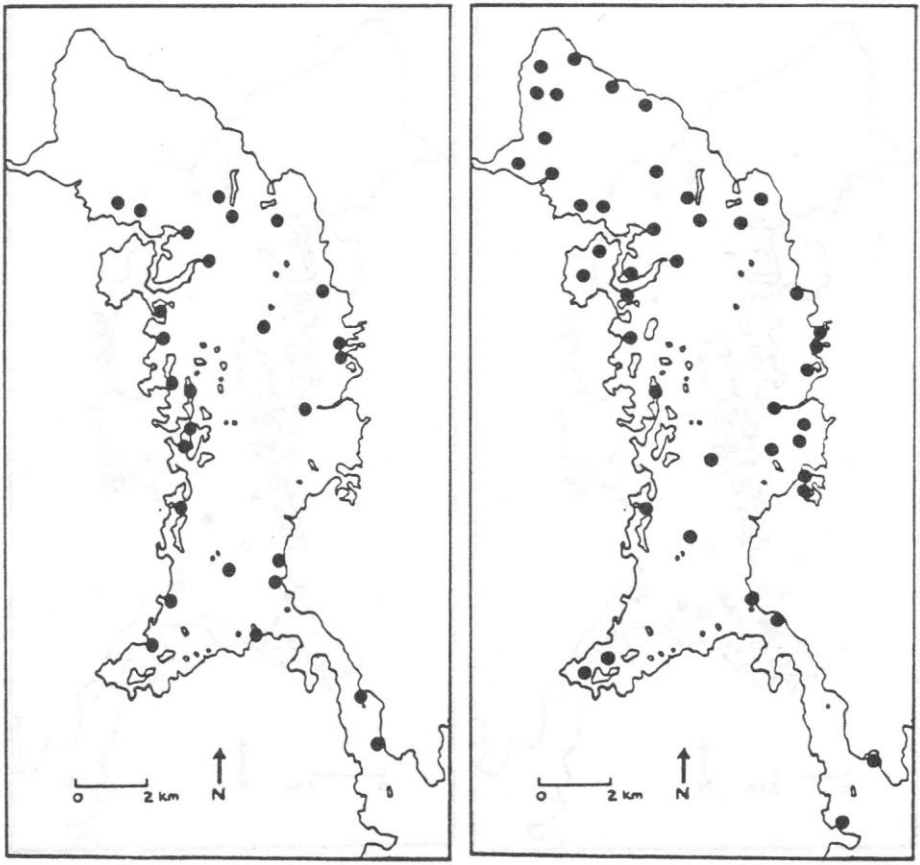
FIGURE 25: distribution maps of *Onoba semicostata* and *Pusillina inconspicua*.



Onoba semicostata **Pusillina inconspicua**

Bull. Ir. biogeog. Soc. No. 17

FIGURE 26: distribution maps of *Pusillina sarsi* and *Hydrobia ulvae*.

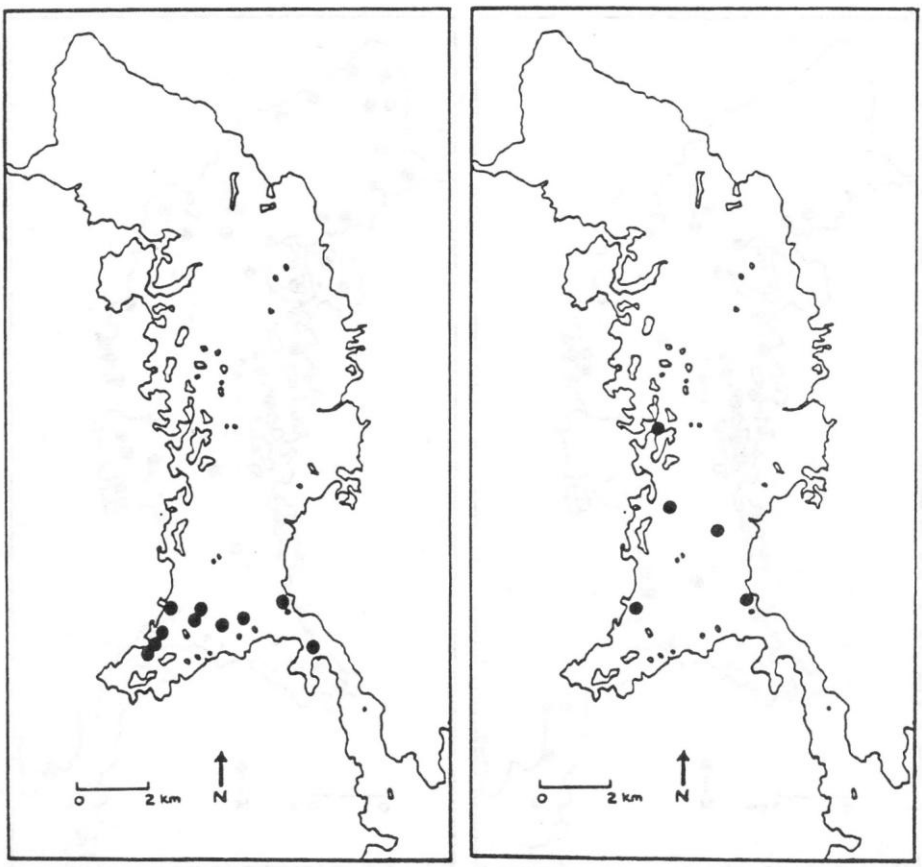


Pusillina sarsi

Hydrobia ulvae

Bull. Ir. biogeog. Soc. No. 17

FIGURE 27: distribution maps of *Aporrhais pespelecani* and *Capulus ungaricus*.

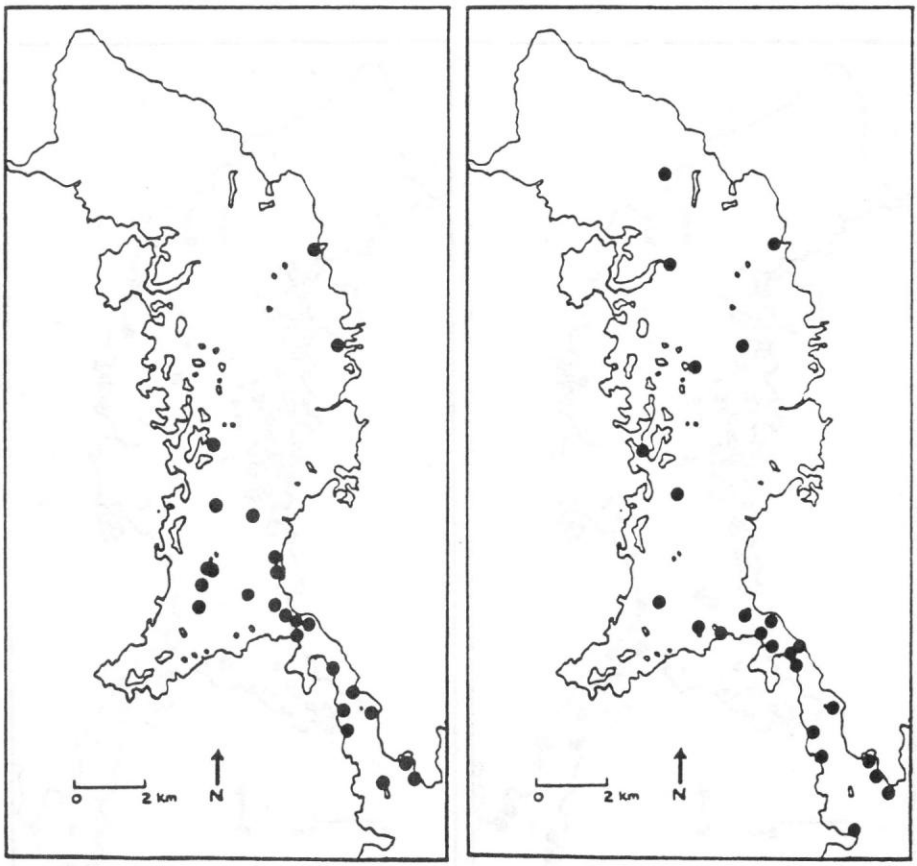


Aporrhais pespelecani

Capulus ungaricus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 28: distribution maps of *Trivia arctica* and *T. monacha*.

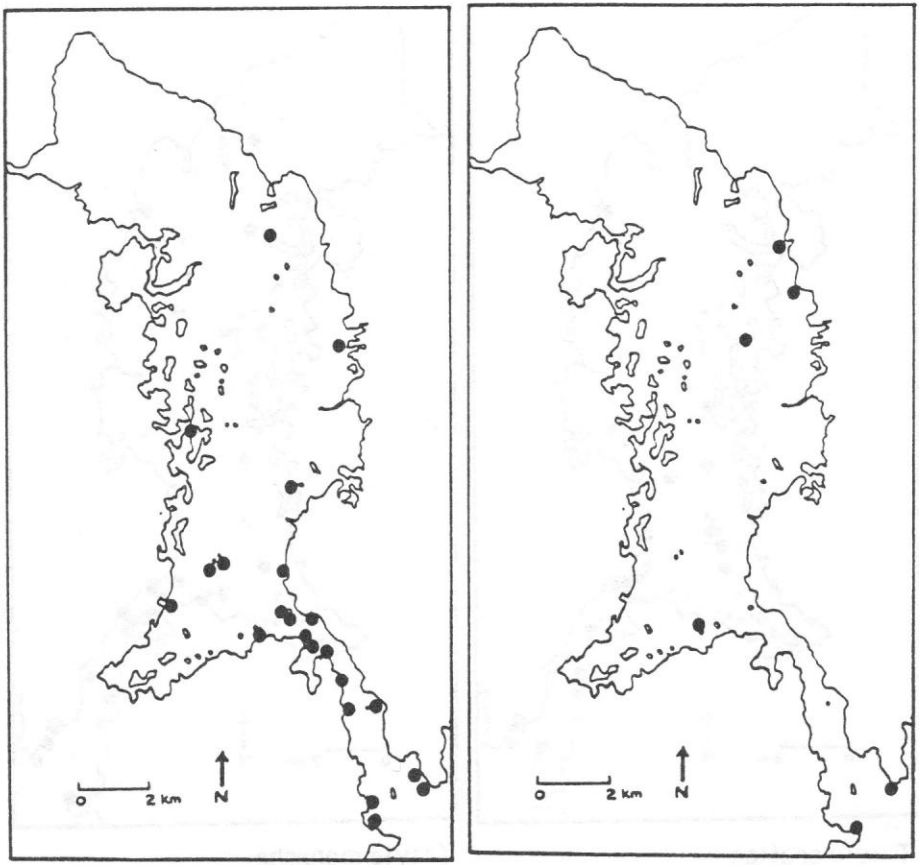


Trivia arctica

Trivia monacha

Bull. Ir. biogeog. Soc. No. 17

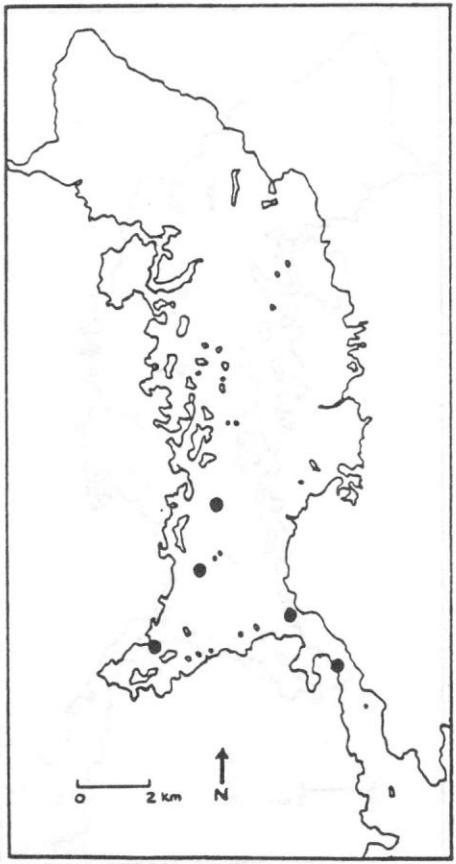
FIGURE 29: distribution maps of *Lamellaria latens* and *L. perspicua*.



Lamellaria latens

Lamellaria perspicua

FIGURE 30: distribution maps of *Velutina velutina* and *Polinices polianus*.

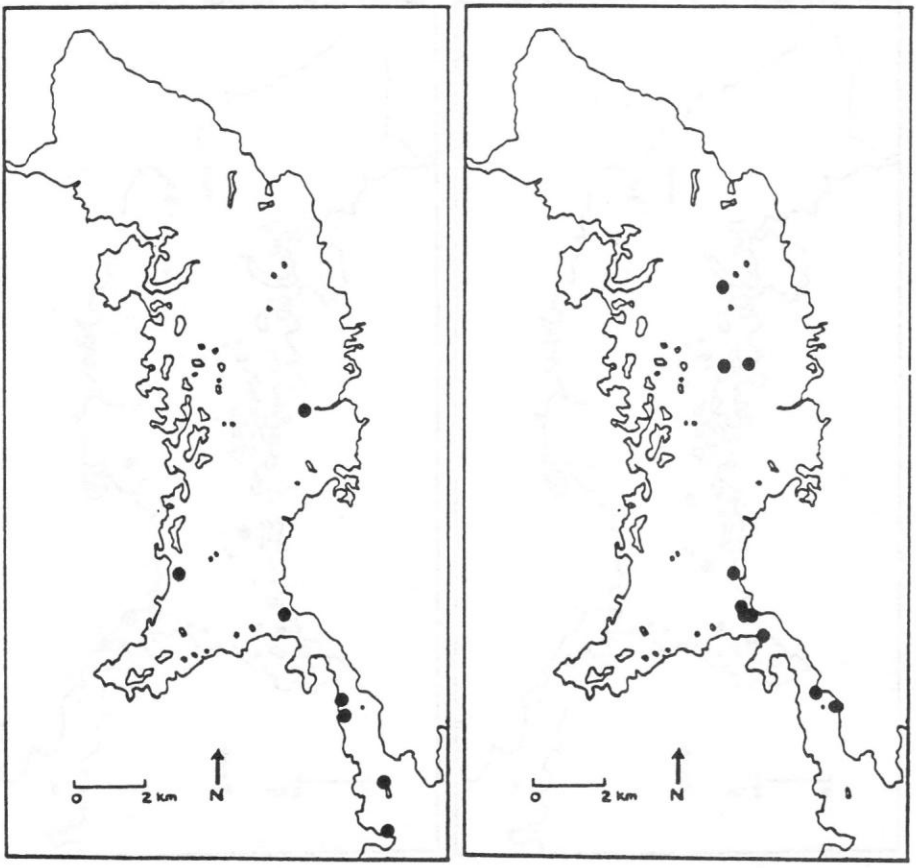


Velutina velutina

Polinices polianus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 31: distribution maps of *Cerithiopsis tubercularis* and *Boreotrophon truncatus*.

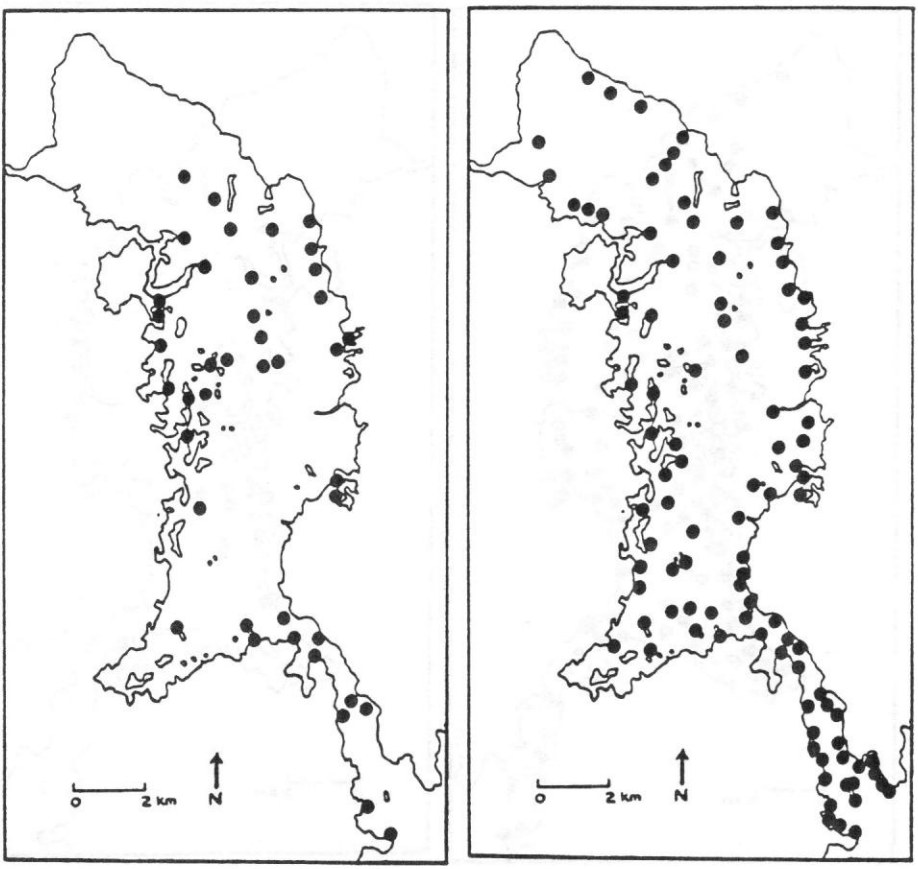


Cerithiopsis tubercularis

Boreotrophon truncatus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 32: distribution maps of *Ocenebra erinacea* and *Nucella lapillus*.

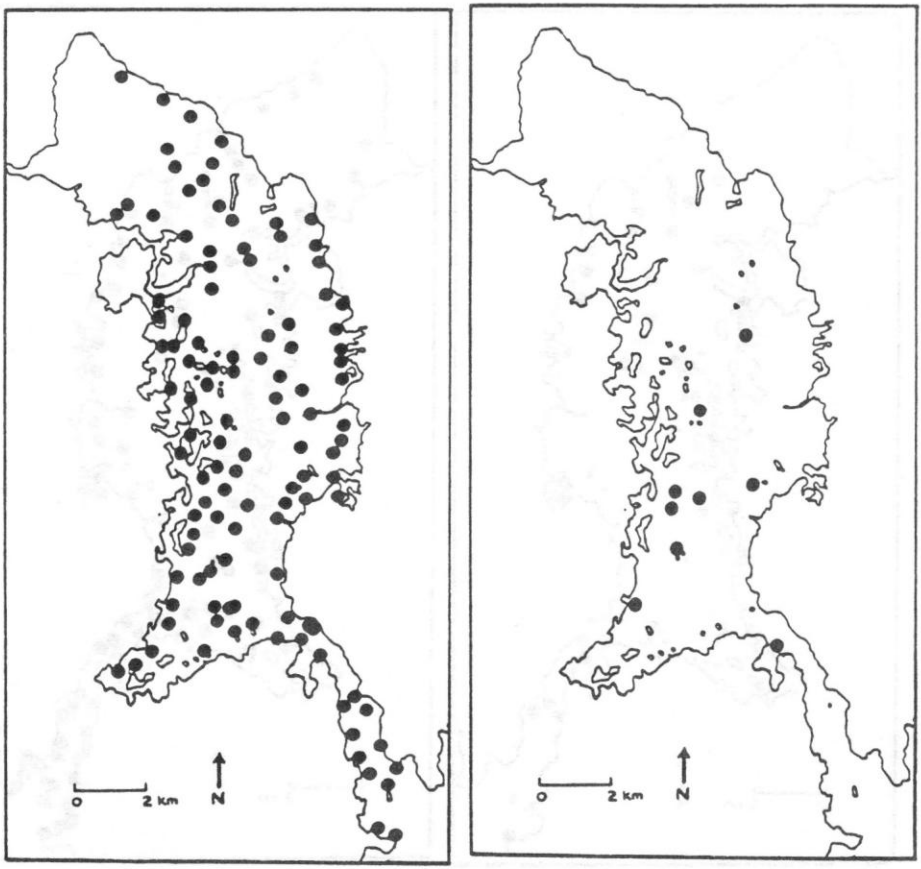


Ocenebra erinacea

Nucella lapillus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 33: distribution maps of *Buccinum undatum* and *Neptunea antiqua*.

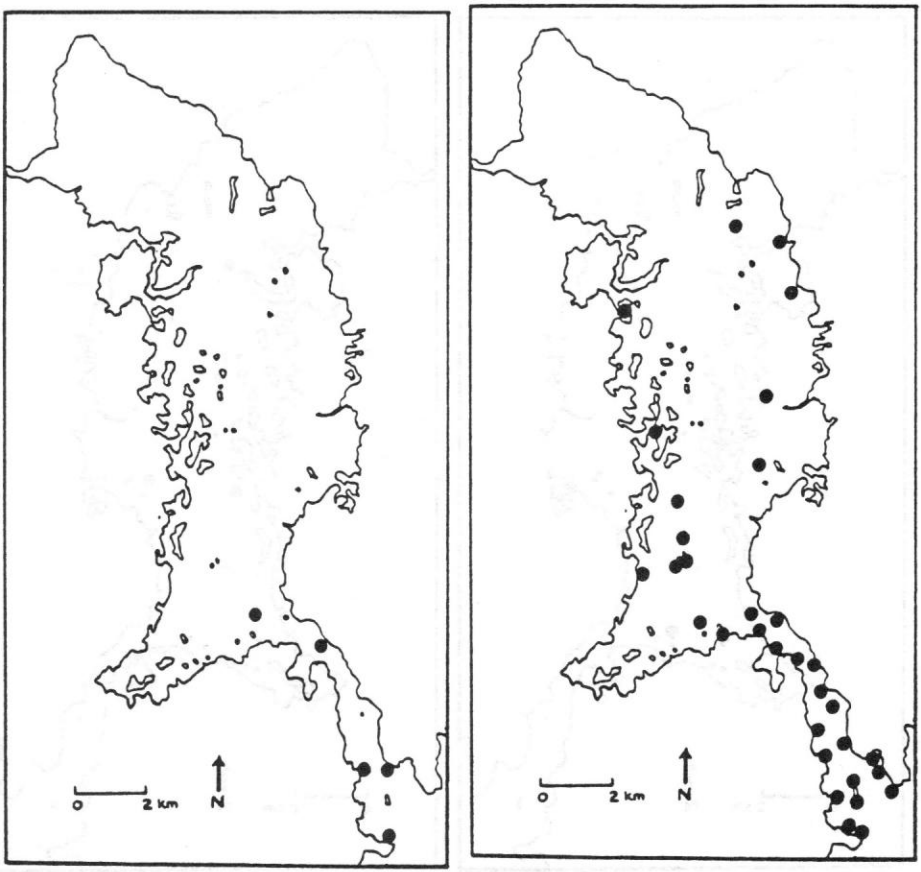


Buccinum undatum

Neptunea antiqua

Bull. Ir. biogeog. Soc. No. 17

FIGURE 34: distribution maps of *Hinia reticulata* and *H. incrassata*.

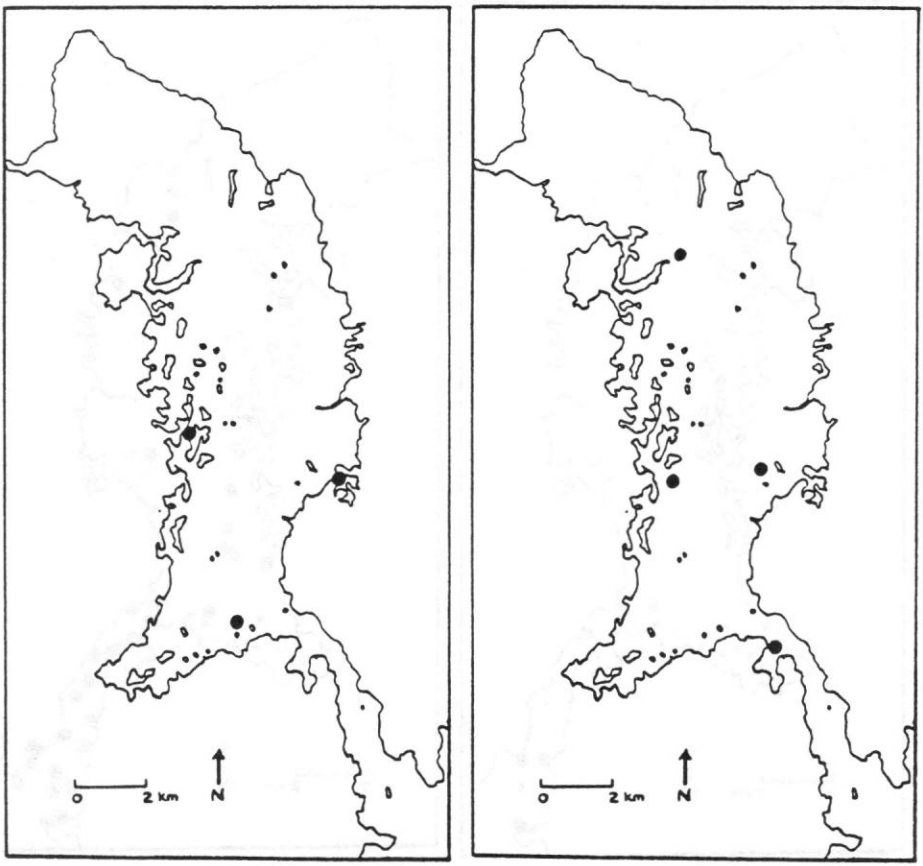


Hinia reticulata

Hinia incrassata

Bull. Ir. biogeog. Soc. No. 17

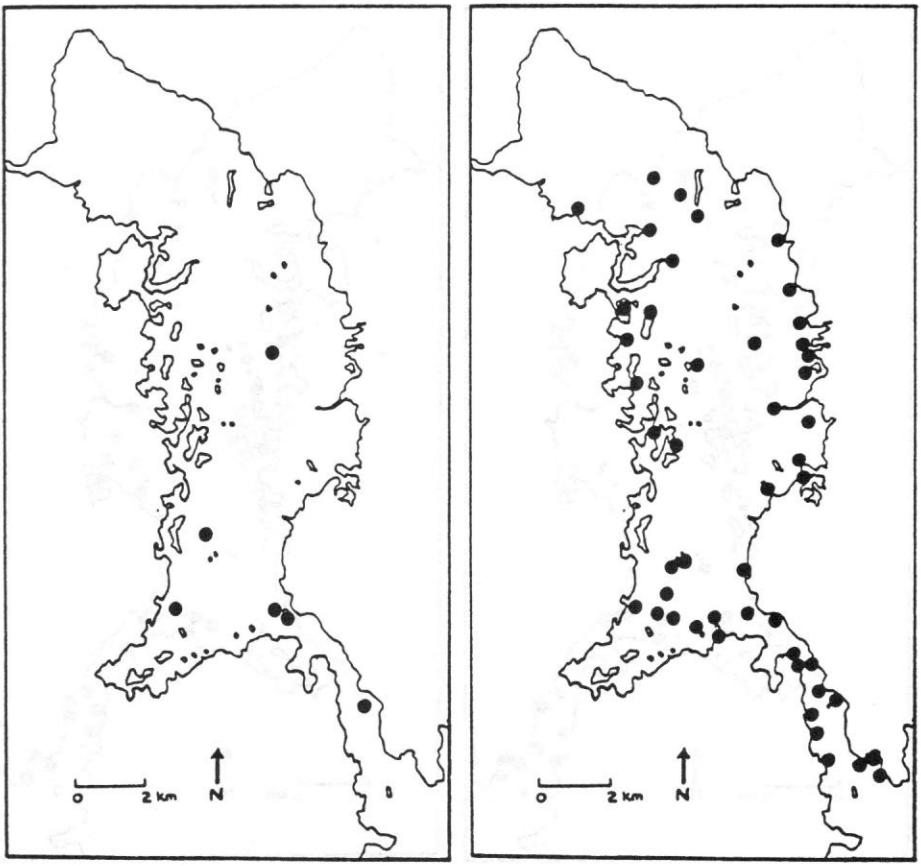
FIGURE 35: distribution maps of *Mangelia attenuata* and *Mangelia coarctata*.



Mangelia attenuata

Mangelia coarctata

FIGURE 36: distribution maps of *Raphitoma linearis* and *Rissoella diaphana*.

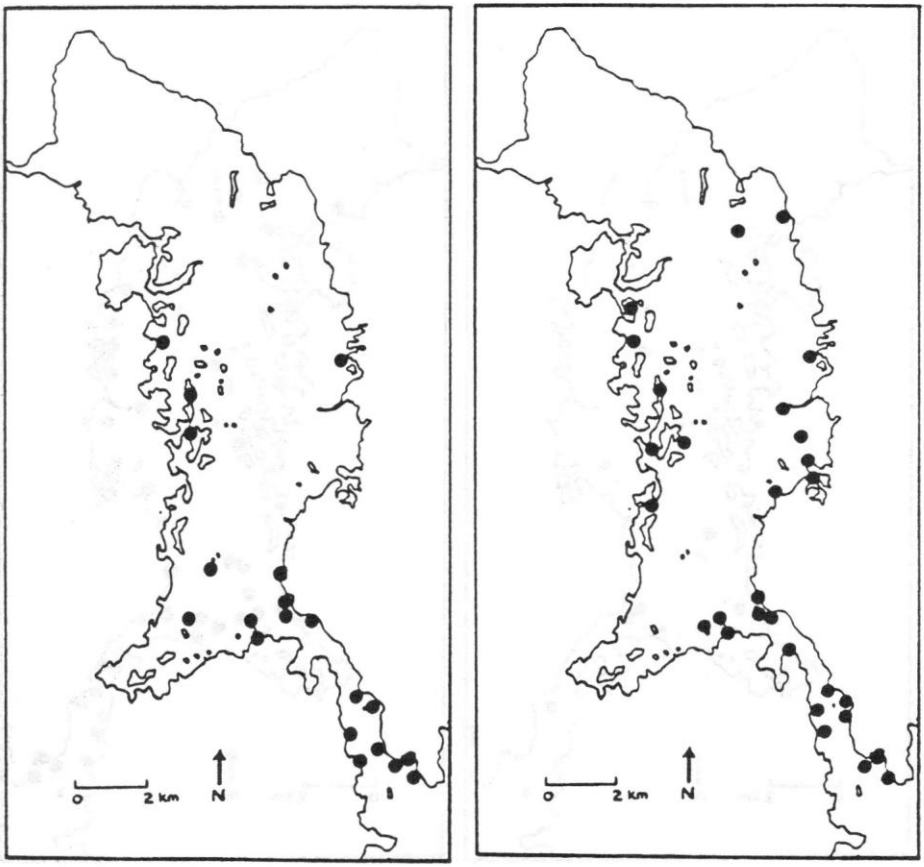


Raphitoma linearis

Rissoella diaphana

Bull. Ir. biogeog. Soc. No. 17

FIGURE 37: distribution maps of *Rissoella globularis* and *R. opalina*.

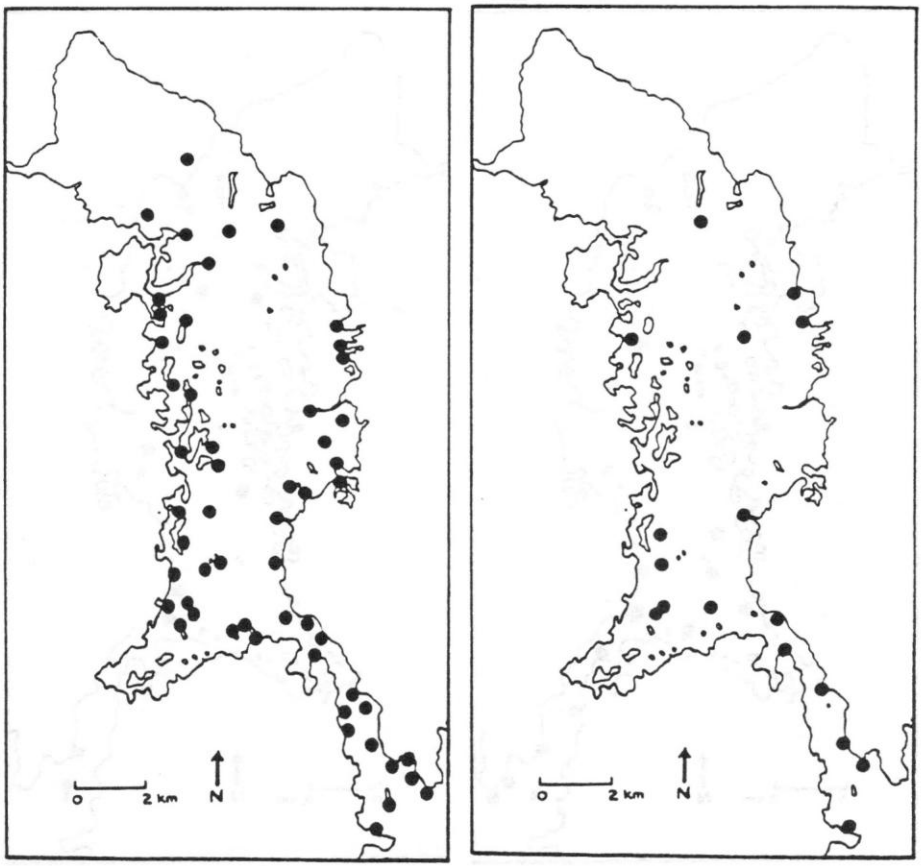


Rissoella globularis

Rissoella opalina

Bull. Ir. biogeog. Soc. No. 17

FIGURE 38: distribution maps of *Omalogyra atomus* and *Odostomia turrita*.

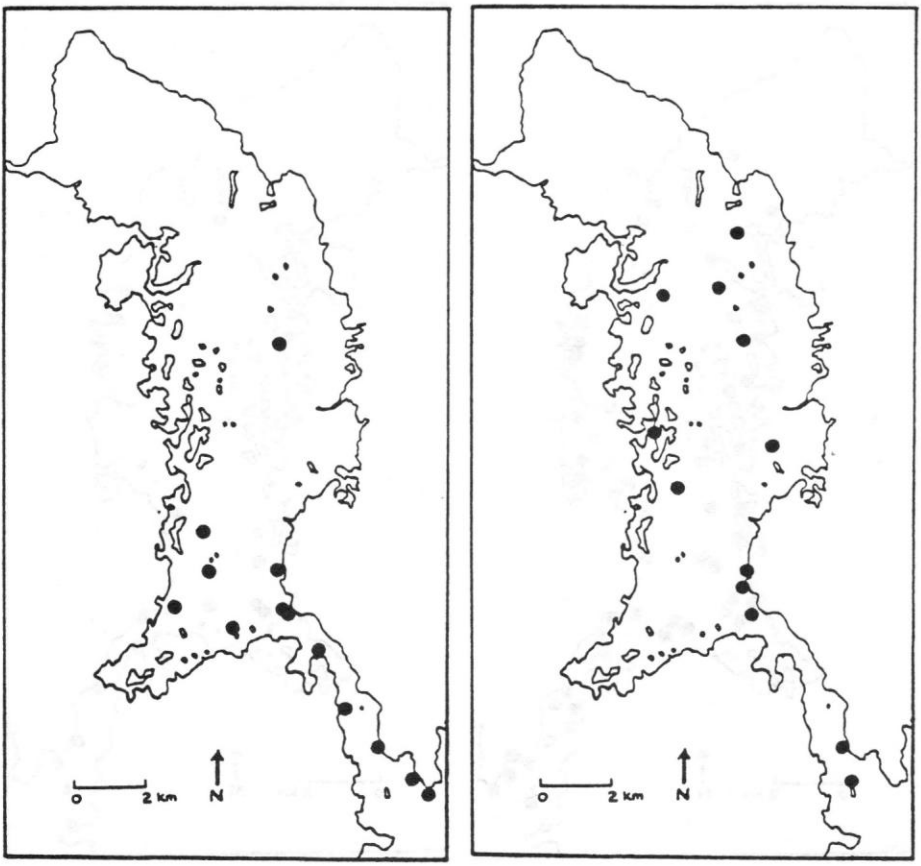


Omalogyra atomus

Odostomia turrita

Bull. Ir. biogeog. Soc. No. 17

FIGURE 39: distribution maps of *Odostomia unidentata* and *Brachystomia eulimoides*.

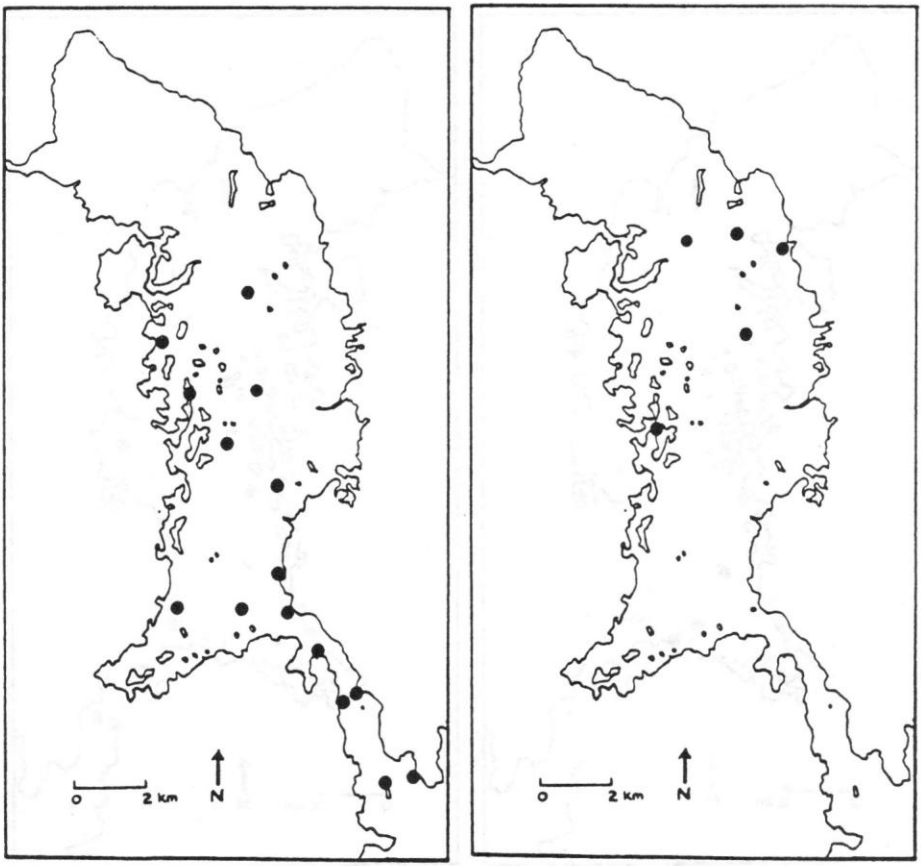


Odostomia unidentata

Brachystomia eulimoides

Bull. Ir. biogeog. Soc. No. 17

FIGURE 40: distribution maps of *Brachystomia scalaris* and *Chrysallida obtusa*.

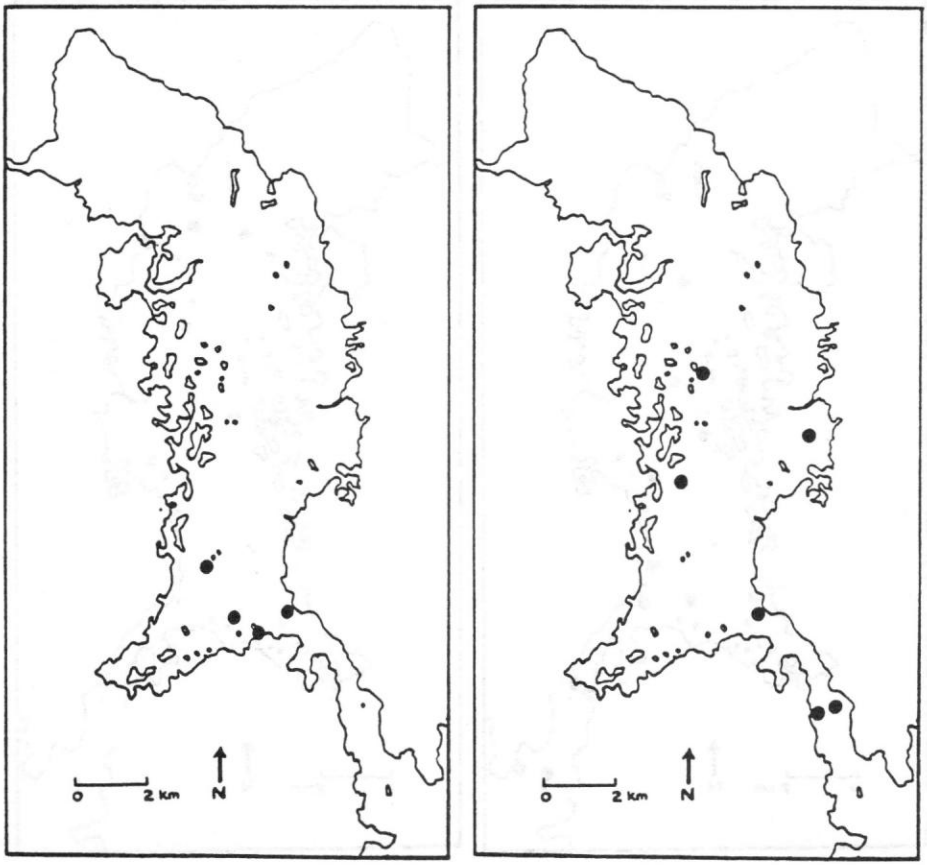


Brachystomia scalaris

Chrysallida obtusa

Bull. Ir. biogeog. Soc. No. 17

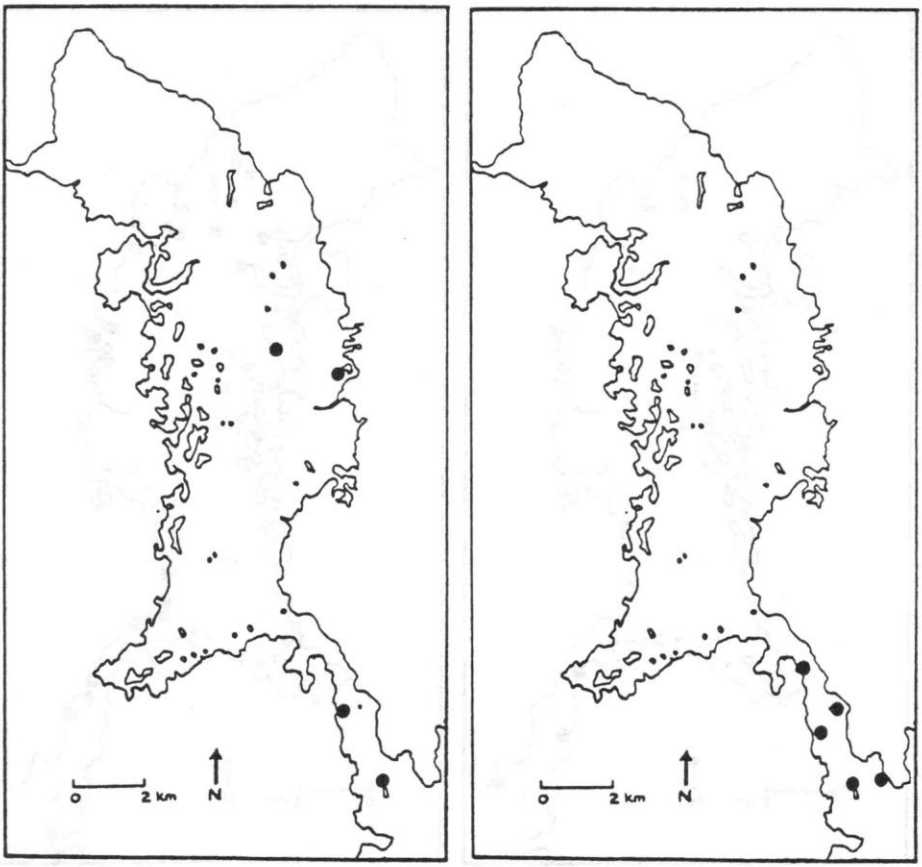
FIGURE 41: distribution maps of *Partulida spiralis* and *Retusa obtusa*.



Partulida spiralis **Retusa obtusa**

Bull. Ir. biogeog. Soc. No. 17

FIGURE 42: distribution maps of *Retusa truncatula* and *Hedylopsis brambelli*.

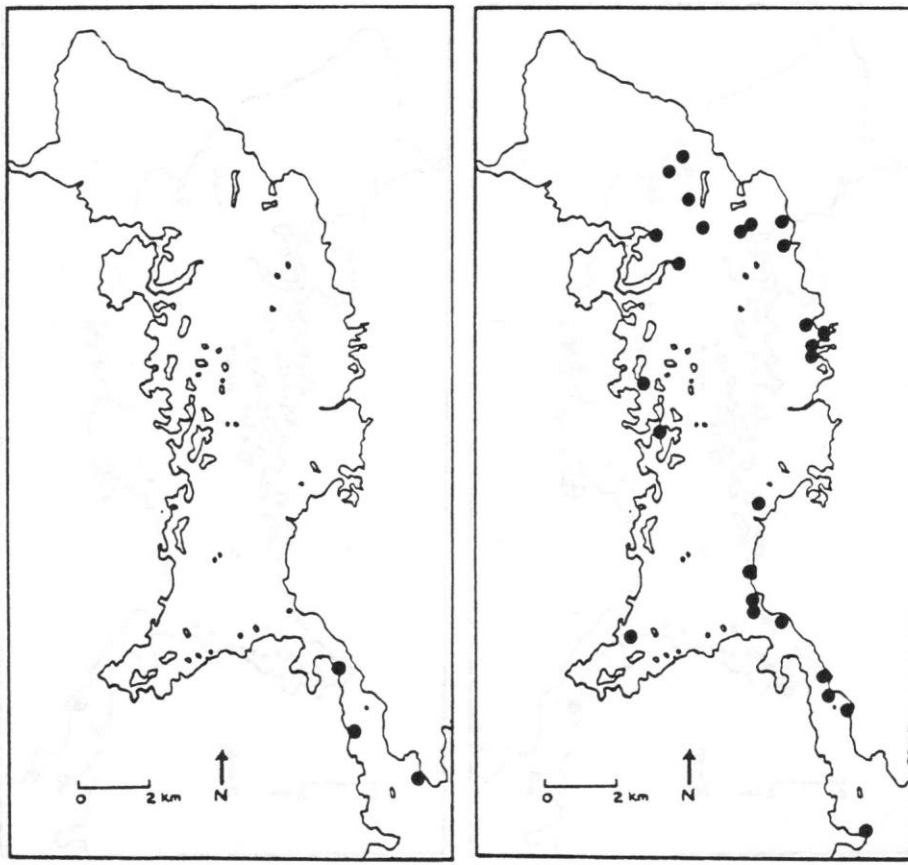


Retusa truncatula

Hedylopsis brambelli

Bull. Ir. biogeog. Soc. No. 17

FIGURE 43: distribution maps of *Philinoglossa helgolandica* and *Elysia viridis*.

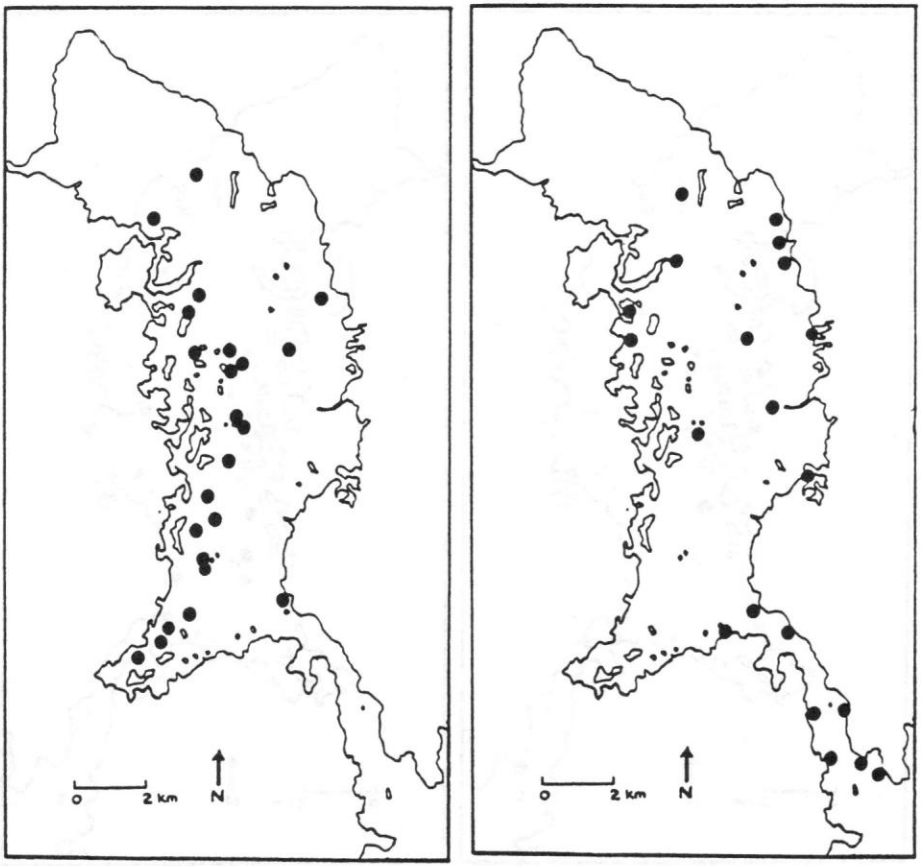


Philinoglossa helgolandica

Elysia viridis

Bull. Ir. biogeog. Soc. No. 17

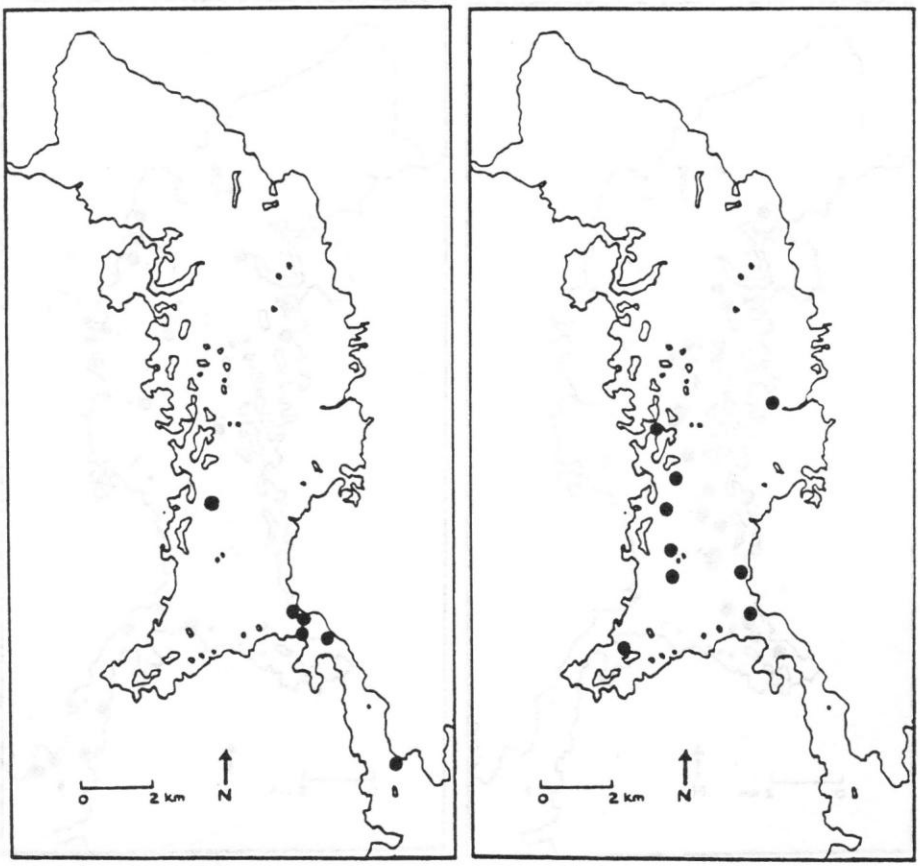
FIGURE 44: distribution maps of *Pleurobranchus membranaceus* and *Berthella plumula*.



Pleurobranchus membranaceus Berthella plumula

Bull. Ir. biogeog. Soc. No. 17

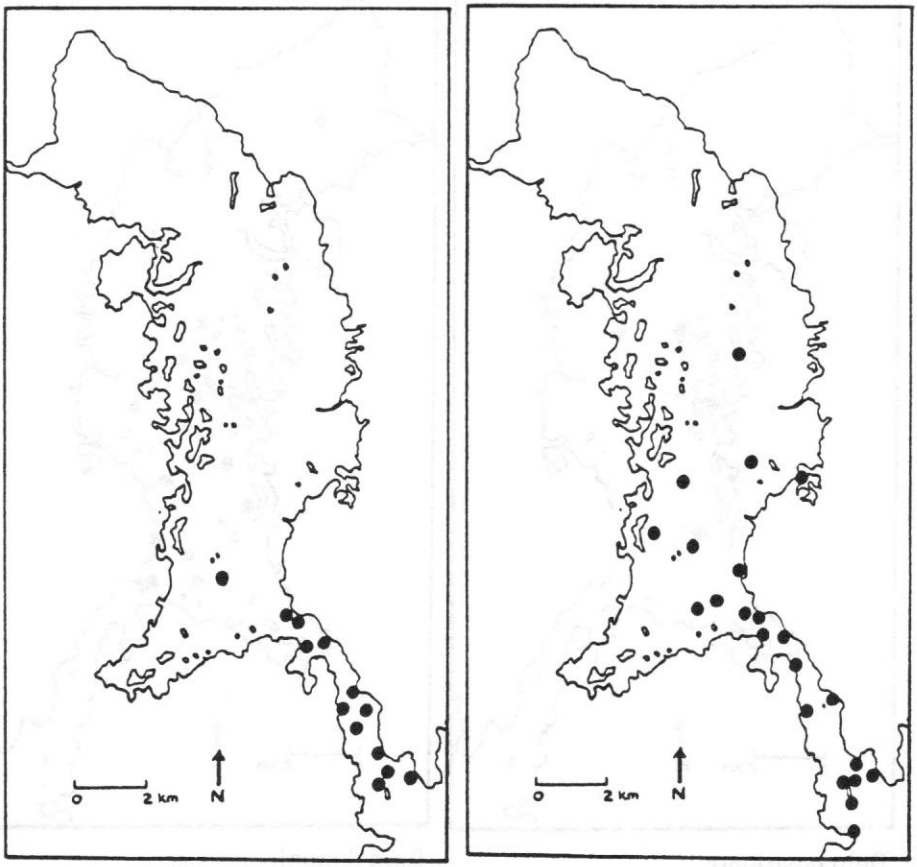
FIGURE 45: distribution maps of *Tritonia hombergii* and *Lomanotus marmoratus*.



Tritonia hombergii Lomanotus marmoratus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 46: distribution maps of *Dendronotus frondosus* and *Doto coronata*.

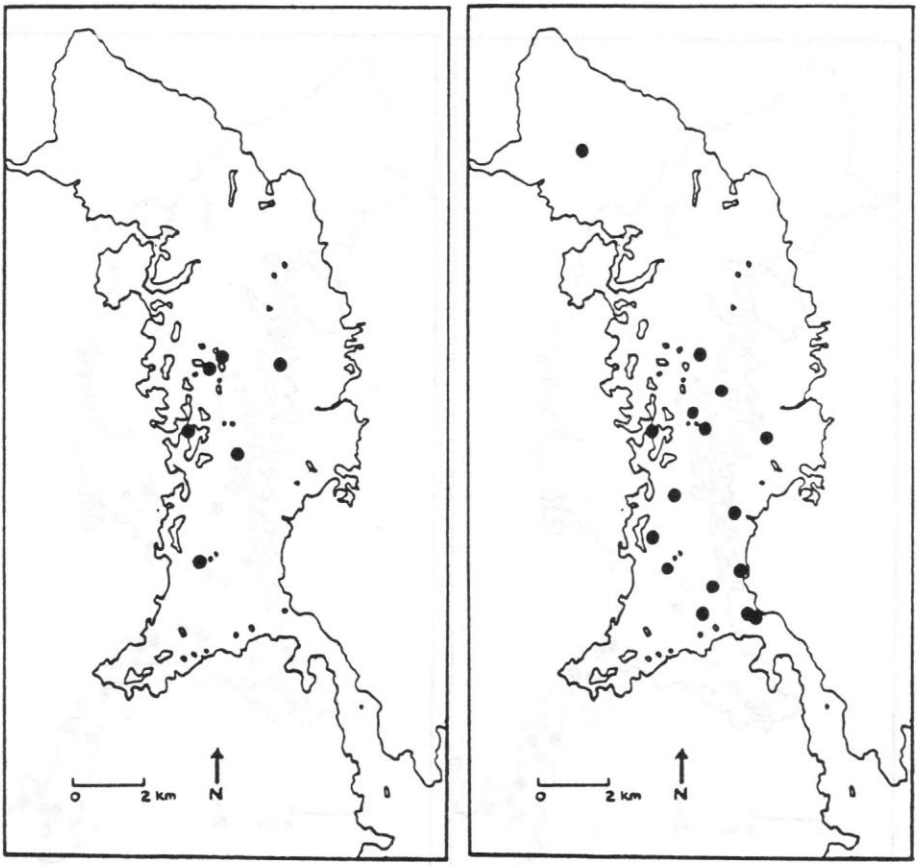


Dendronotus frondosus

Doto coronata

Bull. Ir. biogeog. Soc. No. 17

FIGURE 47: distribution maps of *Doto cuspidata* and *D. dunnei*.

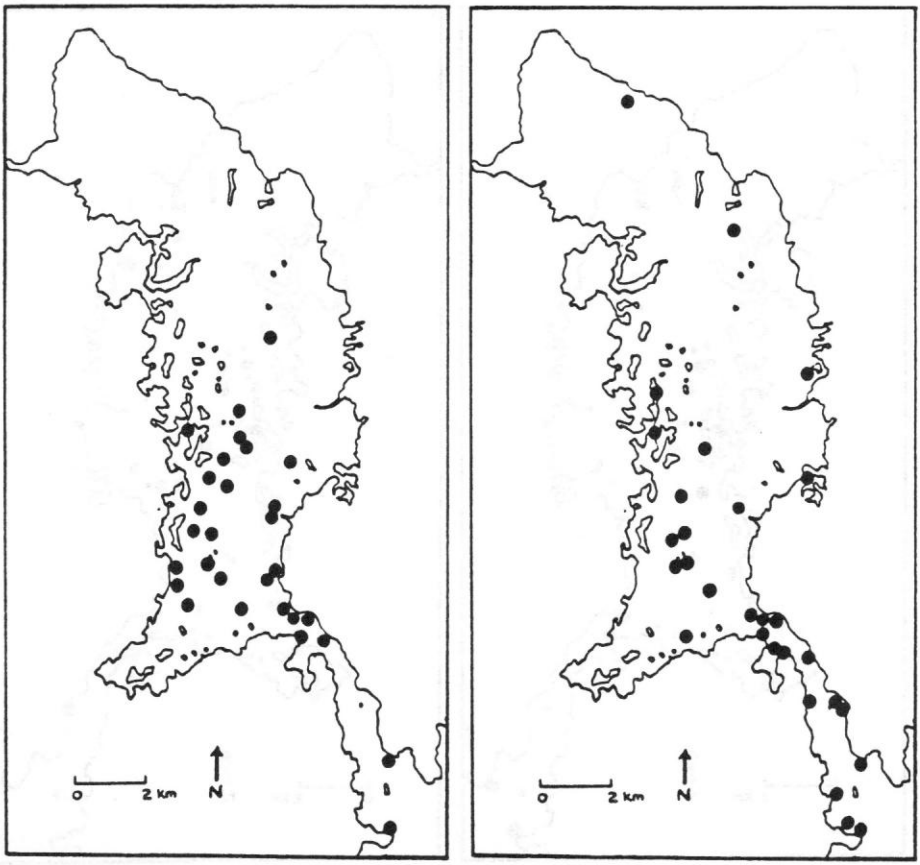


Doto cuspidata

Doto dunnei

Bull. Ir. biogeog. Soc. No. 17

FIGURE 48: distribution maps of *Doto fragilis* and *Goniodoris nodosa*.

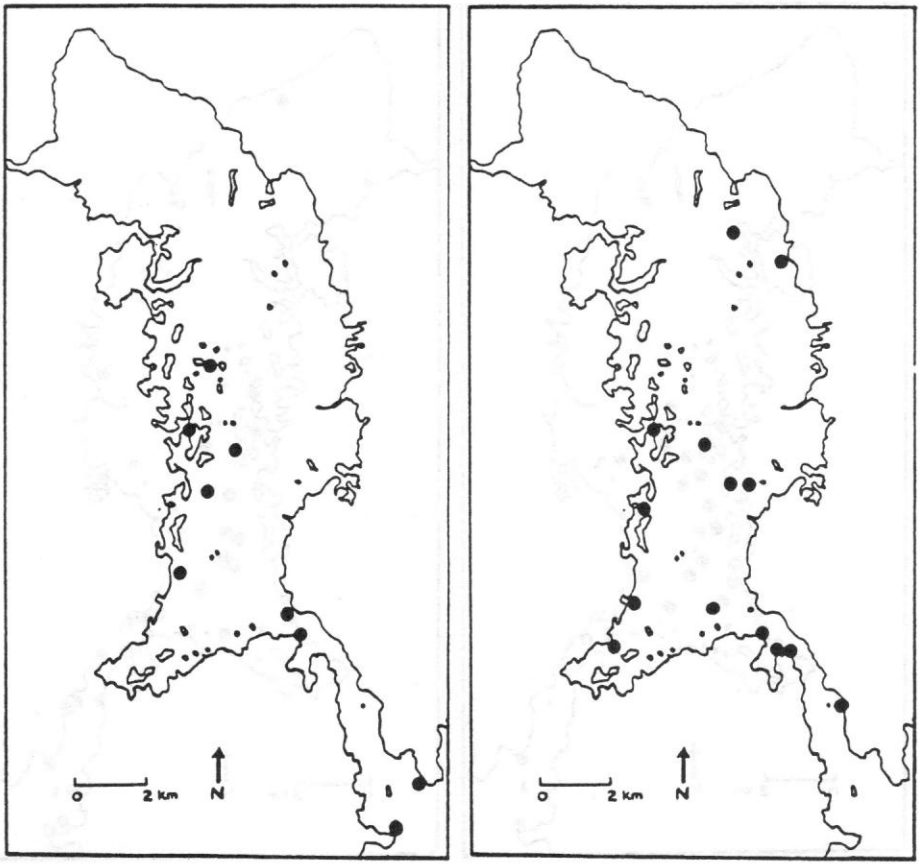


Doto fragilis

Goniodoris nodosa

Bull. Ir. biogeog. Soc. No. 17

FIGURE 49: distribution maps of *Ancula gibbosa* and *Onchidoris bilamellata*.

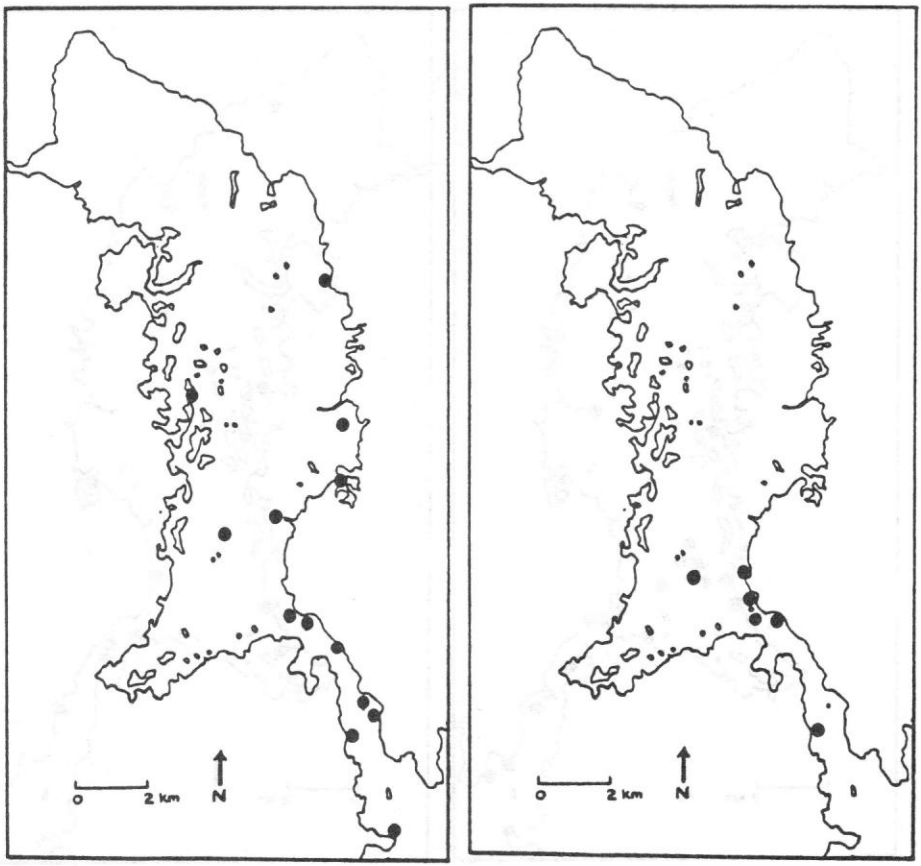


Ancula gibbosa

Onchidoris bilamellata

Bull. Ir. biogeog. Soc. No. 17

FIGURE 50: distribution maps of *Onchidoris muricata* and *Diaphorodoris luteocincta*.

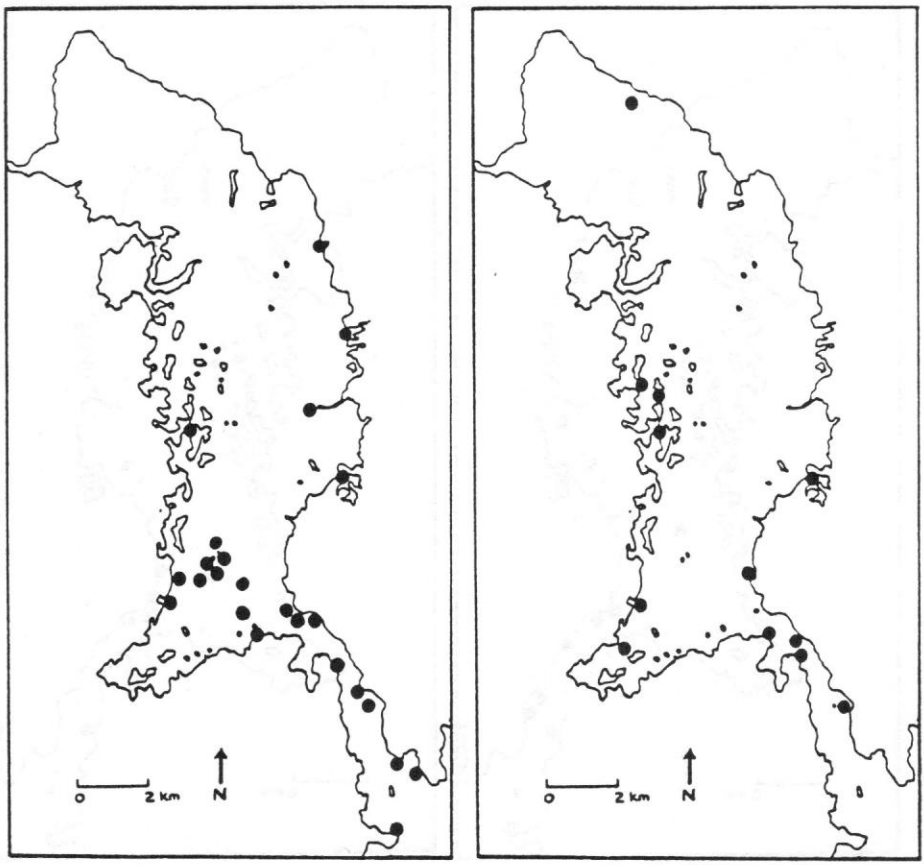


Onchidoris muricata

Diaphorodoris luteocincta

Bull. Ir. biogeog. Soc. No. 17

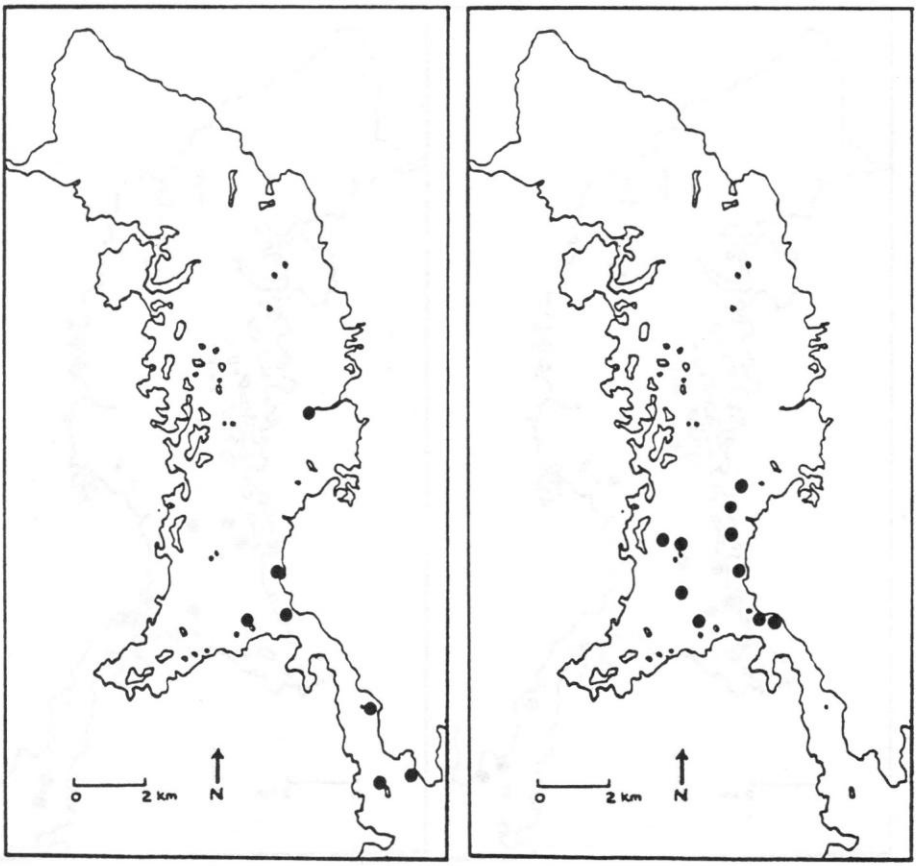
FIGURE 51: distribution maps of *Acanthodoris pilosa* and *Adalaria proxima*.



Acanthodoris pilosa

Adalaria proxima

FIGURE 52: distribution maps of *Aegires punctilucens* and *Polycera faeroensis*.

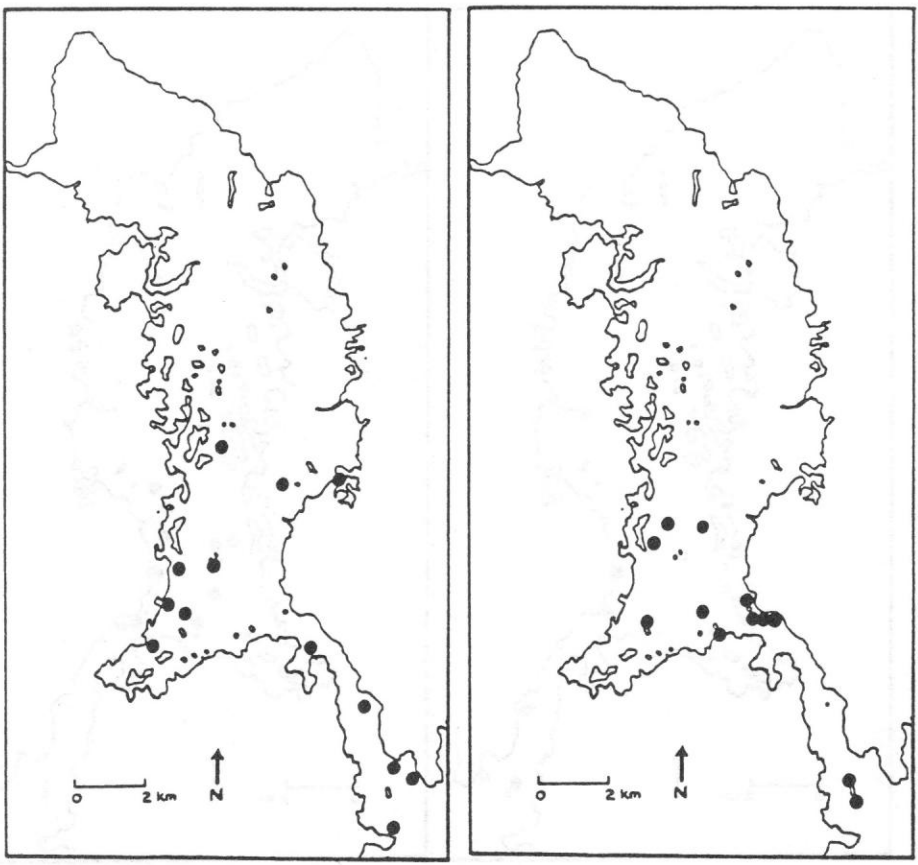


Aegires punctilucens

Polycera faeroensis

Bull. Ir. biogeog. Soc. No. 17

FIGURE 53: distribution maps of *Polycera quadrilineata* and *Limacia clavigera*.

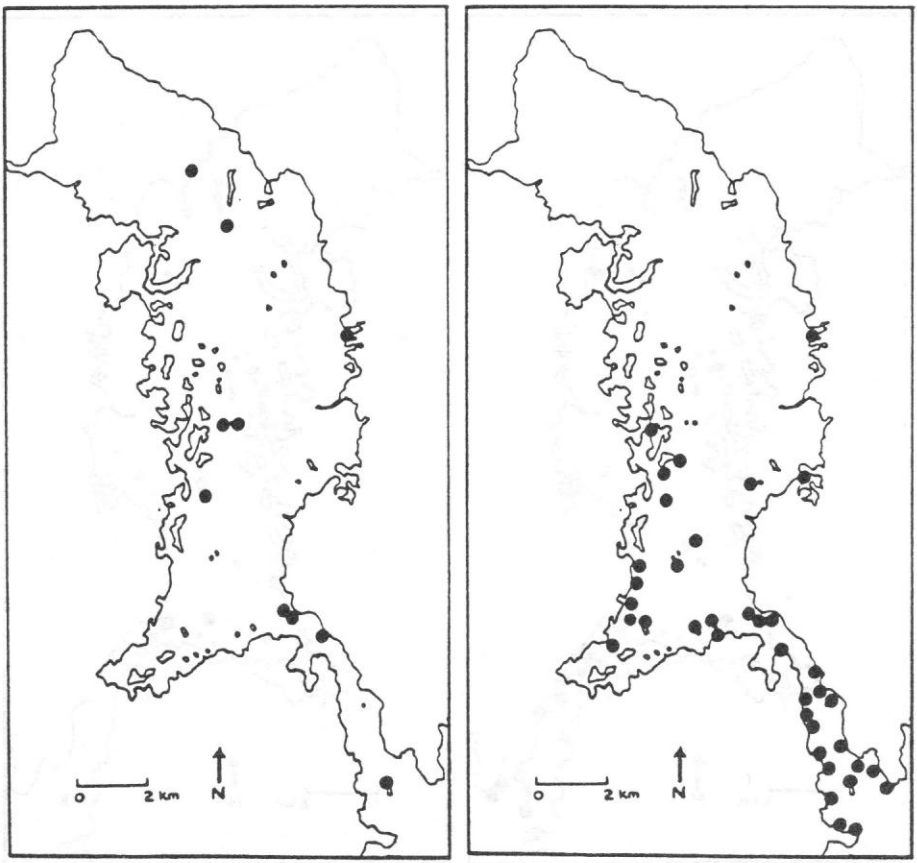


Polycera quadrilineata

Limacia clavigera

Bull. Ir. biogeog. Soc. No. 17

FIGURE 54: distribution maps of *Cadlina laevis* and *Archidoris pseudoargus*.

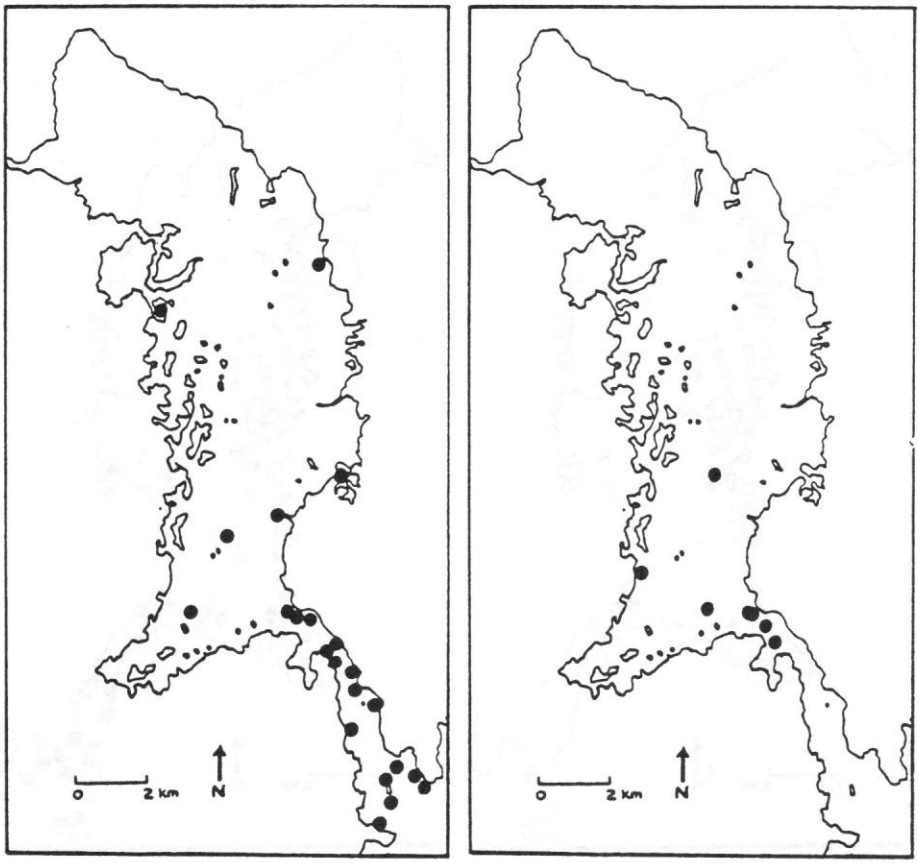


Cadlina laevis

Archidoris pseudoargus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 55: distribution maps of *Jorunna tomentosa* and *Janolus cristatus*.

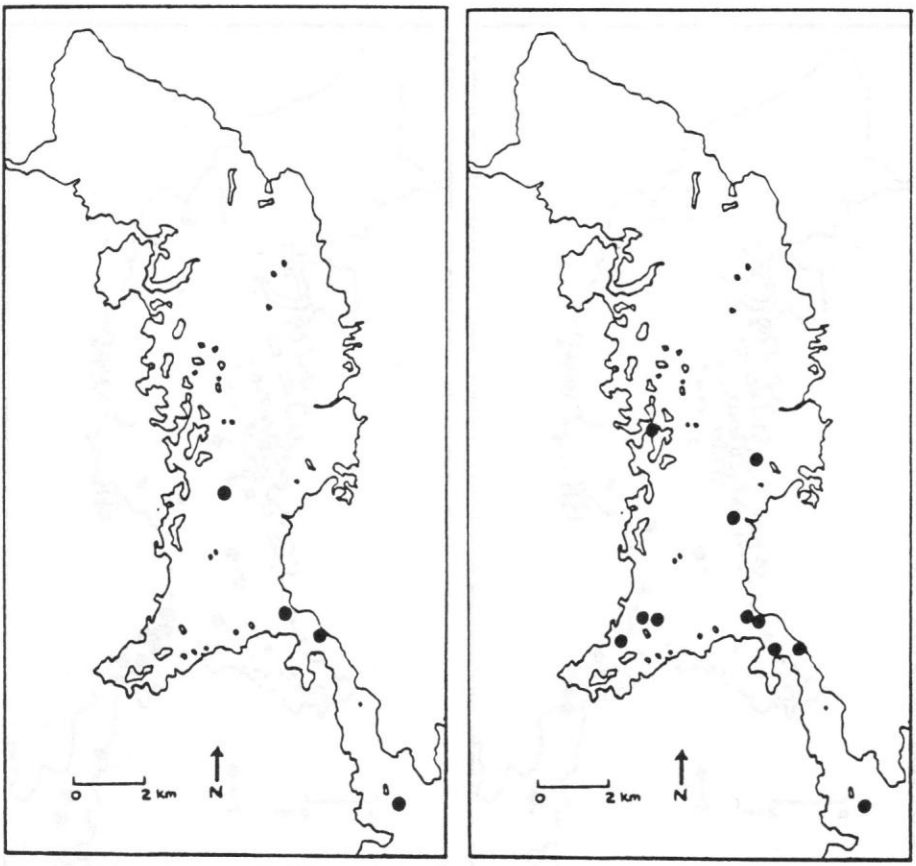


Jorunna tomentosa

Janolus cristatus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 56: distribution maps of *Coryphella browni* and *C. lineata*.

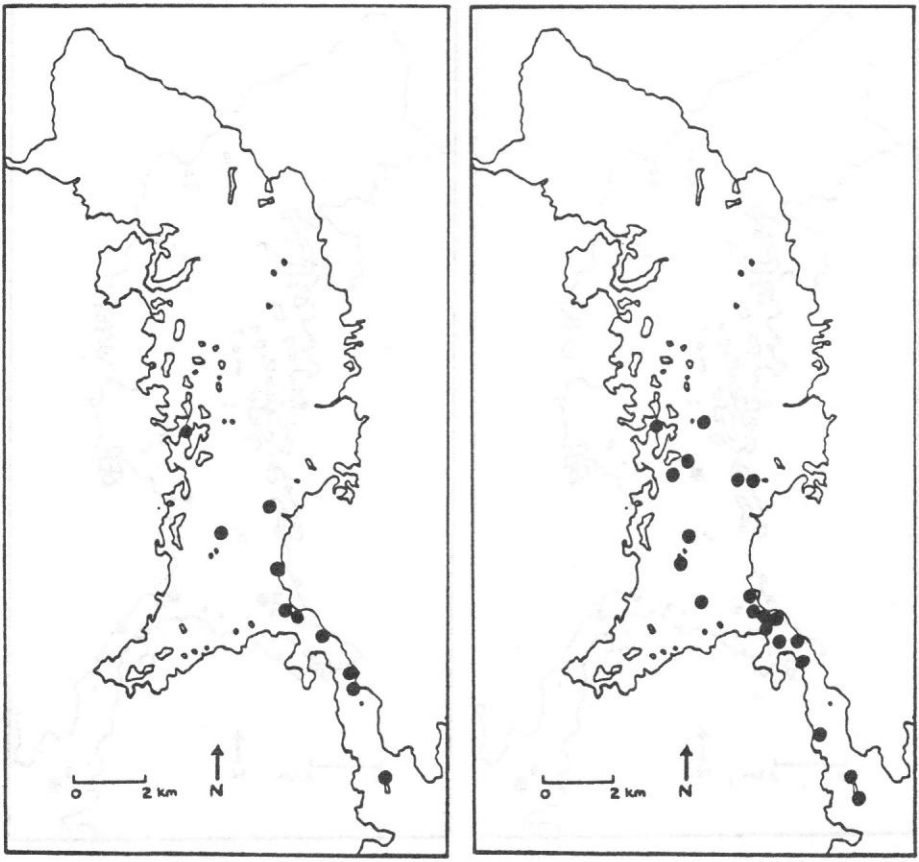


Coryphella browni

Coryphella lineata

Bull. Ir. biogeog. Soc. No. 17

FIGURE 57: distribution maps of *Coryphella verrucosa* and *Flabellina pedata*.

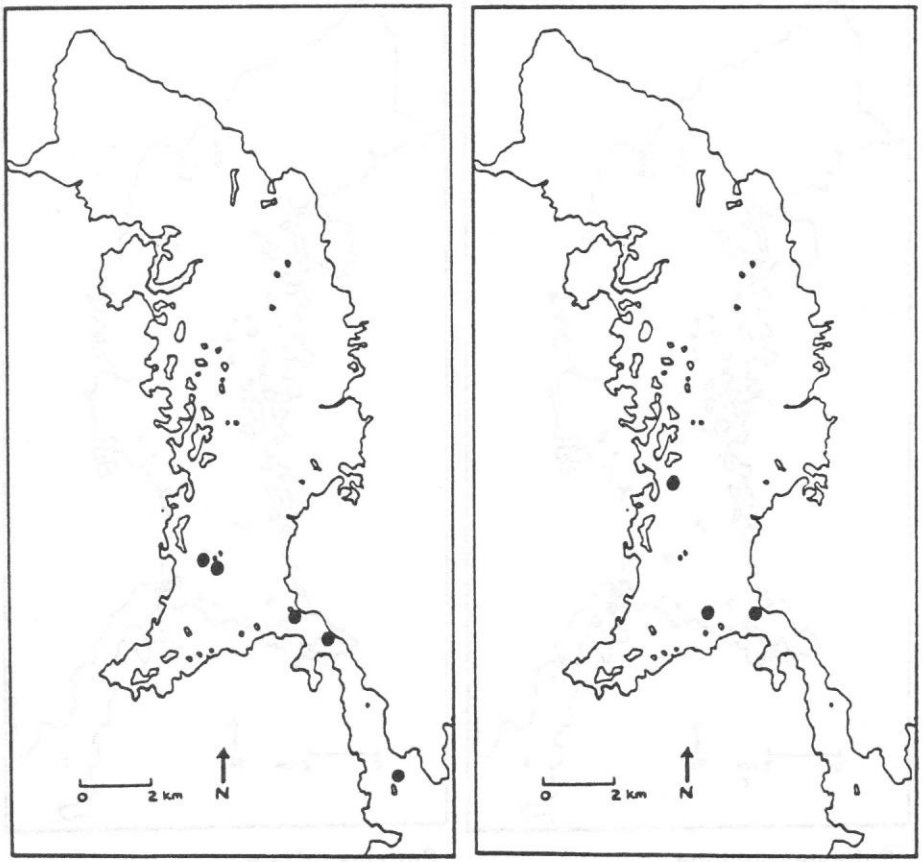


Coryphella verrucosa

Flabellina pedata

Bull. Ir. biogeog. Soc. No. 17

FIGURE 58: distribution maps of *Catriona gymnota* and *Cuthona amoena*.

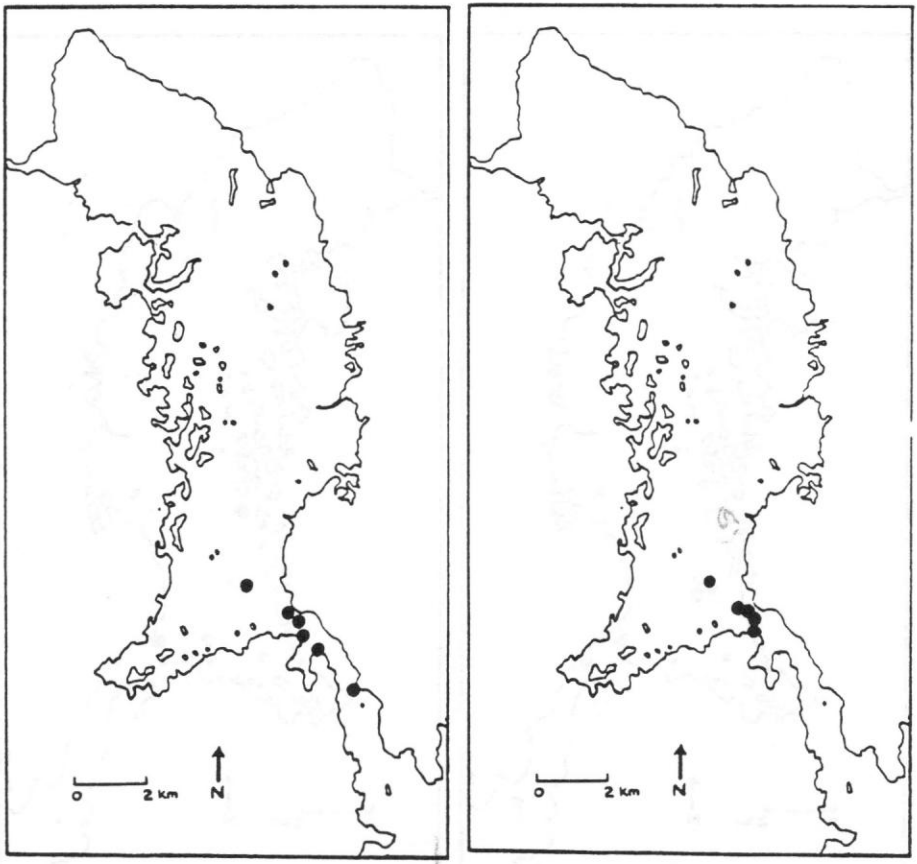


Catriona gymnota

Cuthona amoena

Bull. Ir. biogeog. Soc. No. 17

FIGURE 59: distribution maps of *Cuthona concinna* and *C. foliata*.

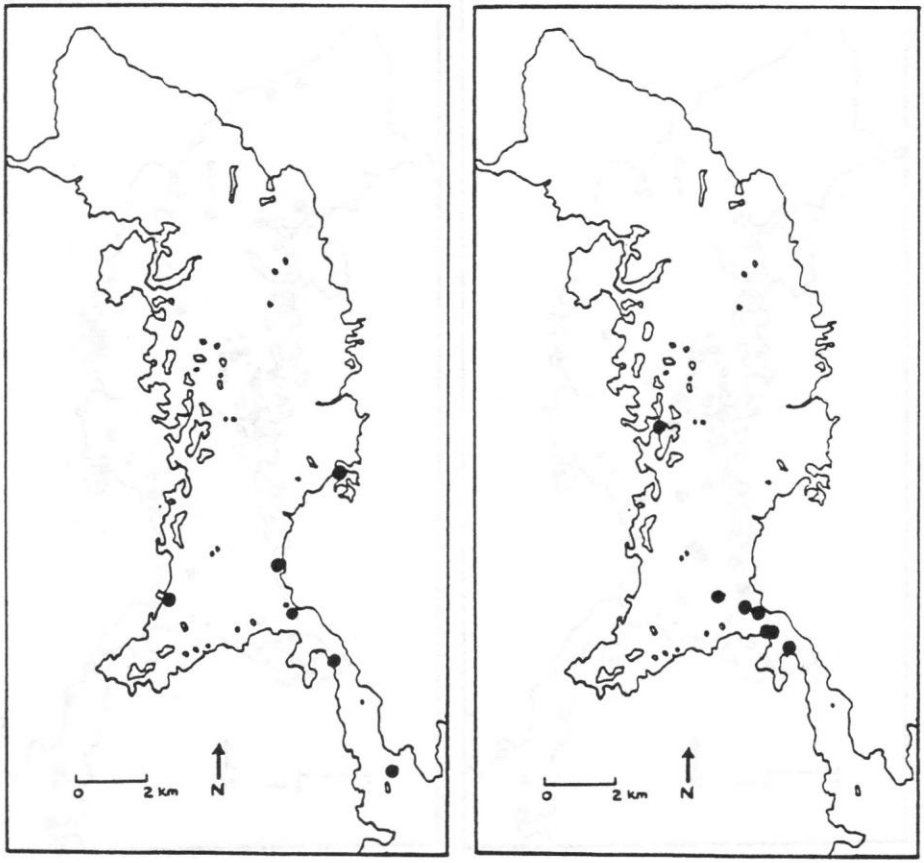


Cuthona concinna

Cuthona foliata

Bull. Ir. biogeog. Soc. No. 17

FIGURE 60: distribution maps of *Eubranchus exiguus* and *E. pallidus*.

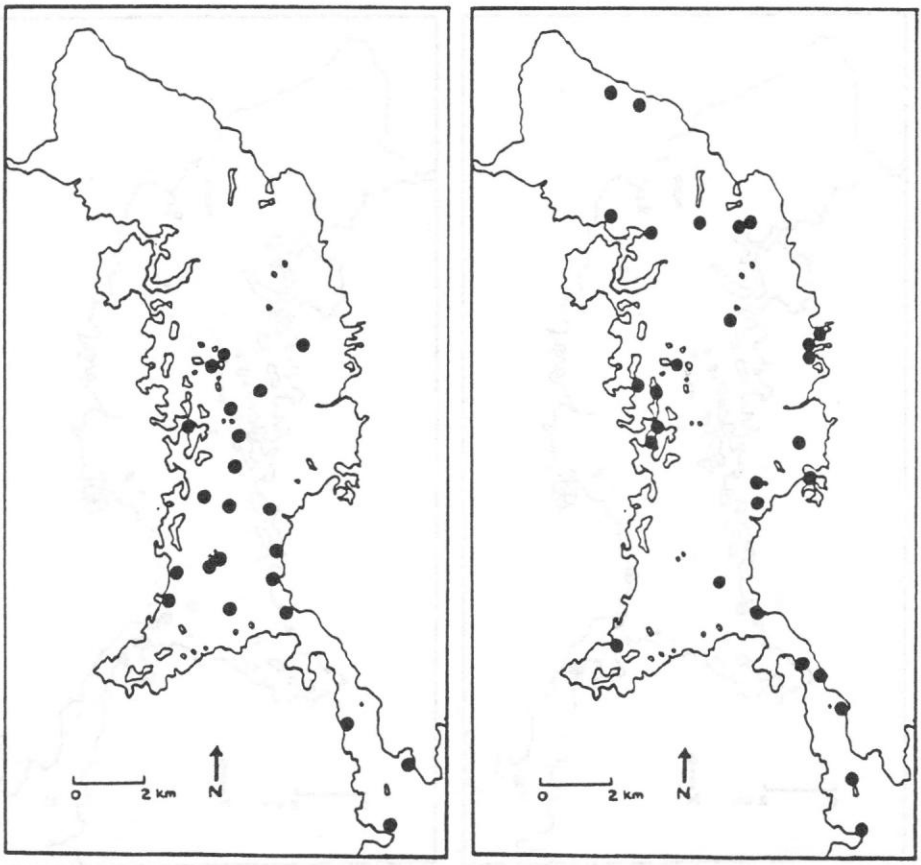


Eubranchus exiguus

Eubranchus pallidus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 61: distribution maps of *Eubranchus tricolor* and *Facelina bostoniensis*.

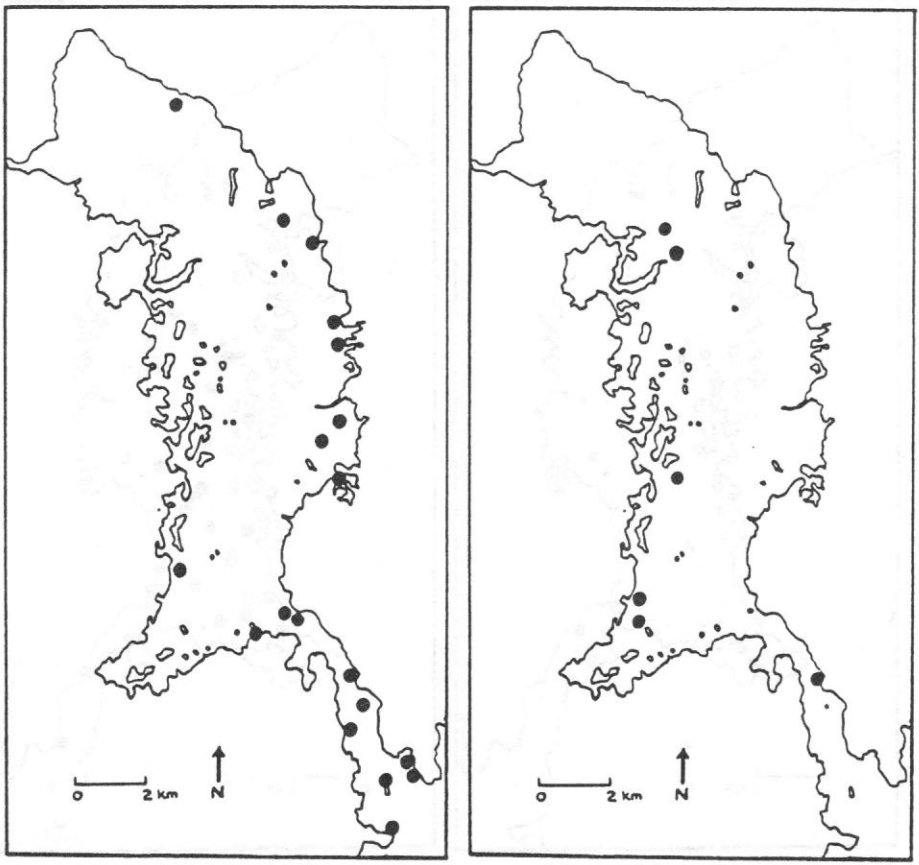


Eubranchus tricolor

Facelina bostoniensis

Bull. Ir. biogeog. Soc. No. 17

FIGURE 62: distribution maps of *Aeolidia papillosa* and *Aeolidiella glauca*.

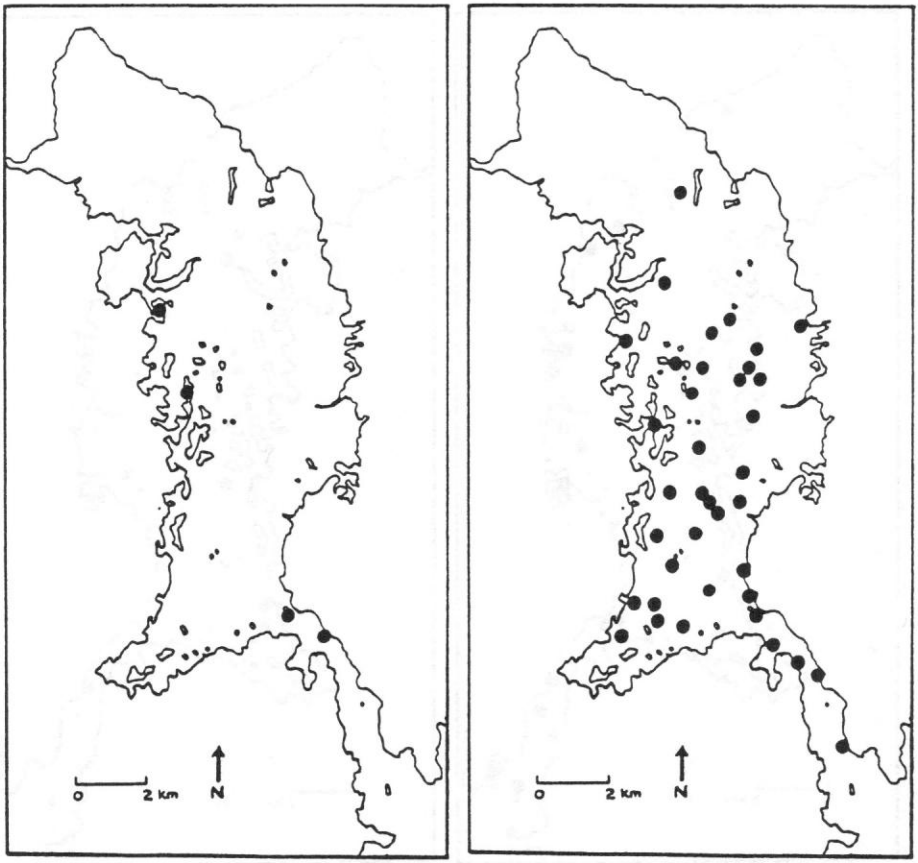


Aeolidia papillosa

Aeolidiella glauca

Bull. Ir. biogeog. Soc. No. 17

FIGURE 63: distribution maps of *Leucophytia bidentata* and *Nucula nucleus*.

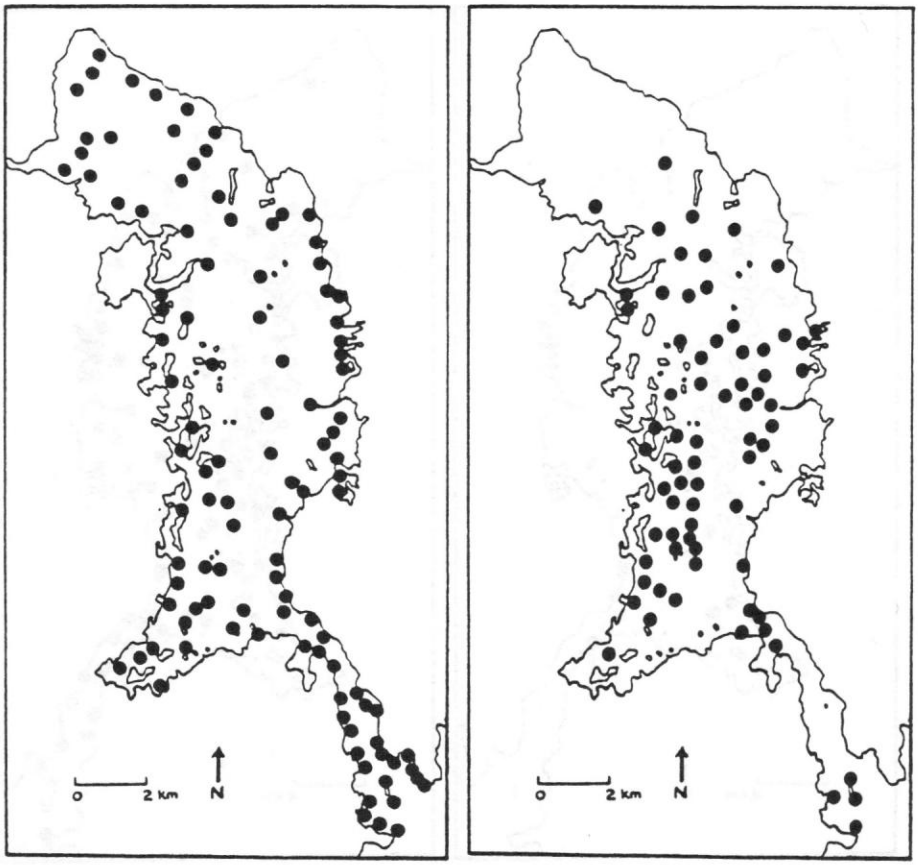


Leucophytia bidentata

Nucula nucleus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 64: distribution maps of *Mytilus edulis* and *Modiolus modiolus*.

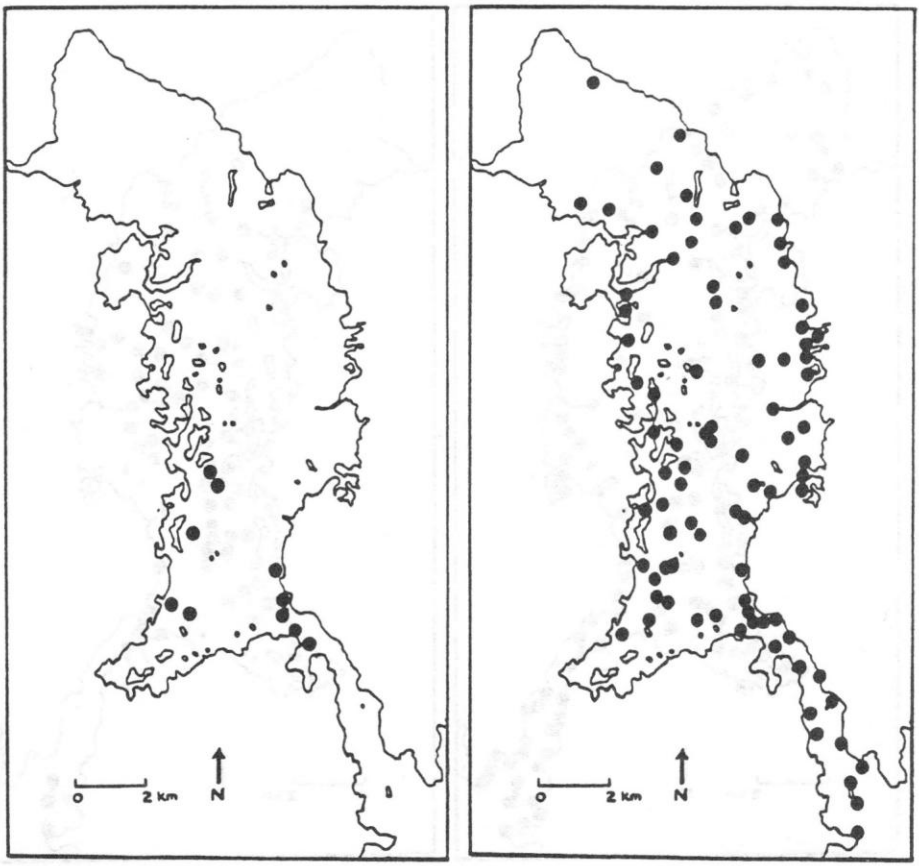


Mytilus edulis

Modiolus modiolus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 65: distribution maps of *Crenella decussata* and *Modiolarca tumida*.

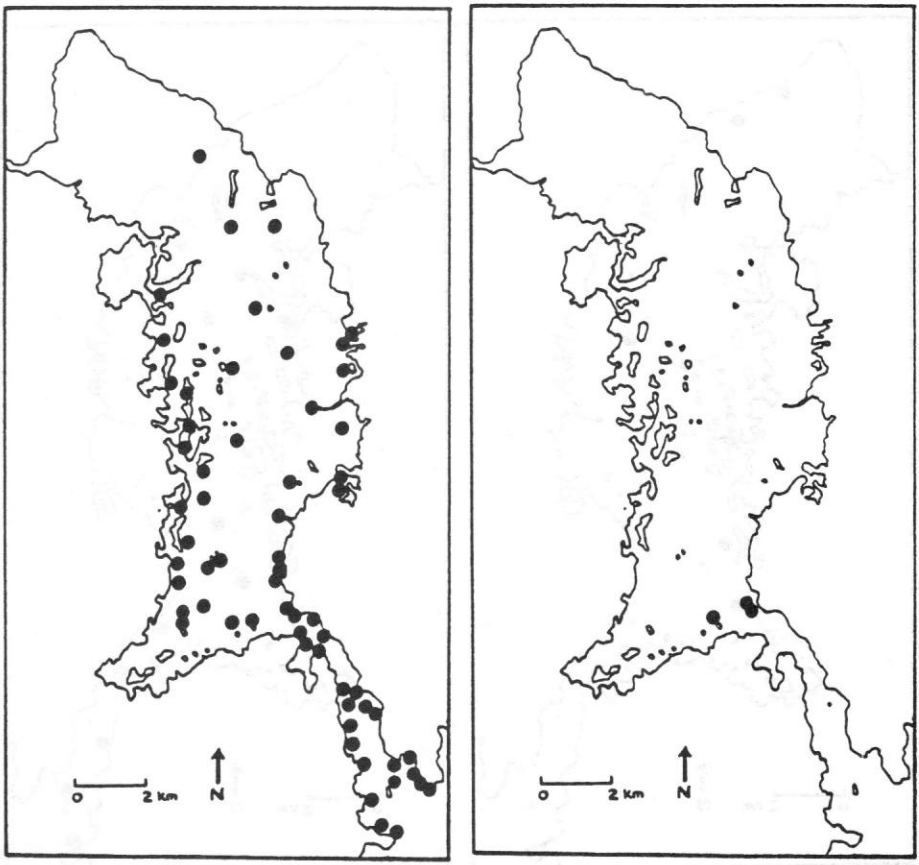


Crenella decussata

Modiolarca tumida

Bull. Ir. biogeog. Soc. No. 17

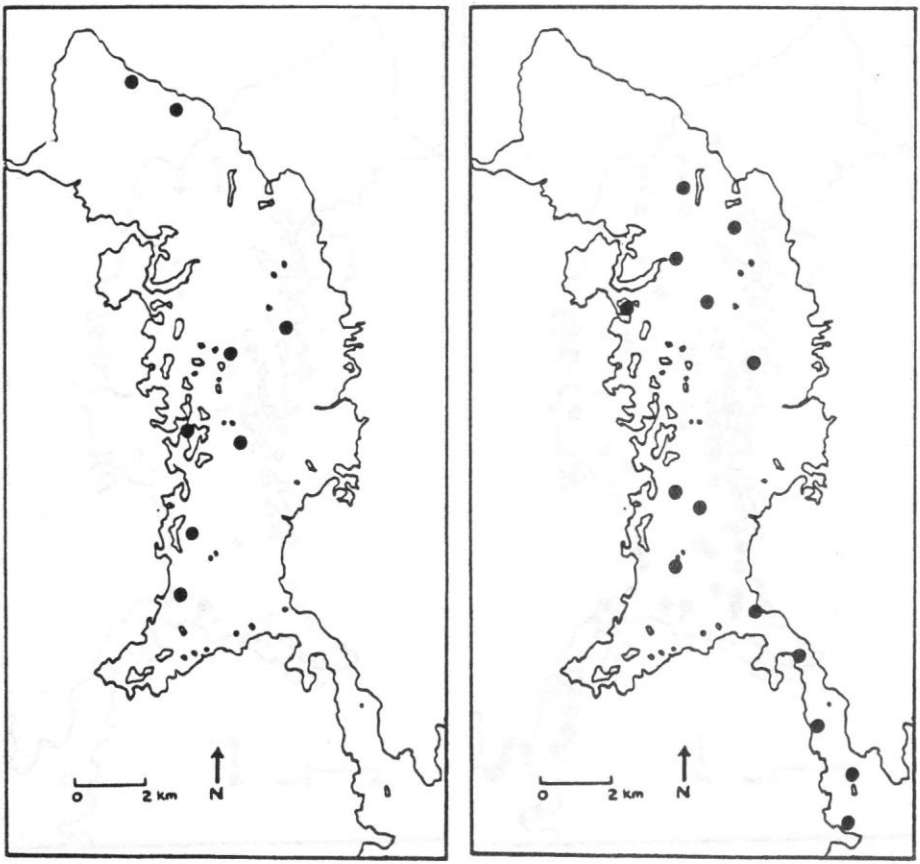
FIGURE 66: distribution maps of *Musculus discors* and *Limatula subauriculata*.



Musculus discors **Limatula subauriculata**

Bull. Ir. biogeog. Soc. No. 17

FIGURE 67: distribution maps of *Ostrea edulis* and *Chlamys distorta*.

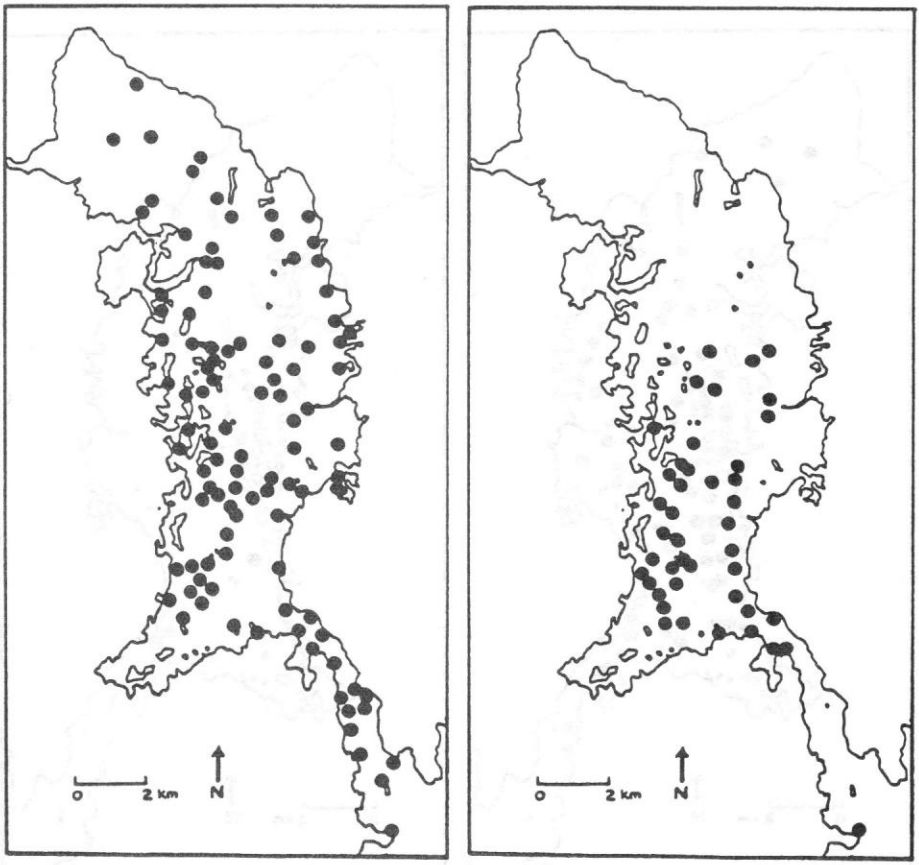


Ostrea edulis

Chlamys distorta

Bull. Ir. biogeog. Soc. No. 17

FIGURE 68: distribution maps of *Chlamys varia* and *Pecten maximus*.

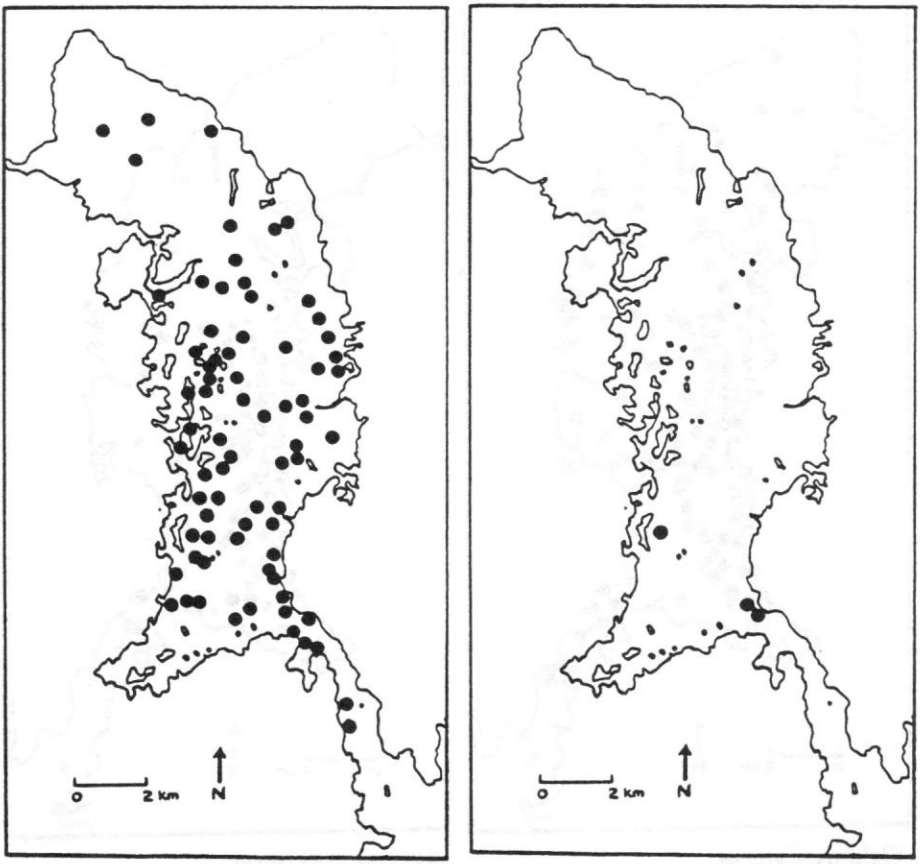


Chlamys varia

Pecten maximus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 69: distribution maps of *Aequipecten opercularis* and *Palliolum striatum*.

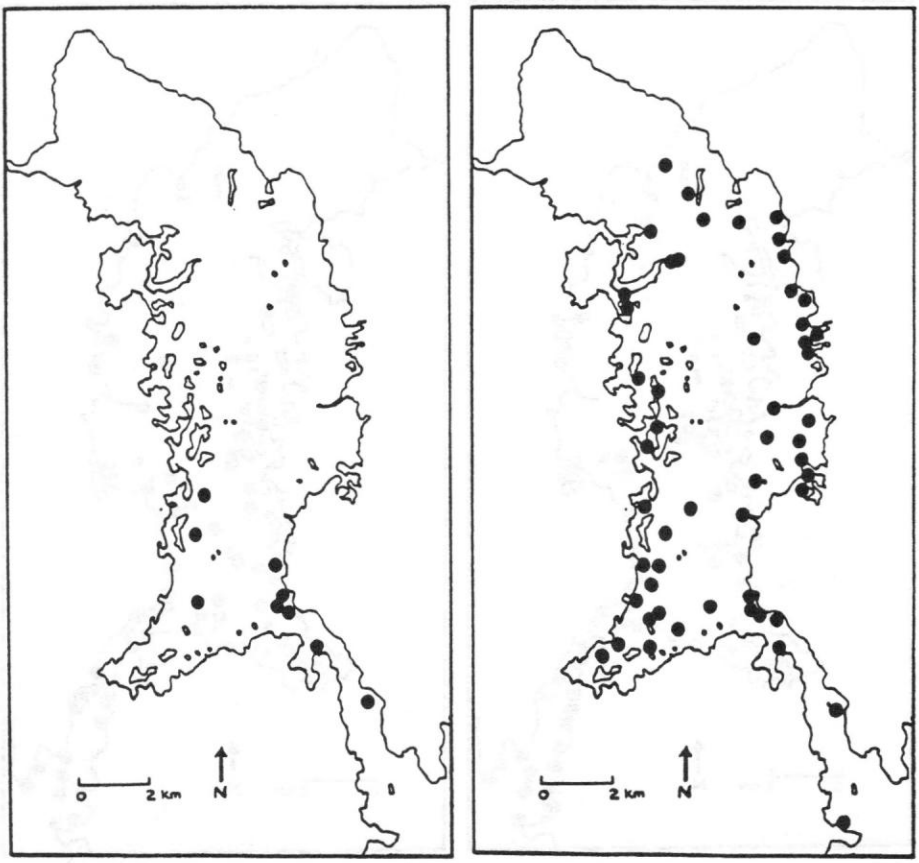


Aequipecten opercularis

Palliolum striatum

Bull. Ir. biogeog. Soc. No. 17

FIGURE 70: distribution maps of *Palliolum tigerinum* and *Anomia ephippium*.

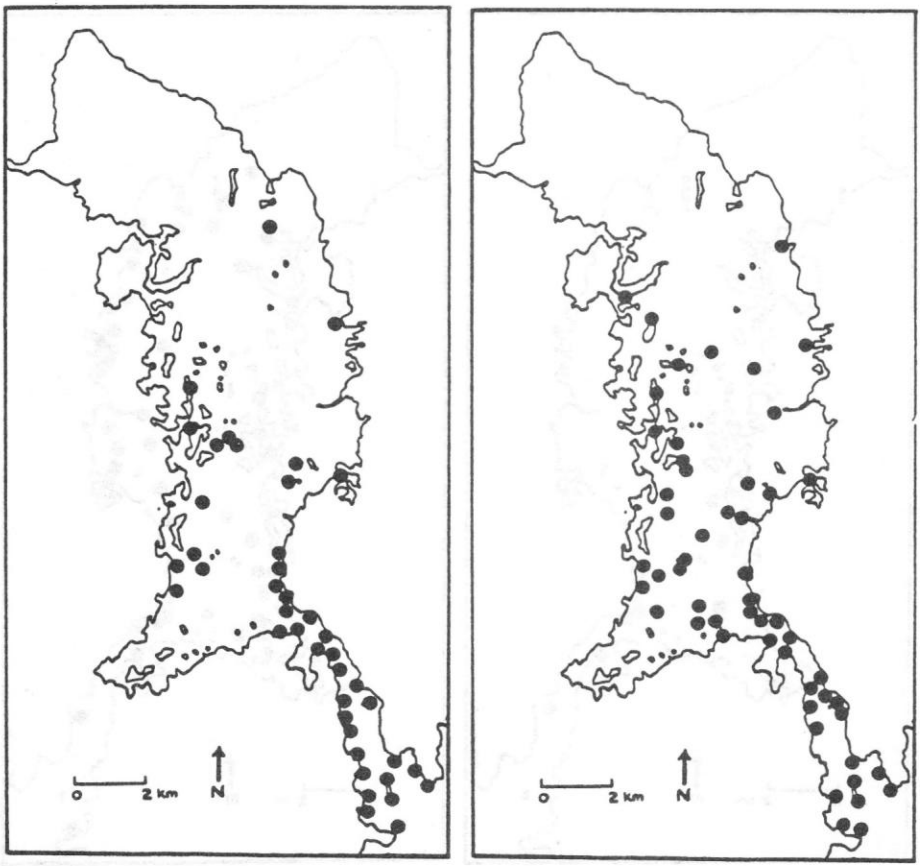


Palliolum tigerinum

Anomia ephippium

Bull. Ir. biogeog. Soc. No. 17

FIGURE 71: distribution maps of *Heteranomia squamula* and *Pododesmus patelliformis*.

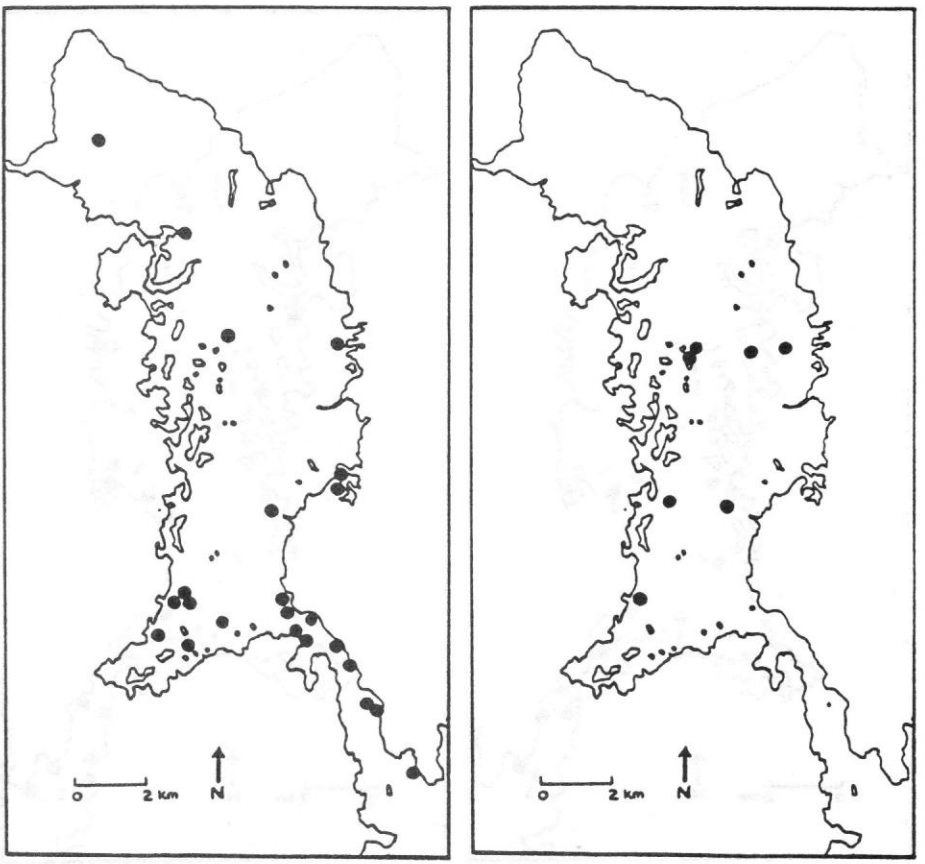


Heteranomia squamula

Pododesmus patelliformis

Bull. Ir. biogeog. Soc. No. 17

FIGURE 72: distribution maps of *Lucinoma borealis* and *Thyasira flexuosa*.

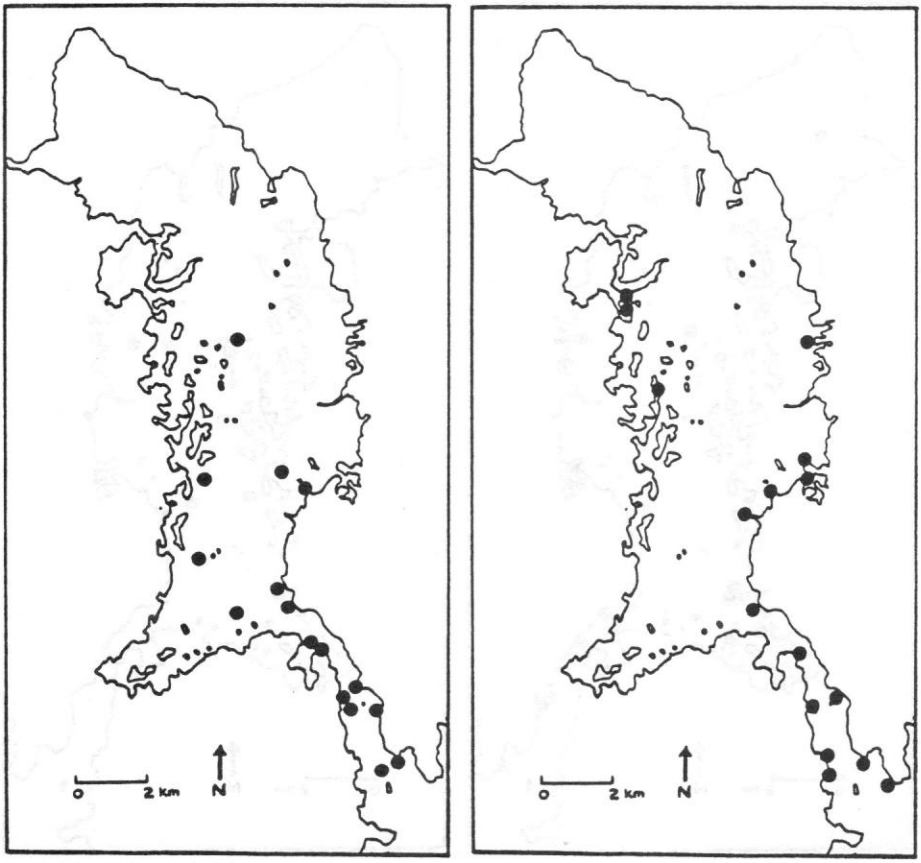


Lucinoma borealis

Thyasira flexuosa

Bull. Ir. biogeog. Soc. No. 17

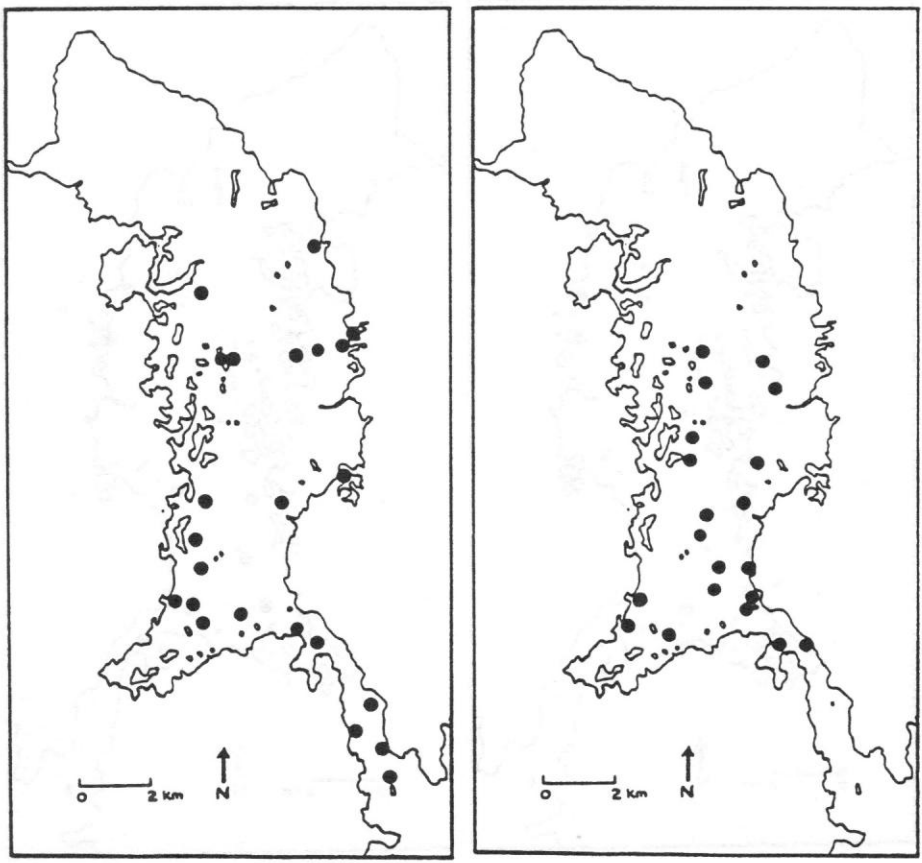
FIGURE 73: distribution maps of *Kellia suborbicularis* and *Lasaea adansoni*.



Kellia suborbicularis **Lasaea adansoni**

Bull. Ir. biogeog. Soc. No. 17

FIGURE 74: distribution maps of *Mysella bidentata* and *Astarte sulcata*.

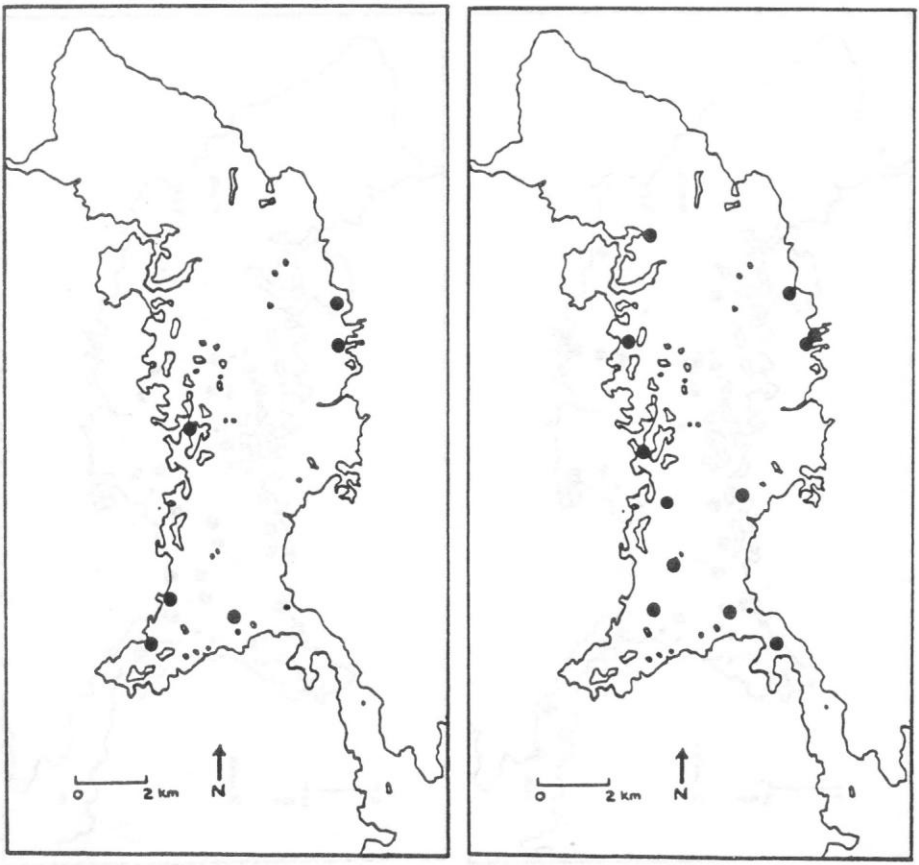


Mysella bidentata

Astarte sulcata

Bull. Ir. biogeog. Soc. No. 17

FIGURE 75: distribution maps of *Acanthocardia echinata* and *Parvicardium exiguum*.

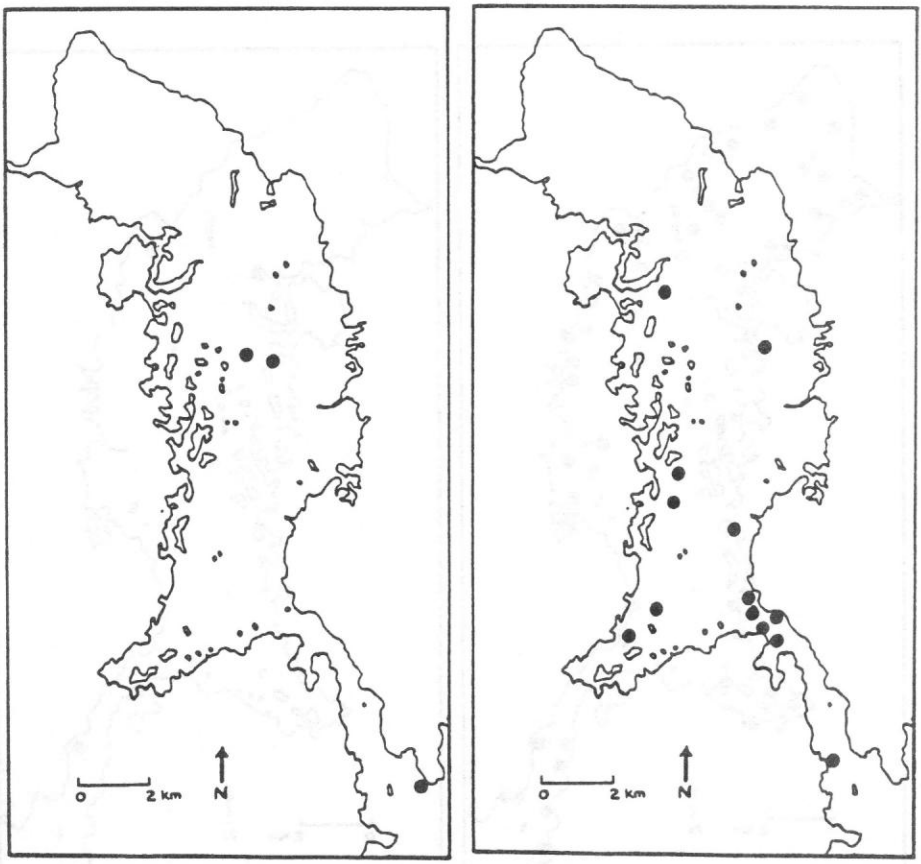


Acanthocardia echinata

Parvicardium exiguum

Bull. Ir. biogeog. Soc. No. 17

FIGURE 76: distribution maps of *Parvicardium ovale* and *P. scabrum*.

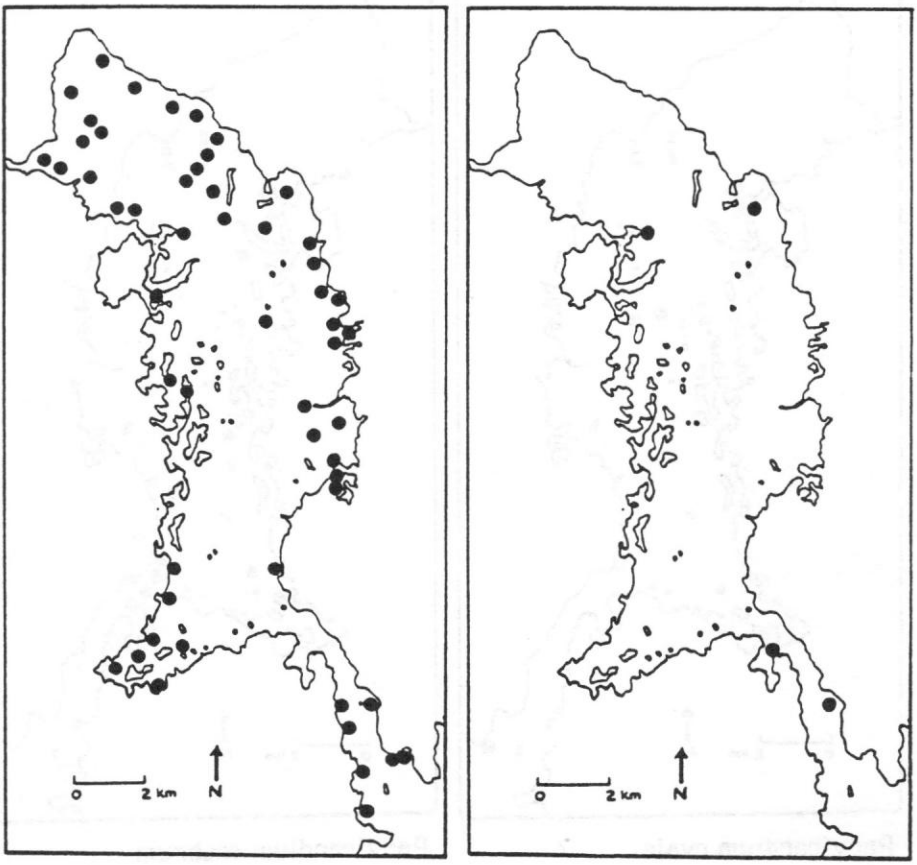


Parvicardium ovale

Parvicardium scabrum

Bull. Ir. biogeog. Soc. No. 17

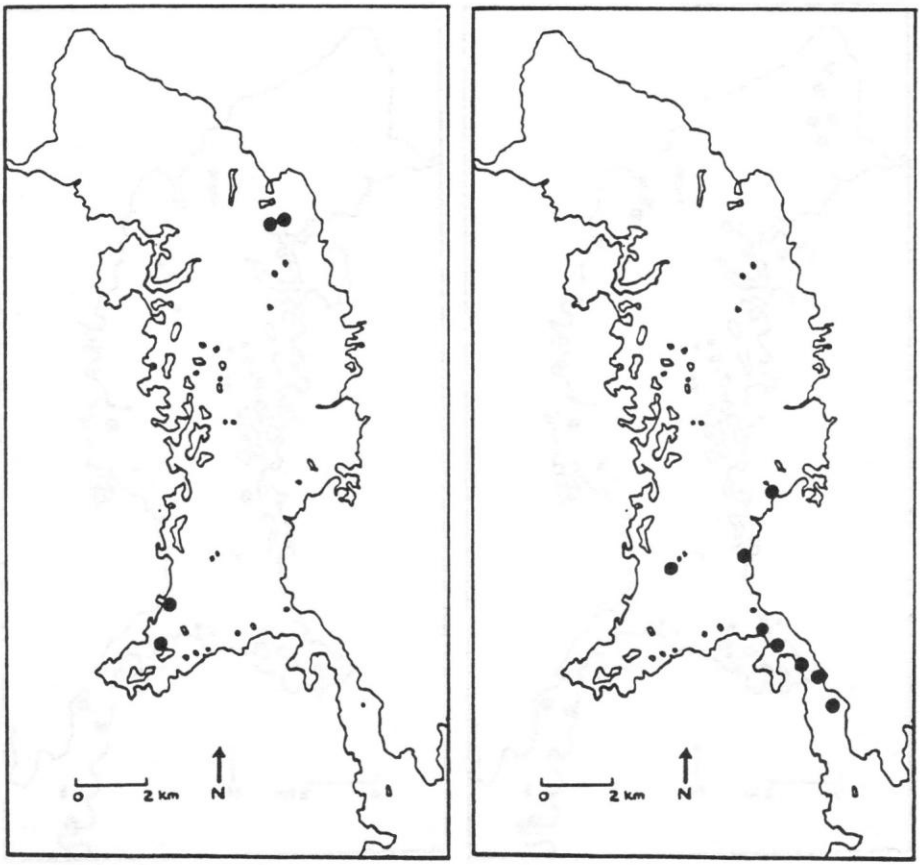
FIGURE 77: distribution maps of *Cerastoderma edule* and *Spisula solida*.



Cerastoderma edule

Spisula solida

FIGURE 78: distribution maps of *Spisula subtruncata* and *Ensis arcuatus*.

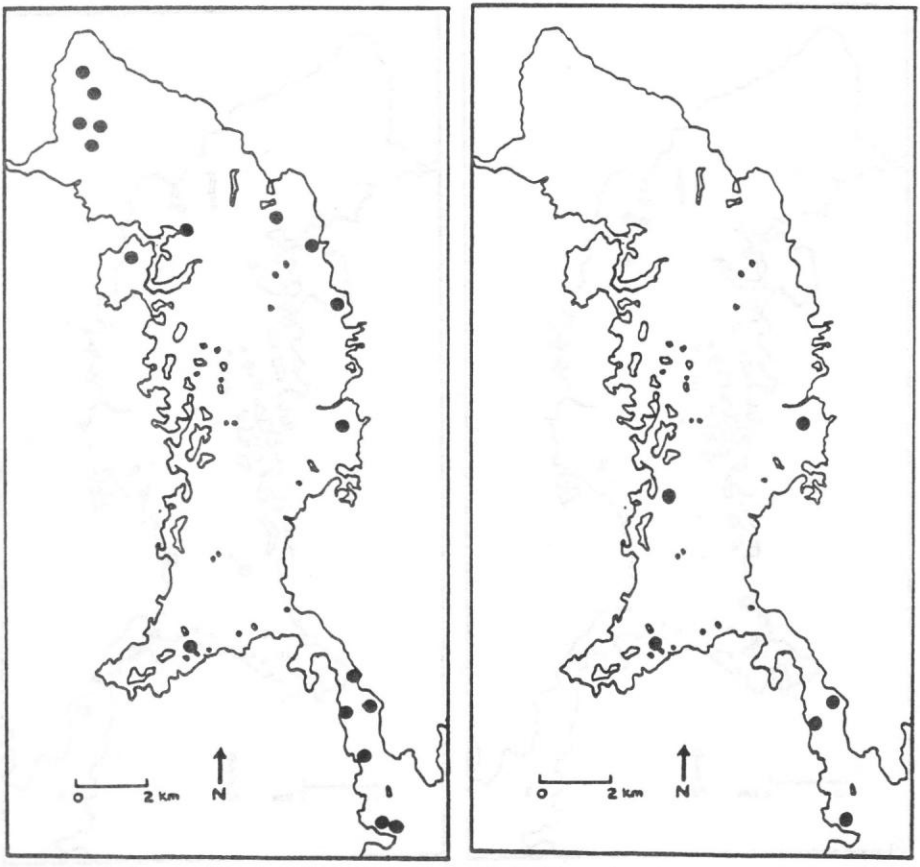


Spisula subtruncata

Ensis arcuatus

Bull. Ir. biogeog. Soc. No. 17

FIGURE 79: distribution maps of *Angulus tenuis* and *Fabulina fabula*.

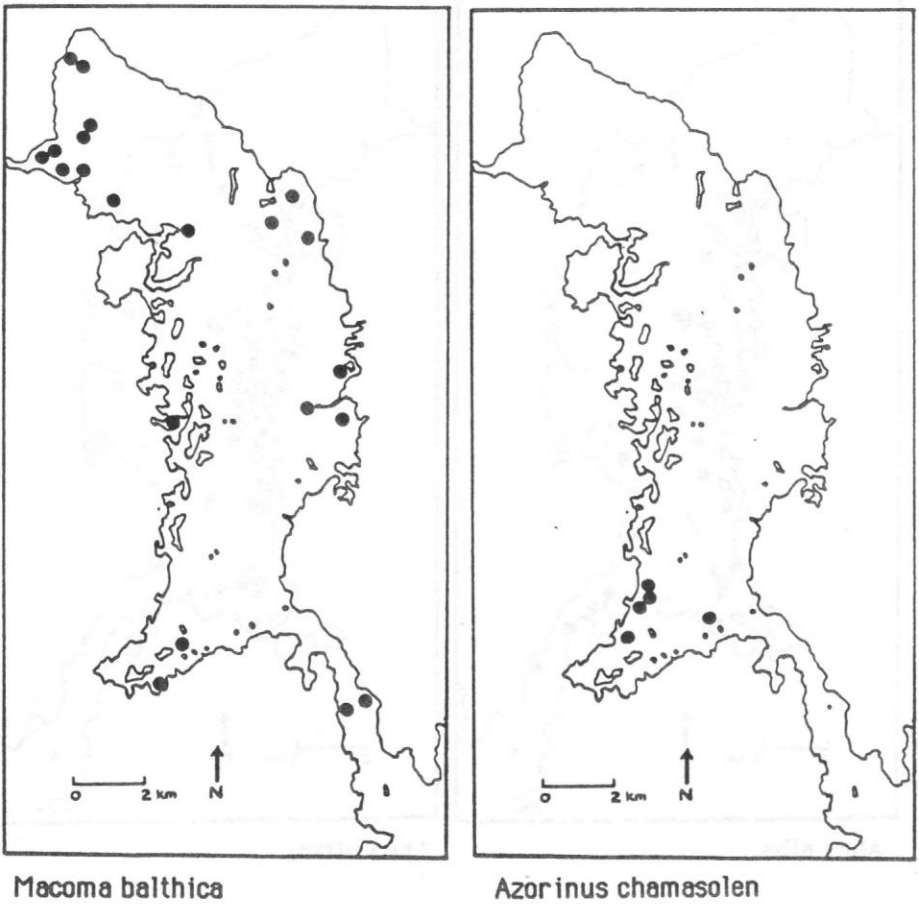


Angulus tenuis

Fabulina fabula

Bull. Ir. biogeog. Soc. No. 17

FIGURE 80: distribution maps of *Macoma balthica* and *Azorinus chamasolen*.

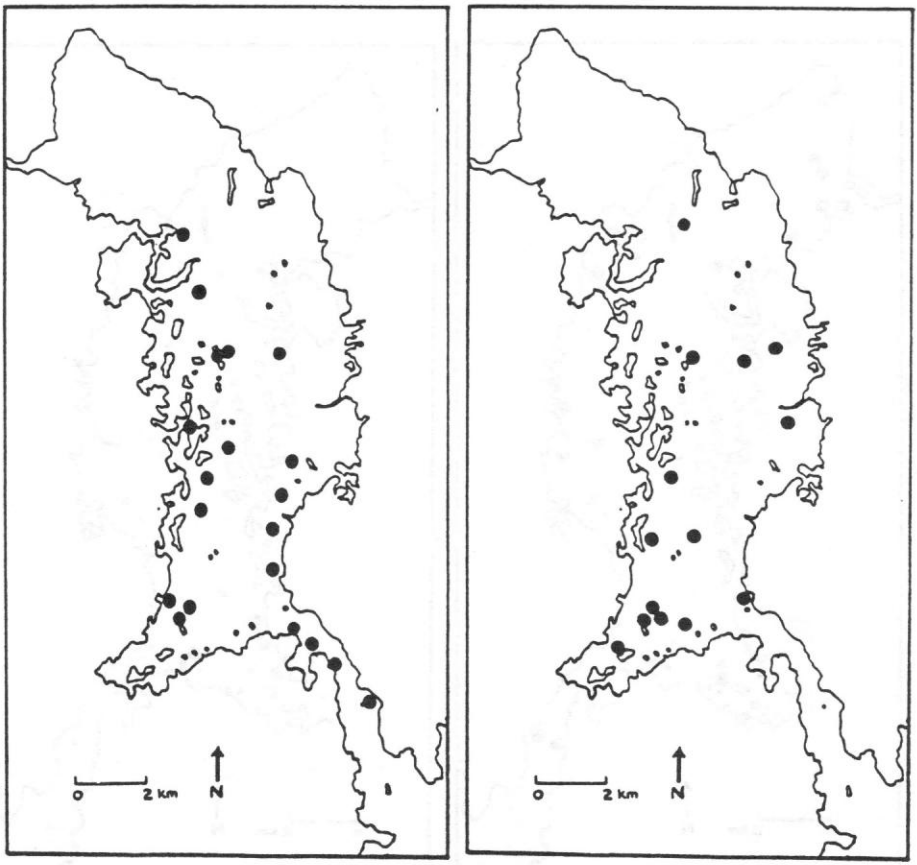


Macoma balthica

Azorinus chamasolen

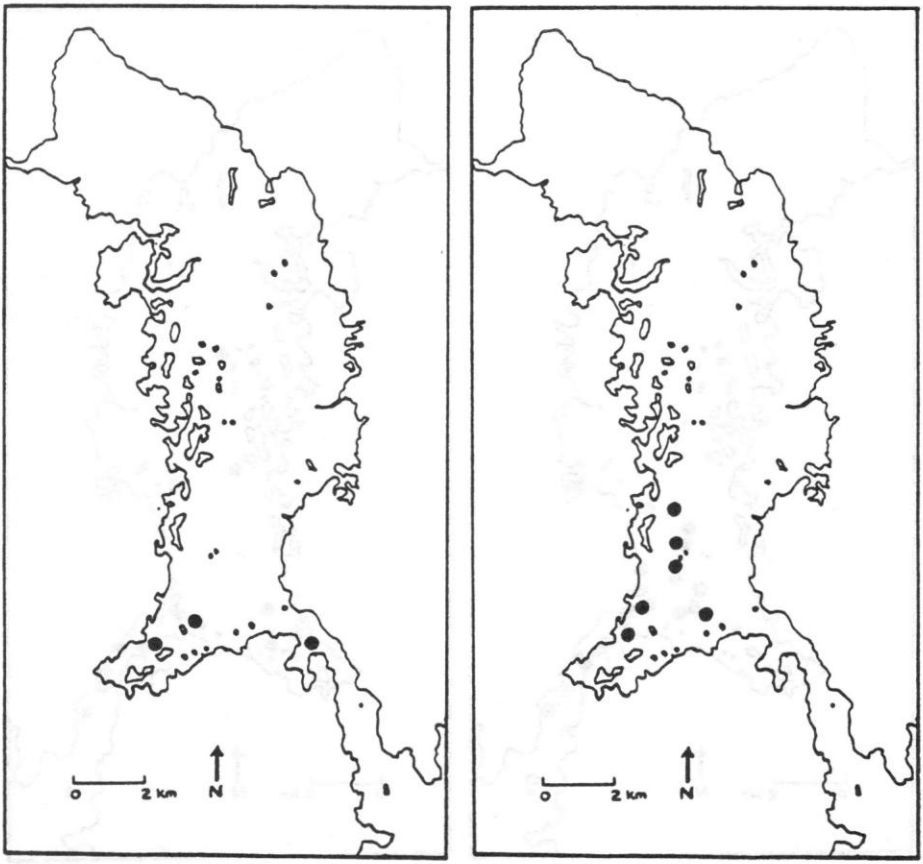
Bull. Ir. biogeog. Soc. No. 17

FIGURE 81: distribution maps of *Abra alba* and *A. nitida*.



Abra alba **Abra nitida**

FIGURE 82: distribution maps of *Abra prismatica* and *Arctica islandica*.

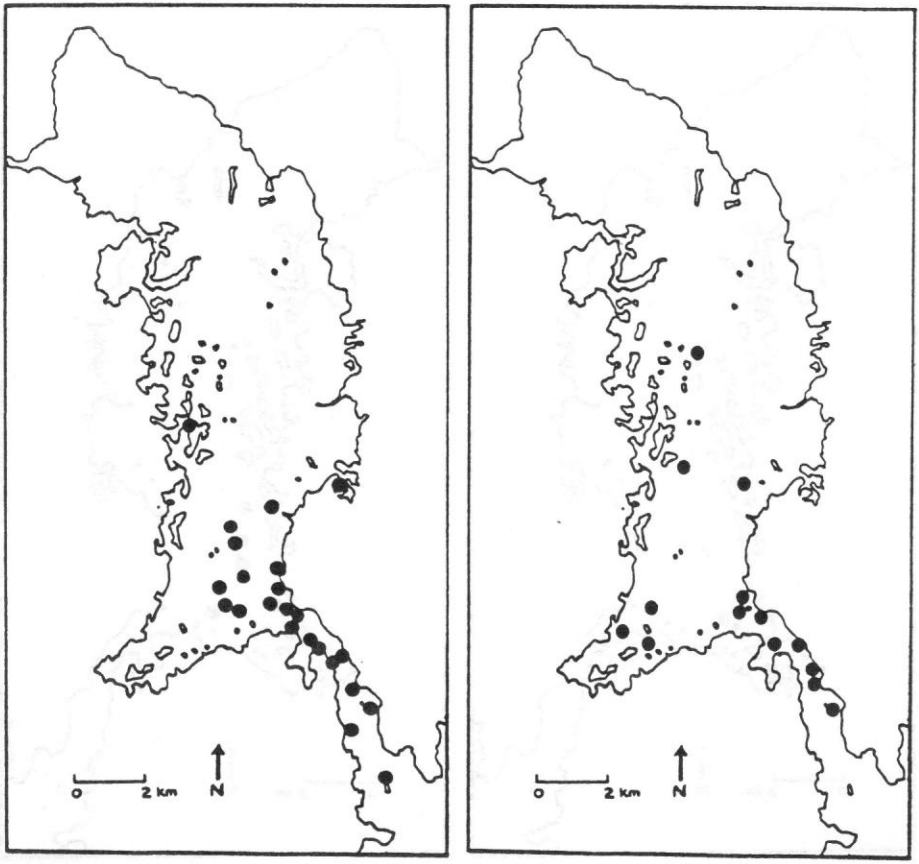


Abra prismatica

Arctica islandica

Bull. Ir. biogeog. Soc. No. 17

FIGURE 83: distribution maps of *Circomphalus casina* and *Chamelea gallina*.

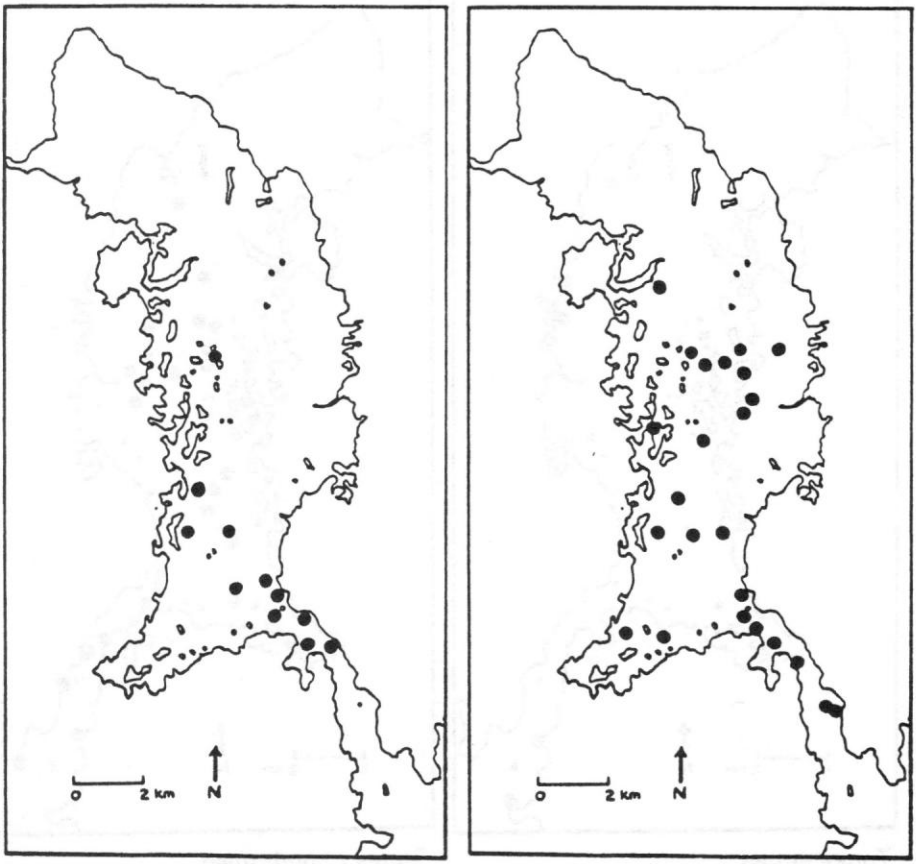


Circomphalus casina

Chamelea gallina

Bull. Ir. biogeog. Soc. No. 17

FIGURE 84: distribution maps of *Clausinella fasciata* and *Timoclea ovata*.

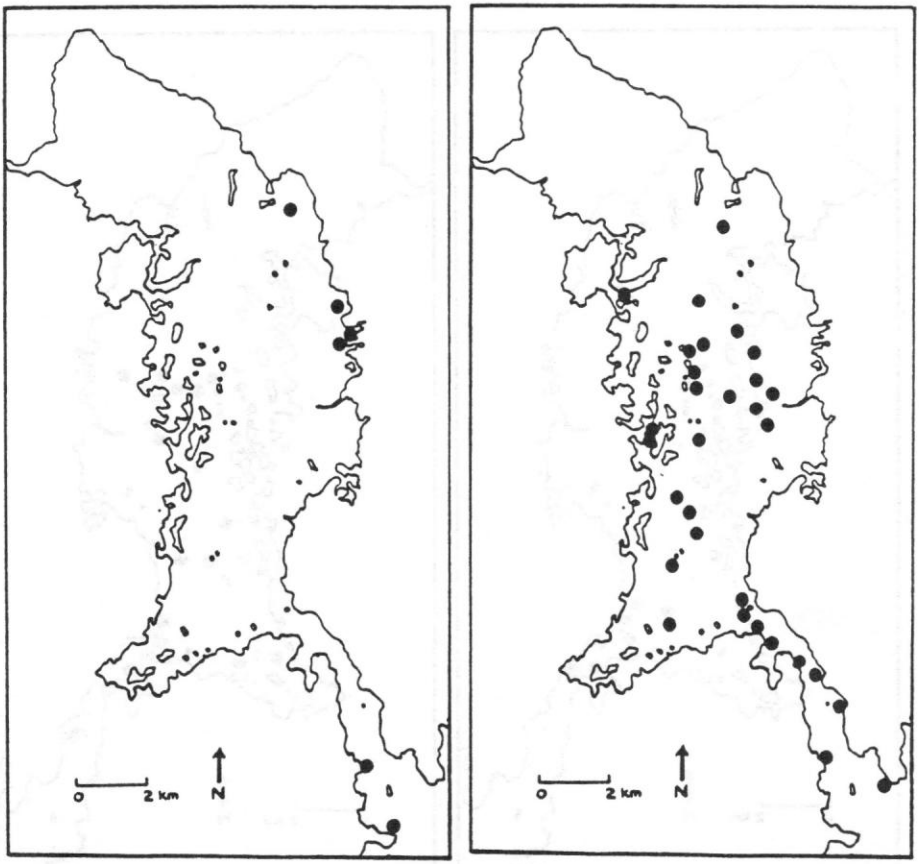


Clausinella fasciata

Timoclea ovata

Bull. Ir. biogeog. Soc. No. 17

FIGURE 85: distribution maps of *Tapes aurea* and *T. rhomboides*.

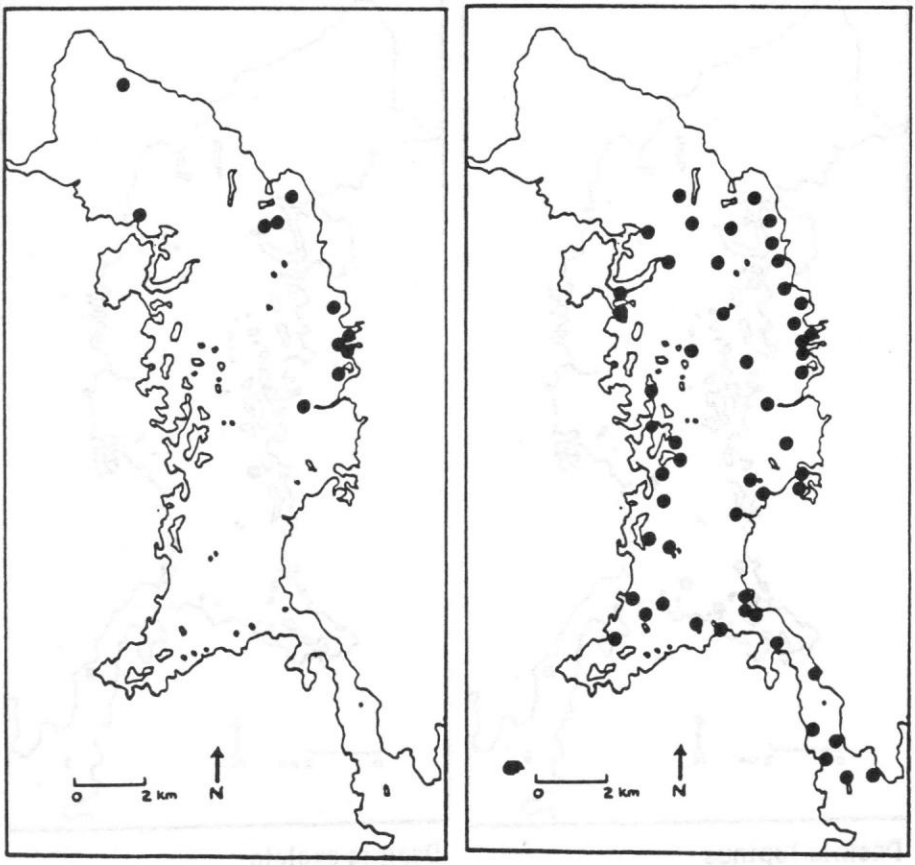


Tapes aurea

Tapes rhomboides

Bull. Ir. biogeog. Soc. No. 17

FIGURE 86: distribution maps of *Tapes decussatus* and *Venerupis senegalensis*.

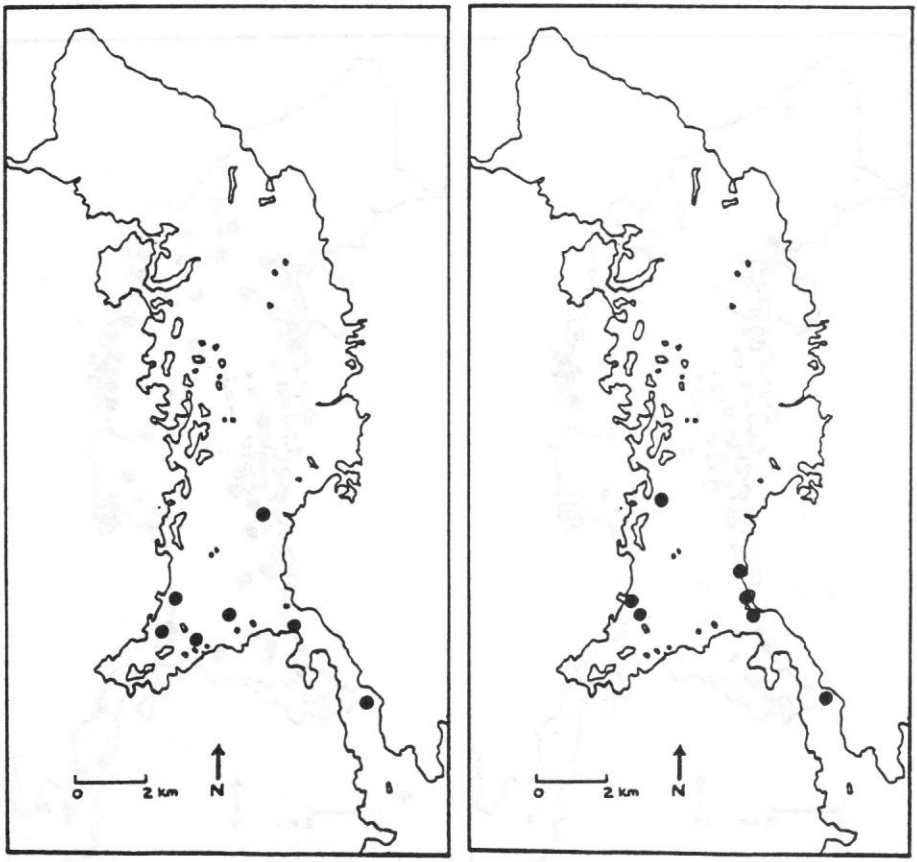


Tapes decussatus

Venerupis senegalensis

Bull. Ir. biogeog. Soc. No. 17

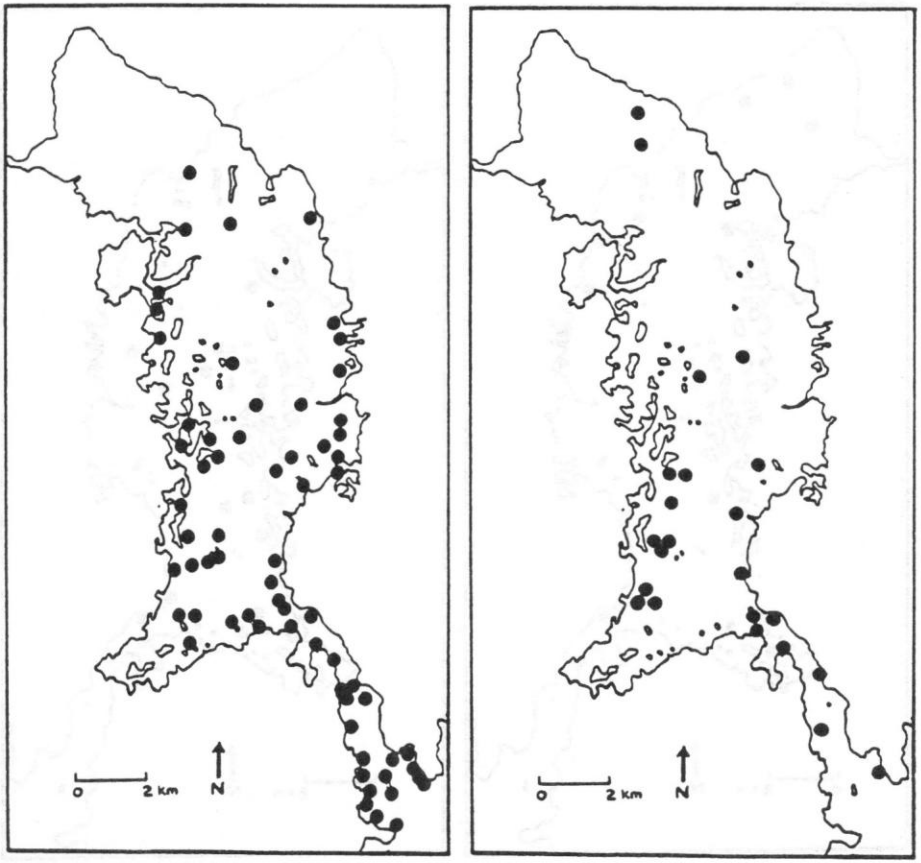
FIGURE 87: distribution maps of *Dosinia lupinus* and *D. exoleta*.



Dosinia lupinus **Dosinia exoleta**

Bull. Ir. biogeog. Soc. No. 17

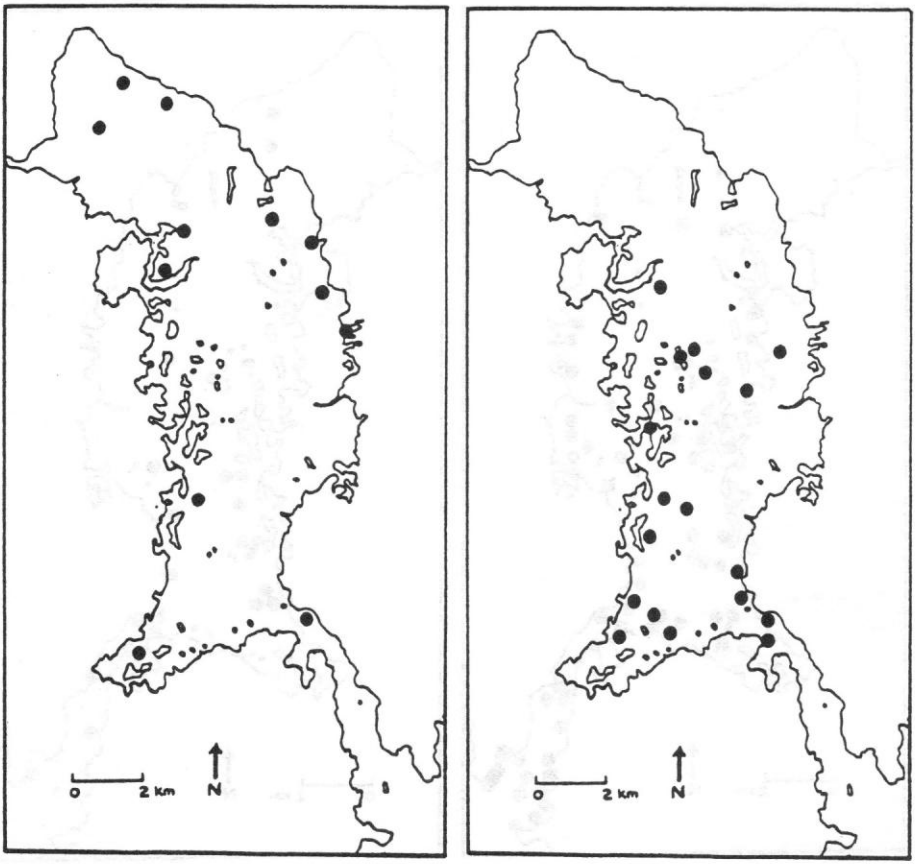
FIGURE 88: distribution maps of *Turtonia minuta* and *Mya truncata*.



Turtonia minuta

Mya truncata

FIGURE 89: distribution maps of *Mya arenaria* and *Corbula gibba*.

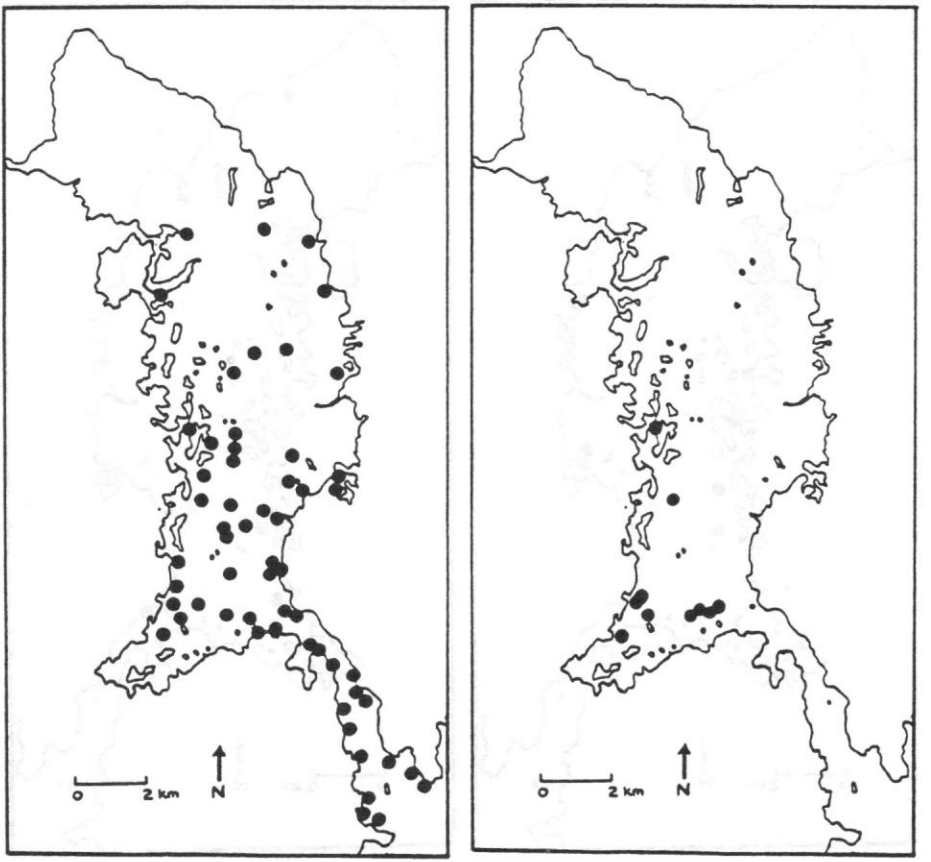


Mya arenaria

Corbula gibba

Bull. Ir. biogeog. Soc. No. 17

FIGURE 90: distribution maps of *Hiatella arctica* and *Thracia convexa*.

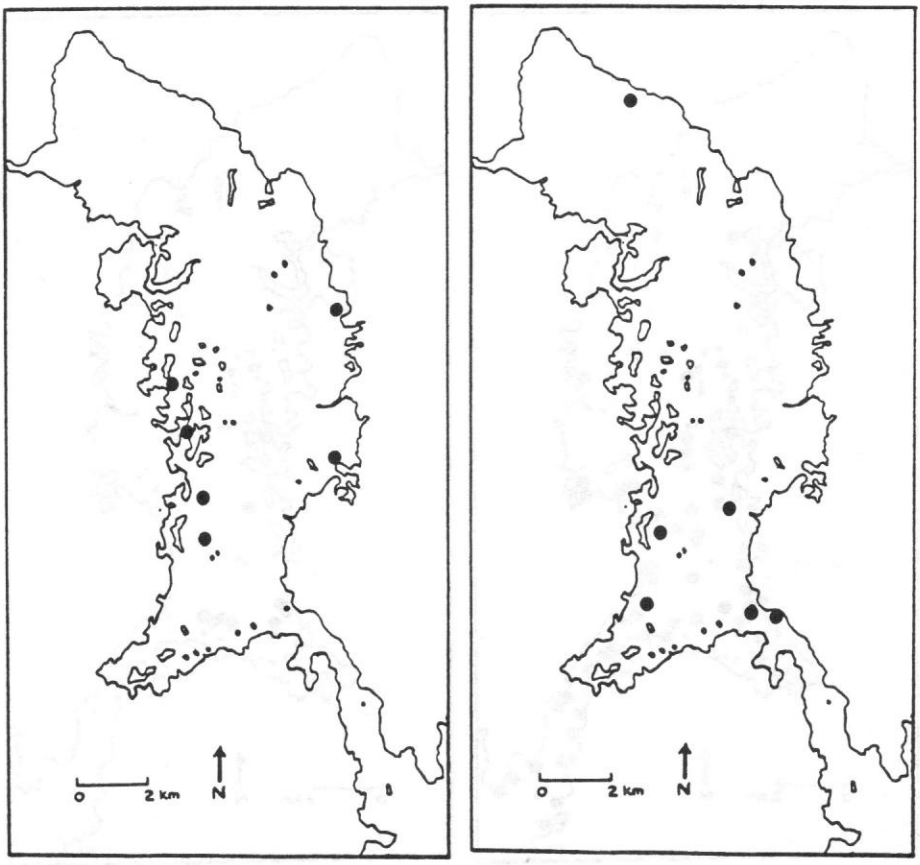


Hiatella arctica

Thracia convexa

Bull. Ir. biogeog. Soc. No. 17

FIGURE 91: distribution maps of *Sepiola atlantica* and *Eledone cirrhosa*.



Sepiola atlantica

Eledone cirrhosa

Bull. Ir. biogeog. Soc. No. 17 (1994)

AA GLOVEBOX ATLAS IRELAND. 1: 350 000, 1st edition. p.p. I-VI, 1-90. 210 x 149mm, paperback. Automobile Association, Basingstoke. December 1992. Price £3.50 UK net. Available from the AA office, Suffolk Street, Dublin 2. ISBN 0-7495-0636-9

This is a remarkable new colour Atlas, suited to the Irish biogeographer. The Irish grid is used through-out at a scale of about 5.25 miles to 1 inch [10km to 3.5cm]. This Atlas is certainly not a replacement for the essential full set of ½ inch OS maps, but in some situations clarity and lack of fine detail has distinct advantages. The AA have carefully designed their map features making this atlas a pleasure to consult.

Instructions on how to use the Irish National grid are provided and are not convoluted. Eastings are clearly printed along the lower page margin in a small inset, blue on white, using a single digit representing the 10km square. Northings on the left margin of even numbered pages are conversely coded, white on blue. On each page 10km grid squares are marked by thin blue lines and bold lines mark edges of 100km grid squares. Code letters for the relevant 100km grid square can be found on each opening. Every map page is numbered distinctly by inset bold white numbering.

An alphabetic place-name index gives four figure grid references to over 2400 towns and villages. The index entries (e.g. Cappataggle *Galway* 23 M7224, Ballytarsna *Tippry* 37 S1147) are in a format listing the county name, often abbreviated but remaining phonetically comprehensible, page number, standard 100km square code letter and a four figure grid reference with the leading 10km square numbers highlighted in bold.

For many of us with an insularly poor conception of geography of Great Britain, a 1: 1 400 000 map, with a five page town index, may be enlightening, and for those who wish to impress their

colleagues, a crisp map for learning off 10km grid references of the principal Irish towns is included. Also there is a mileage chart and some 23 Irish town plans.

The first 1: 350 000 Atlas of Ireland from the AA AutoMaps database was produced in 1987. Changes in the 1992 Atlas include improvements in quality of the binding, expanded and refined index and slightly smaller size. The map detail for very minor roads remains disappointing and, with shaded metric contours, clarity has suffered. There are a few interesting slips in the maps; e.g. on page 50 of my copy, northern Leitrim has been over-run and conquered by Donegal!

As a base map, I have found the AA Atlas a convenient notebook to annotate with Areas of Scientific Interest - Natural Heritage Area 'Blue-book' locations and for keeping progress map data on 10km square recording schemes. For casual observations of some plants or animals of interest noted while stopped 'on the road', by consulting this Atlas you can easily look up the 10km square and you can file approximate grid references for your data immediately without further ado. With a lack of map detail at the 1: 350 000 scale, for very precise work (e.g. edges of 10km squares), recourse however to an OS ½ inch map is unavoidable.

Four figure Irish National grid references in the large index put this Atlas in an altogether different league from all others. It can be used to help check for inversion errors in long lists of grid references to collection localities. I recommend it to both authors and editors for checking copy during preparation of biogeographical manuscripts and papers.

The Atlas is produced on stout paper and, with sewn binding and wipeable covers, this volume should travel and wear well. Considering the headaches grid references cause biogeographers, at

less than a fiver, this Atlas, come biogeographer's notebook, is excellent value. The AA's Glovebox Atlas of Ireland should be in your glovebox!

H. F. Fox

WILD PLANTS OF THE PHOENIX PARK by P. A. Reilly with contributions from D. L. Kelly, D. M. Synnott and J. McCullen, edited by E. C. Nelson. p.p. 1-126 with 14 colour and 13 black and white plates and maps. National Botanic Gardens, Glasnevin and Office of Public Works, Dublin. 1993. Price IR£7.50. ISBN 0-7076-0331-5

In *The flowering plants and ferns of the Phoenix Park* we are given a resume of the climate, geology and some of the edaphic factors which influence the flora. For this study, the Park has been divided into five Districts using the internal roads as boundaries. For each District, an account is given of the more interesting or prominent plants occurring at various sites/ habitats. A complete study of the flora of the Park has never been attempted before and Paddy Reilly, by means of a thorough analysis of the literature from Threlkeld's time to the present day, and by herbarium searches, has shown that a significant number of species are no longer extant. Some of this loss of diversity is attributed to drainage and change in management practice. In this context it would have been interesting to have some details of the current Phoenix Park Management Plan which is alluded to elsewhere in the publication.

In the systematic section a catalogue of the flowering plants, ferns and charophytes (one species) is given together with brief details of previous records and some recent sites found in this survey, according to District. Nomenclature follows that of the

Census catalogue of the flora of Ireland (Scannell and Synnott 1987), while the family-species sequence follows that of Webb's (1977) *An Irish flora*. Approximately 600 taxa, about half of the flora of County Dublin, are reported.

In this very interesting flora there are some discrepancies between the bibliography and the references and the District boundaries on the map do not always correspond with the text description. There are a small number of misprints or inconsistencies such as the use of *Thymus vulgaris* and *T. praecox* for the same species. In a managed area such as the Phoenix Park it would be interesting for the reader to know what criteria were used for the inclusion of species in the catalogue, where *Quercus ilex*, which is plentiful, is omitted, whereas *Q. cerris*, which is rare, is included.

The article is accompanied by some excellent colour plates which feature some well known places and a number of the flowering plants in their habitats. There are English and Latin name indices. The author is to be congratulated on the production of such a comprehensive list of species from what might be expected to be botanically a very monotonous parkland. He has also laid down a challenge to botanists through his list of species which should be found but were not encountered in this survey. Spring botanists should look out for *Erophila verna*!

The bryophytes of the Phoenix Park, which includes ten hepaticae and 87 mosses, is a very useful addition to the knowledge of this group which has been relatively neglected in Ireland. The only two previously published records from the Phoenix Park were by David Moore in 1878. The herbarium specimens referred to include a few collected by Moore and by J. P. Brunker. As might be expected, the bryophyte flora consists mainly of calcicoles or species which have a wide pH tolerance. Only three calcifuge species are noted.

Rhytidiadelphus squarrosus is found in two locations in Oldtown Wood and in the Fifteen Acres. The latter area, used as a storage site for turf during the "Emergency", provides a substrate of appropriate acidity. A new Irish record for the species *Bryum creberrimum* and three American species recently discovered for the first time in Ireland are noted. A list of species occurring in habitats such as Trees and Shrubs and on Tarmac Paths is given and the systematic inventory gives a brief resume of habitat and, in many instances, specific locations such as the "Walls of St. Mary's Hospital". This bryophyte flora will be of interest to the specialists and should also provide invaluable assistance to the beginner who might like to commence identification by focusing on a particular habitat.

In the *Landscape history of the Phoenix Park*, John McCullen gives us an overview of the history of the Park as is gleaned from the known records and reminds us of a history of human association that perhaps goes back 5000 years as indicated by the Knockmaree cist burial sites above Chapelizod Village. He brings us up to the present day through many events, including the Night of the Big Wind, the birth of the Zoological Gardens, the building of the Vice Regal Lodge (Aras an Uachtarain) and the opening up of the Park to the public by Lord Chesterfield in the 1740s, which have shaped a landscape which is so well known to Dubliners. We are reminded that in many ways there is nothing very new in the 20th century management of our affairs. Deer farming in recent years has become a significant feature of alternative agricultural enterprise. In 1623, by royal command, it was decided that a deer park for game and breeding should be enclosed in Dublin. It took forty years for action to follow! The Phoenix Park in its early years spanned the Liffey into Kilmainham. The enclosure was a slow process which involved shoddy wall construction and the bankruptcy of a builder. A committee was set up to establish the `facts'. Rezoning also occurred. Part of the Park was given as a site for

the Royal Hospital. Eventually the Solicitor General intervened and was paid and given another bite of parkland, for reconstructing a more satisfactory enclosure wall.

John McCullen shows a particular interest in the arboreal aspects of the Park and his account of the plantings of woods, plantations and avenues contains much interesting information. We discover that Lord Ardilaun donated 800 evergreen oaks to replace the large losses of trees, including elm, in the 1903 storm and we are also told of the effort to replace elms lost through Dutch Elm Disease in the 1980s.

The article has a substantial bibliography of published and unpublished sources which will direct those who seek further information. There are six appendices. Appendix I lists the extent and some of the purchase prices of the original park lands. Appendix 6 is a list of the ceremonial tree planting events, initiated by Queen Victoria (1853), up to Noel Dempsey T.D. (1993); and Appendix 5 contains a catalogue of some 130 trees in 11 named locations. A number of the more `exotic' species such as *Liriodendron tulipifera* and *Trachycarpus fortunei* are unfortunately located in areas, like the Ordnance Survey office and Áras an Uachtaráin, which are not normally open to the public.

In conclusion, this very worthwhile publication contains considerably more than the title indicates. Overall it is very worthwhile indeed and includes much interesting and valuable information which was formerly unavailable or not readily accessible. Readers will get many hours of pleasure from this book, both in the armchair and in the Park. It is hoped that the second edition will contain a comprehensive topographical index together with a large and detailed map.

References

Scannell, M. J. P. and Synnott, D. M. (1987) *Census catalogue of the flora of Ireland*. Second Edition. Stationery Office, Dublin.

Webb, D. A. (1977) *An Irish flora*. Sixth Edition. Dundalgan Press, Dundalk.

D. W. NASH

TREES OF IRELAND, NATIVE AND NATURALISED by Charles Nelson (text) and Wendy Walsh (illustrations). p.p. 1-256 with 30 colour plates. Lilliput Press, Dublin. 1993. Cloth bound IR£35 (ISBN 1-874675-24-4), paperback IR£17.99 (ISBN 1-874675-25-2)

The front of this handsome book is adorned by a fine picture of a strawberry tree (*Arbutus unedo*) - perhaps Ireland's chief claim to botanical fame - growing in the wild in Co. Kerry, and which summarises the rugged beauty of much of the remoter parts of Ireland and entices the prospective reader to venture within and explore some of the variety of trees growing in this island.

Wendy Walsh's illustrations consist of a pencil sketch of the whole tree, giving a good representation of its outline and habit, and attractive water colours of leaves, flowers and fruit, capturing the subtlety and delicacy of the texture and colours of the foliage. The Walsh-Nelson combination is now well established and this book is typical of their joint style - beautiful colour plates and readable, discursive accounts of the biology, folklore and cultivation of each species. A typical Charles Nelson touch is the frequent excerpts from Irish poets.

From the botanist's standpoint there are good clear descriptions

with succinct analyses of the distinctions between allied species, such as the two oaks or the birches, but this is not an identification manual, rather it is an appreciation in pictures and words of the diversity and beauty of Ireland's trees.

I was intrigued by one reference to white-fruited holly trees in the Dungannon area of Co. Tyrone, for a non-botanist friend described to me some years ago how he had known of a white-berried holly in an old churchyard in Cookstown but he had not appreciated its significance and by the time he had told me about it, the churchyard had been tidied up and the tree removed.

Altogether this is a splendid volume which all who love trees should acquire.

PAUL HACKNEY

Bull. Ir. biogeog. Soc. No. 17

INSTRUCTIONS TO CONTRIBUTORS

1. Manuscripts should follow the format of articles in this *Bulletin*.

2. Manuscripts should be submitted as typed copy on A4 paper, using double-spacing and 2.5cm (1 inch) margins.

3. Figures should be submitted in a size suitable for reduction to A5 without any loss of detail.

4. Records: please ensure that, when possible, the following information is incorporated in each record included in a manuscript:-
(a) latin name of organism.
(b) statement of reference work used as the source of nomenclature employed in the text. The describer's name should be also given when a zoological species is first mentioned in the text.
(c) locality details including at least a four figure Irish grid reference (e.g. N3946), county, vice-county number and some ecological data about the collection site, plus date of capture.
(d) collector's name and determiner's name (where different from collector's name), and
(e) altitude data should be included where relevant.

(5). Manuscripts should be submitted to the Editor, Dr J. P. O'Connor, at the following address:- National Museum of Ireland, Kildare Street, Dublin 2, IRELAND.

Fodhla Printing