PORCUPINE NEWSLETTER

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The present Newsletter (the ninth) heralds the beginning of the Society's fourth year, and included reports from the Leeds meeting held in October 1979, together with a brief resumé of the A.G.M. held at the Royal Scottish Museum, Edinburgh, in March 1980.

Apologies are due to contributors and members for the considerable delay in the publication of this issue, due to the Editor taking up a new post in Scotland. This has resulted in minor production problems which it is hoped will soon be resolved.

I feel is would be remiss if I did not take this opportunity to express my sincere thanks on behalf of myself and PORCUPINE to the Chairman of Tyne & Wear Museums' Committee, Councillor K. Scrimger, and to the Director of Tyne & Wear Museums, Mr J. Thompson, and his staff, for their considerable help and encouragement to our Society over the last three years. Our thanks are also due to David Heppell for generously stepping in to produce the present issue at such short notice.

The next edition of the Newsletter, i.e. Volume 1 Number 10, is envisaged as forming the completion of Volume 1, and will include an Index together with any additions and corrections to previous issues which I hope members will draw to my attention. Finally, members are reminded that all contributions should now be sent to me at my new address, Art Gallery and Museum, Kelvingrove, Glasgow G3 8AG.

Fred R. WOODWARD
Hon. Editor.

ACCOUNTS FOR THE YEAR ENDING 5 APRIL 1979

Income and Expenditure Account

Dr.	£ p		Cr. £ p
To Donations	0 - 28	By Stationery	7 - 04
Entrance Fees	9 - 00	Postage	49 - 64
Subscriptions for 1978	35 - 40	Speakers' Expenses	12 - 00
Subscriptions for 1979	144 - 40	Meetings	10 - 00
Receipts from Meetings	13 - 60	Accommodation (deposit)	80 - 00
Sale of Newsletters	4 - 20	Excess of Income over Expenditure carried to Balance Sheet	48 - 20
	£206 - 88		£206 - 88

Balance Sheet

Dr.	£ p		Cr. £ p
To Subscriptions paid in Advance	2 - 00	By Cash at Bank	912 - 42
Accommodation fees paid in Advance	226 - 70	Petty Cash in Hand	6 - 45
Balance at 6 April 1978	641 - 97		
Transferred from Income and Expenditure Account	48 - 20		
	£918 - 87		£918 - 87

Charles Pettitt, Norman A. Holme
Hon. Auditors
May 1979

David Heppell
Hon. Treasurer
20 April 1979

THE DISTRIBUTION OF NUDIBRANCH MOLLUSCS IN THE NORTH ATLANTIC OCEAN

G.H. Brown
Zoology Department, University of Bristol.

Differences in the nudibranch fauna around the British Isles were quantified using data from all available sources including personal collections and published records. There was little reason to consider the English Channel to be a significant zoogeographical barrier for the nudibranchs. Around the west of Britain, the most significant change in the nudibranch fauna occurs between the Celtic Sea and West Scotland although the English Channel to the east of the Isle of Wight has a depleted fauna similar to that of the southern North Sea. The similarity between records from the southern North Sea and Scottish coasts is greater than with the records from the English Channel.

An examination of nudibranch ranges in a broader sense reveals that there is a steady decline in species from the Mediterranean to Arctic waters. The British fauna is a composite of a large number of species also found in the Mediterranean together with a smaller cold-water faunal element. These latter species reach a southern limit around Britain or along the French Atlantic coast. The aeolid component of the cold-water fauna is dominated by the Coryphellidae (the least morphologically-adapted aeolid family) and primitive species of other families. In general, levels of evolutionary adaptation and the remoteness of distributions from tropical waters were found to be positively correlated.

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THE INTERTIDAL SURVEY UNIT

S.J.T. Knight
Scottish Marine Biological Association.

The Intertidal Survey Unit is a team of people, some working at the MBA in Plymouth and some at the Scottish Marine Biological Association in Oban, under contract to the Nature Conservancy Council. The purpose of the contract is to collect information about the intertidal region of the shores of the whole of the UK. This information includes both biological and physical data, and it is to be used to help the NCC with their conservation plans for the intertidal region. To aid in this the data are stored on a computer, using a generalised database management system called G-EXEC. The system is being run on a large computer associated with the Atomic Energy Research Establishment at Harwell, and is owned by the Science Research Council. The main features of the database management system are ease of use, compatibility between databases, large size and its range of data management and analysis options. Of interest for the purposes of phytogeography is the range of graphics hardware and software. Maps are easily produced in a variety of ways, including 36 inch wide plotter, 35mm black and white or colour slide, microfiche, 16mm film and 12 inch square photographic paper. It is possible to make computer films on either 35mm or 16mm film.

The structure of the database used by the Intertidal Survey Unit will enable maps to be constructed of distributions of species, communities, habitats or any combination of these, not only for one particular year or month, but for different years and different months. While the volume of information is not at present sufficient to make this particularly useful yet, in the future it is hoped that this database will be of great benefit to the study of phytogeography.

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LOBSTER LARVAL INVESTIGATIONS OFF THE NORTH EAST COAST OF ENGLAND

J. H. Nichols
Fisheries Laboratory, Lowestoft, NR33 OHT

Scientists from the MAFF Fisheries Laboratories at Lowestoft and Burnham on Crouch began investigating the distribution and abundance of lobster larvae off the north east coast of England in 1976, and have continued these investigations in Bridlington Bay, Yorkshire from July to September of this year (1979). These studies should greatly assist scientists engaged in managing lobster stocks around the UK coasts. They will produce information on larval distribution, abundance and mortality rate through each stage, providing a further insight into the size of lobster stocks and the recruitment of young lobsters into these stocks.

The larval development of the lobster is well known from observations made on hatchery reared specimens. They spend the first few weeks of their life as members of the plankton, during which time they moult through four development stages, each lasting one or two weeks, depending on the water temperature. At the fourth stage the larva assumes the more familiar lobster like appearance and is then believed to seek shelter on the sea bed.

Prior to 1976 little was known about the occurrence of lobster larvae around the coasts of northern Europe. Previous records are limited to isolated occurrences and are typically of a few taken with hand dip nets after observation at the surface in daylight. Most of these published records are from observations made over fifty years ago. During 1976 MAFF conducted a series of extensive plankton surveys of the distribution of the eggs and larvae of fishes, off the north east coast of England. These surveys offered an opportunity to sample specifically for lobster larvae in the inshore waters of that area. These samples, which contained a total of 133 lobster larvae, helped to identify the area where lobster larvae were most abundant and where further investigations could usefully take place.

The surveys in 1976 highlighted a sampling problem which had to be solved before quantitative surveys could begin. The sampling problem is produced by the low fecundity of the adult female (7,000 - 14,000 eggs) and the consequent low density of the larvae in the plankton. If the larvae were distributed throughout the water column then their low density would make them very difficult to sample. However, work in recent years on the closely related American lobster, has shown that the larvae of this species spend most of their time concentrated very close to the surface, allowing sampling to be confined to the top few metres. Most of the work done in Bridlington Bay this year has been an attempt to establish whether or not a similar behaviour pattern applies to the European lobster, thus enabling quantitative sampling of the larvae to be concentrated on the near surface water.

The Ministry's 46ft long research vessel NUCELLA has been used to tow twin, two metres wide, nets at the surface and at varying depth. A total of 808 lobster larvae in all four development stages were caught in the 218 hauls completed. Preliminary analysis shows that whilst in the early part of the survey (July) most of the larvae were taken close to the surface, a similar pattern did not prevail through to September. During August and September many more of the larvae were found below 2 metres including one haul of 13 larvae taken from 4.5 metres.

Preliminary analysis of these data in relation to development stage, cloud cover and total sea surface irradiance, has so far failed to provide a satisfactory explanation for the apparent behavioural differences found during the course of these surveys.

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FIELD OBSERVATIONS ON THE SETTLEMENT OF SOME MARINE PROSOBRANCH GASTROPODS

Dr. Vera Fretter, University of Reading.

About two thirds of the members of the order Mesogastropoda have a planktonic veliger larva. The bilobed head fold, the velum, is delicately adjustable, and the action of the cilia fringing the margin directs the larva upwards through the water column and, at the same time, collaborates with cilia of the underlying food groove in collecting food particles. When the velum is withdrawn the larva sinks. Veligers of all ages are found at all depths in coastal waters (Fretter & Shale, 1973); their shell height is a fraction of a millimetre, so they are at the mercy of tidal currents. During this planktonic developmental stage the shell height may be doubled and attain about a millimetre in some of the larger veligers (e.g. Nassarius, Mangelia). A high percentage of older veligers of all species is found at greater depths: the foot has attained the adult organization and mobility, and, in addition, it has special glands related to settlement (Fretter, 1972) and metamorphosis. The precise timing of metamorphosis must be determined by a correct set of environmental conditions acting upon the correct physiological state of the larva. Metamorphic changes involve the attainment of a secure stance, the loss of the velum and the siting of the odontophore, which has been developing during larval life, in the finite position, also in limpet-like forms the loss of the operculum. These changes occur almost simultaneously and their speed is the hallmark of success.

Simulation of the complexities of a natural environment in the laboratory can only be approximate and whenever possible observations on the settlement of veligers in the field are of greater value. Such observations have been relatively easy for Littorina neritoides since in the sites that have been studied large numbers settle in a localized area, filling crystal pits of exposed quartz rock above MHWN and appearing conspicuous on account of the semitransparent, chestnut brown shell (Fretter & Manly, 1977). The smallest snail collected from the pits has a shell height of 0.37mm. and a diameter 4.0mm., which are the dimensions of the largest veligers. At this stage growth at the shell lip is negligible as compared with radial enlargement of the whorls which secures the snail in the crystal pit; here it rasps algal growths from the walls. Increase in size of the visceral coils of the shell is made possible by the flexibility of the fibres of the shell matrix prior to complete calcification, when the shell becomes opaque; it has been observed in veliger stages of other species (Fretter & Pilkington, 1971). On the rocks which were studied over a period of 5 years settlement from the plankton was confined with rare exceptions, to a limited lower area of the vertical seaward faces, whereas higher up, where older snails were abundant, the physical conditions appeared equally favourable for settlement. This suggests that settlement and metamorphosis are a response to some epecific factors which may include a biotic attractant, perhaps the microflora, about which we have only scanty knowledge. Search for stranded veligers on these rocks was unsuccessful, indicating that older veligers hurled by the tide into the confines of crystal pits secure a grip and metamorphose immediately, presumably as a result of thigmotactic and biotic responses, whereas younger veligers withdraw into the shell and are washed back into the tidal flow.

Veligers of gastropods living in the intertidal zone may be carried away from the areas appropriate for settlement. They continue to feed and grow and may be collected in offshore plankton at a time when the seasonal settlement period for the species is past (Fretter & Shale, 1973). Thus veligers of Lacuna vincta with shell height of 0.82mm. have been collected at the Plymouth International Station L3 in October, whereas in inshore waters they no longer occurred after mid July and the recently metamorphosed individuals had a shell height of 0.55mm.

There is evidence that a momentary shelter from the tidal current is an advantage to the veligers of other species in allowing opportunity for the selection of a settlement site. Some prosobranchs favour weed-covered rocks between MHWS and EIWS and of these 3 have been studied in the Plymouth area - Lacuna vincta and Tricolia pullus, which feed on diatoms and detritus on the surface of algae and also the epidermal tissues, and Cerithiopsis tuberculoris which feeds on the sponges Halichondria spp. and Hymeniacidon perleve and is found creeping over weeds associated with these. In the sites that were studied 25 species of alga occurred, Lacuna of various ages were found on 11, Tricolia on 8 of the same species and Cerithiopsis on 5. Lomentaria articulata had the highest density of these three snails. This alga, together with other rhodophyceans which were favoured by the snails, form turf-like coverings over the rocks, their branched, semi-rigid fronds providing large surface areas for the growth of epiphytic algae and the entrapment of diatoms and sediment from the tide. The veligers settle from the plankton on fronds and basal areas of the algae, particularly algal mats which will entangle the larvae and give them greater protection as young snails. The surface selected must have the required rigidity for maintaining a firm grip given by secretion from the pedal gland and must provide the food that the young snail takes almost immediately. Thus it may be assumed that as in Littorina neritoides thigmotactic and chemotactic responses initiate settlement. Cerithiopsis must be affected by an attractant related to its sponge food since no recently-settled individuals have been collected from weed far from the surface of a sponge. Many larvae of Lacuna and Tricolia settle in the vicinity of adults and it may be that some attractant, such as mucous trails, is provided by their exudates (Wells & Buckley, 1972).

Observations on species living sublittorally on soft substrata have been made by examining samples taken with the Ockelmann detritus sledge (Ockelmann, 1964) with a net mesh of 160 µm, at 11 stations outside Plymouth Sound. The results are necessarily less informative, but are of value in relating settlement areas to the adult populations. The shallowest station was at the entrance to the Sound (30m) and the deepest 9 miles south of Rame Head (66m). The stations fall into 3 categories according to the physical nature of the substratum and the organic content of the soil: the poorly-sorted sediments with highest organic content (1.2 - 0.5%), moderately well-sorted sandy/shell gravels with reduced organic content (0.23 - 0.06%) and poorly-sorted coarse shell gravels with the lowest organic content (0.17 - 0.09%). No prosobranchs were collected from the last of these. The first, comprising 3 stations nearest to land, was favoured by the sedentary filter-feeder Turritella communis, and the second, comprising the 5 stations of greatest depth in the vicinity of the Eddystone, was favoured by 2 rissoides, Alvania punctura and Rissoa inconspicua of modal shell height 3mm. The modal particle size at the sites at which the rissoides were most frequently collected was 125 - 500 µm.: the shell height of the veligers at settlement was under 500 µm. There is copious secretion provided by the pedal glands of the veligers and it may be that, as Sigurdsson (personal communication) has found for bivalves, this forms guy-ropes over the surface of the soft substratum which can be used in search of a suitable settlement site. The smallest snails, with shell dimensions similar to those of the largest veligers, were consistently found with the adults indicating that settlement is selective. Veligers of Turritella were scarce, contrasting with the sedentary, gregarious adults. Their scarcity on this and other occasions, together with the ineffectiveness of the velum as a swimming organ and the relatively small size of the shell at metamorphosis, suggests that pelagic life is short. (Lebour, 1933; Thorson, 1946). In contrast to other prosobranchs, a recently-settled Turritella may be collected from the plankton indicating that it may be easily dislodged and that there is an unusually high mortality rate at this age. Although snails of the smallest size were with the aggregations of adults there was evidence that they were dispersed over a wider area in the same habitat.

Whatever stimuli initiate settlement it is the presence of an established population of snails of the same species which is of supreme importance for any successful prosobranch, especially those with limited powers of locomotion due to small size, such as rissoids, or with loss of mobility due to specialized pedal structure as turritellids, for all must meet a partner for mating.

REFERENCES

Fretter, V, 1972. Metamorphic changes in the velar musculature, head and shell of some prosobranch veligers. Journal of the Marine Biological Association of the U.K., 52, 161-77.

Fretter, V. & Pilkington, M. C., 1971. The larval shell of some prosobranch gastropods. Journal of the Marine Biological Association of the U.K., 51, 49-62.

Fretter, V. & Shale, D., 1973. Seasonal changes in population density and vertical distribution of prosobranch veligers in offshore plankton at Plymouth. Journal of the Marine Biological Association of the U.K., 53, 471-92.

Fretter, V. & Manly, R., 1977. Algal Associations of Tricolia pullus, Lacuna vincta and Cerithiopsis tubercularis (Gastropoda) with special reference to the settlement of their larvae. Journal of the Marine Biological Association of the U.K., 57, 999-1017.

Fretter, V. & Manly, R., 1977. The settlement and early benthic life of Littorina neritoides (L) at Wembury, S. Devon. Journal of Molluscan Studies, 43, 255-62.

Fretter, V. & Manly, R., 1979. Observations on the biology of some sublittoral prosobranchs. Journal of Molluscan Studies (in press).

Lebour, M. V., 1933. The eggs and larvae of Turritella communis Lamarck, and Aporrhais pes-pelicani (L). Journal of the Marine Biological Association of the U.K., 18, 507-10.

Ockelmann, K. W., 1964. An improved detritus sledge for collecting meiobenthos. Ophelia, 1, 81-91.

Thorson, G., 1946. Reproduction and larval development of Danish marine invertebrates. Meddelelser fra Kommissionen for Danmarks Fiskeri-og Havundersøgelser, ser. Plankton, 4, 1-523.

Wells, M. J. & Buckley, S. K. L., 1972. Snails and trails. Animal Behaviour, 20, 345-55.

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THE UNDERWATER CONSERVATION SOCIETY

An inaugural meeting of the Underwater Conservation Society was held on November 2nd, 3rd and 4th 1979, in Manchester, which proved to be a resounding success.

Response to the projects has been very encouraging and a number of very interesting discoveries have been made during the season. The anemone Prothanthia simplex - only discovered to occur around U.K. last year, has now been described and photographed by no less than five independent divers. Similarly a large sea slug Adalaria loreni previously only known from one specimen from S. W. Ireland in the 1800's was found during the Kerrera expedition. A number of the projects have'evolved' signigicantly during the season, the original habitat scheme has been split into a site register project along the lines of the BS-AC wreck register and a biological habitat recording form. A breakthrough on studies with single species has been made with the introduction of observation scheme style record cards, with the addition of an abundance scale (Sea urchin project) and timed search (Spider crab project) sections. This

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has meant that individuals, not just groups, can participate and this provides a suitable 'lead in' to more intensive studies of morphometrics or depth distributions at sites where the species are found in adequate numbers.

The one week Millport course proved to be a great success with 16 people in attendance - an outcome very much due to the superb facilities and great help provided by the station staff. The expedition to Kerrera and Orkney involved 21 divers and were both highly successful. Currently an expedition has just been completed on Skomer to look at the effects of scallop dredging and the scallop population around the island.

Plans are well under way for the production of a comprehensive mini print guide to the British Anthozoa (anemones, corals, sea fans and sea pens). This guide will be based along the lines of the Species Recording Scheme set with a full text to support the 80+ photographs, and is being prepared by Dick Manuel. Available now is an audio visual set of slides which the World Wildlife Fund have produced in conjunction with U.C.S. The set contains 40 slides taken by the very talented underwater photographer Jim Greenfield, accompanied by an illustrated text written by Bob Earll. The set is intended as an educational aid and sets out to outline a number of the major relationships between sublittoral marine life and the environment. (Cost £8 to U.C.S. members, £10 to non U.C.S. members). Photographs of the remaining 40+ species of nudibranch not covered in the original mini-print set are now being assembled and a mini-print set and text will be available during the Autumn (1979).

Anyone needing further information on U.C.S., any of these projects or production, should contact Bob Earll, U.C.S., C/O: Zoology Department, University of Manchester, Oxford Road, Manchester, M13 9PL. Tel. 061 273 7121, Ext. 5501.

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BRIEF ABSTRACT FROM PORCUPINE MEETING: FUNCTIONAL & ANATOMICAL DEVELOPMENT OF OLFACTION IN THE LARVAL HERRING

Dr. C. Dempsey, C.E.G.B., Fawley.

A brief unpublished description of the physical development of the paired olfactory organ in herring from hatching to the juvenile stage, was given. Published quantitative results of responses of larvae to feeding and social cues in activity chambers were linked to this, but changes in response were shown to be related to diet changes, rather than physical changes. Unpublished experiments following larval movements in odour gradients were presented showing that responses were not simple taxes shown by some invertebrates and previously suggested for adult fish. A process of arousal of the forebrain was proposed as the result of receipt of the stimulus, requiring secondary, probably visual reinforcement.

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BRIEF ABSTRACT FROM PORCUPINE MEETING: LABORATORY EGG AND LARVAL DEVELOPMENT STUDIES IN NORTH SEA COD (Gadus morhua L.)

Dr. Brenda M. Thompson, Fisheries Laboratory, Lowestoft.

A series of 5 development stages of cod eggs from fertilization to hatching have been described. The duration of each of these stages decreases with increasing temperature; over the temperature range 1.70°C to 11.59°C. A linear relationship exists between the natural log of the stage durations and the experimental temperatures. Using regressions of these data the duration of any stage at any required temperature can be calculated.

The development rate of cod larvae was described at 6.5°C and a series of developmental stages defined.

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The data obtained on stage durations can be used in conjunction with field data to convert estimates of egg and larval abundance to rates of production of eggs and larvae.

In this way daily production of eggs and larvae over the whole spawning season can be calculated and an estimate of the number of spawning females obtained.

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MARINE MOLLUSCA OF WEST SCOTLAND

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Shelagh M. Smith
Royal Scottish Museum, Chambers Street, Edinburgh

During 1976 we started an experimental project to map the marine Mollusca of East Scotland, using the grid based on 6' of latitude by 12' of longitude (McKay & Smith, 1977), which has now been published as a check list and atlas (McKay & Smith, 1979). Having proved that manual processing of large amounts of data to produce maps was practical, we have begun a similar project for the marine Mollusca of West Scotland, and plan to accomplish this in five years. The area covered, shown in Fig.1, extends from 58°30'N to 55°00'W and from the mainland westwards to 09°24'W.

We have compiled from our own records, some records from friends, a few from the Marine Census of the Conchological Society of Great Britain and Ireland, and data we have so far found in the literature, the beginnings of the atlas. In Fig.1 we indicate the localities in which we consider that the recording effort to date (chiefly littoral) while not at the standard obtained for the East of Scotland may have, of necessity for a more remote region, to be regarded as adequate for a provisional atlas. It is evident that much of the coastal area is fairly well covered with the main exceptions being the Inner Hebrides, especially Skye and Mull, and the coast of Strathclyde. The recording situation in Ireland is not at present known, except that we personally have very few records. With the exceptions of two rectangles in the North Minch, two in the Sound of Jura and in some sea lochs, our information for offshore is very limited. Although the immediate sublittoral fauna is rich we have few diving records except for the Summer Isles and near Oban.

We would very much appreciate help with this project and therefore ask that anyone who has or knows of information of samples from the study area should contact us as soon as possible. We will gladly suggest localities to people planning to visit the region. All data made available will be treated in confidence and will only be published on the basis of the 6' x 12' rectangles, except perhaps for records of rare species quoted individually in the text. All contributors will be acknowledged. Samples sent to us will be analysed and returned if required. We will investigate any material taken offshore and littoral specimens particularly if live-caught or of historical importance. From experience we find that shellsand from the strandline takes up research time often out of all proportion to its usefulness and therefore we would prefer material from this source to be at least partly pre-sorted by the sender. We regret that we cannot undertake detailed separation of sample material but we will on request return named samples of species found in the samples together with complete qualitative species lists. In order to produce a work of as high standard as possible we would prefer that identifications are checked by us personally or by an authority on the group(s) concerned. We would

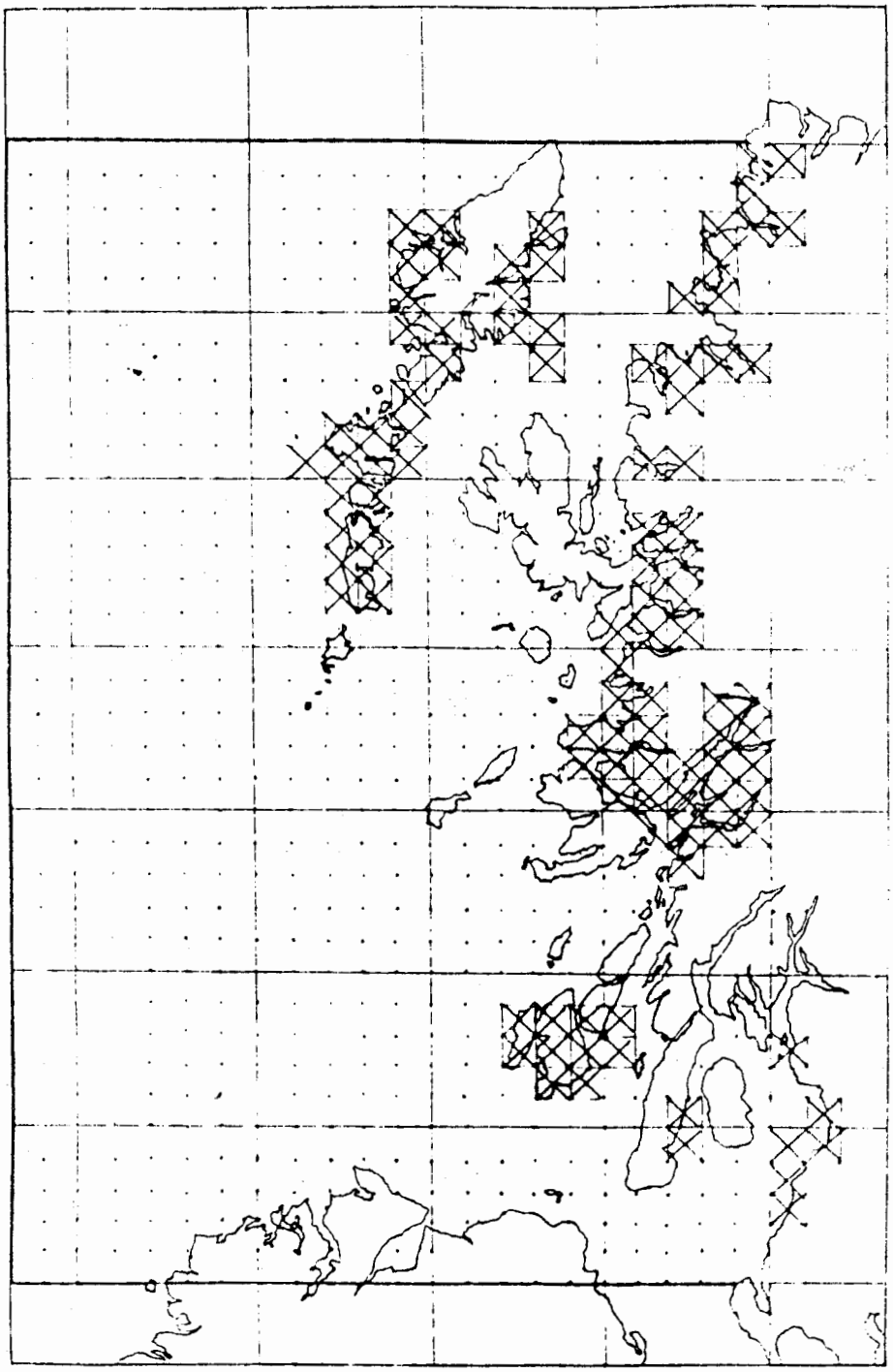

Fig 1. Map showing area covered by project on the marine Mollusca of West Scotland.
Rectangles crossed out are moderately well worked.

appreciate donation of material supporting records for this project, which would be lodged in the Royal Scottish Museum as part of its voucher collection.

References:

McKay, D.W. & Smith, S.M., 1977. Marine mollusc recording: a proposal for a unified grid system of recording. Porcupine Newsletter 1: 17-19.
----- & -----, 1979. Marine Mollusca of East Scotland. Edinburgh: Royal Scottish Museum.

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COLLECTIONS OF MATERIAL FROM THE DREDGING EXPEDITIONS OF HMS 'PORCUPINE' IN N.E.ENGLAND

Peter Davis
Keeper of Natural Sciences, Sunderland Museum

Edward Killwick Calver (1813-1892) was in charge of the Royal Navy Hydrographic Department's survey of the north and east coasts of England and Scotland from 1847 to 1872 during which time he produced charts of nearly the whole of the eastern coasts. He lived in Sunderland (at 16 Roker Terrace) from 1858-1874, being appointed as Staff Commander of the surveying vessel HMS 'Porcupine' on 8th August 1863. His principal achievements were in surveying and his observations on the improvement of tidal harbours and estuaries, yet there can be no doubt that his expertise during the Porcupine voyages of 1869 and 1870 contributed greatly to the success of these exploratory deep sea dredgings. Calver's ability with the dredge, and his innovation of the 'hempen tangles' (teased out hemp attached to the dredge bag which picked up many invertebrates missed by the dredge itself), coupled with an obvious sympathy for the biological objectives of the voyage made him a much respected member of the expedition - indeed Wyville Thomson (1874) mentions his contribution on a number of occasions.

During his years in Sunderland Calver became a much respected member of the community - 'the name of Captain Calver was as familiar as any household word in Sunderland, and the gallant officer himself was a conspicuous figure in the public life of the town' (Anon, 1894) - not only for his surveying work, but for that of a philanthropic character, notably his efforts in raising subscriptions for the Workmans Hall at Monkwearmouth, Sunderland.

Nor surprisingly, his movements were followed with interest by the local press, including the departure of HMS 'Porcupine' from Sunderland on 8th April 1869, and the return on 25th April, 1870. Following his return from the 'Mediterranean' voyage of the 'Porcupine' in October 1870 Calver gave a public lecture (30th October) on 'The Wonders of the Great Deep'. This obviously aroused considerable interest, and an account of the lecture, supplemented by information from the preliminary expedition reports, made front page news in the Sunderland Times (12th November 1870).

This public interest may have spurred Calver to donate his collections from the voyage to Sunderland Museum (the latter had been established as one of the first local authority museums in 1846 when the Sunderland Corporation took charge of the collections of the Sunderland Natural History & Antiquarian Society (established 1836). Unfortunately no record exists in the Museum accession registers of Captain Calver's donation and consequently there is no list of the number or identification of specimens received or when they were received. However, the collection was on

display at the opening of the present Museum building in 1879 - 'between the windows are a series of handsomely glazed cases, beautifully adapted for interesting specialities in natural history. The centre case of this series placed in the middle of the east wall contains the results of Captain Calver's celebrated Porcupine Expedition. These are arranged for the purpose of showing the different forms of life found in the ocean to the depth of 2,000 fathoms'. (Sunderland Daily Echo, Thursday 6th November 1879). Further reference to the collection is made in the Sunderland Library Circular (1910).

The collection as it now exists (1979) is perhaps the remnants of a much more extensive one. It consists of 72 lots of specimens, the majority of which are stored in glass-topped pill boxes, and complete (in most cases) with full data. The majority are foraminiferal oozes (36 lots), the Mollusca (13), echinoderms (8), corals (5) and Crustacea (4) being less well represented.* Very few of the specimens had been identified, although it is hoped that this situation can be remedied in the near future. In searching through the collections for this material, a number of specimens were found which could have been part of the Calver collection, but which have lost data following exhibition, perhaps an indication of a larger initial donation.

Not all the 'Porcupine' material came direct from Calver to the Museum. On 17th January 1907 the Edward Backhouse collection (some 20,000 natural history specimens) was presented to Sunderland Museum by the Trustees of Mrs K. Backhouse. Edward Backhouse (1808-1879), a less well known member of a distinguished family of naturalists, had the time and money (the Backhouse Bank was established in Sunderland in 1816) to indulge his passion for natural history. It is not known if Calver and Backhouse were close acquaintances, but their philanthropic interests must have brought them together. Whatever the relationship, a number of specimens from the Backhouse collection, mounted in typical fashion on glass plates, feature Edward Backhouse handwriting stating 'The gift of Captain Calver R.N.' and 'from the voyage of the Porcupine 1869'.

The history of the 'Porcupine' material at the Hancock Museum in Newcastle upon Tyne is less well known. An entry in the Accession Register for 1903 reads: 'Acc. 2/03. Davison, C. A collection of Foraminifera, chiefly mounted as microslides, and a large series of samples of Foraminiferal oozes from the Porcupine dredgings (1869). Formerly belonged to donor's father, 7.1.03'. A written label accompanying part of the collection reads 'small packages containing dredgings from the Atlantic by HMS Porcupine during the summer of 1869. See Chapter 3, p.82 of The Depths of the Sea by Prof. C. Wyville Thomson. Chas. Davison Coll.'. Initial research into the identity of Charles Davison (or Davidson) has proved fruitless, although it must be suspected that his father is the Davidson mentioned as being an officer on the 'Porcupine' (p.83 of Depths of the Sea). A search of naval records held at the Public Records Office, Kew, is planned which may reveal more about the collector.

The Davison Collection has been found to be an extensive one,* stored in three main lots. These are i) a collection of 133 microscope slides, mainly of Foraminifera, many of which have lost the specimens formerly associated with them, ii) 45 packages (re-stored in polythene tubing) of foraminiferal oozes, and iii) 153 lots of specimens, principally bottom deposits, stored in an assortment of pill boxes, glass jars and glass vials. As with the Calver collection, the majority of specimens have full associated data, including exact position, depth and bottom temperature. The handwriting on the Davison and Calver collections is comparable in certain instances.

* Complete lists of the specimens, with associated data, are available from the author.

Although the survival of the material from the 'Porcupine' expeditions in the north east of England is notable, it is of some concern that for 110 years the collections have remained un-worked and un-noticed.

References:

Anon, 1894. Captain Calver. Dodd's Almanac. Sunderland.
Anon, 1910. Ref. to Calver, p.386. The Sunderland Library Circular.
Dawson, L.S., 1855. Memoirs of Hydrography. Eastbourne.
Thomson, C. Wyville, 1874. The Depths of the Sea. MacMillan.

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3rd SCALLOP WORKSHOP

The 3rd Scallop Workshop meeting will be held at Port Erin, Isle of Man, from 13 - 16 May 1980. Scallop Workshop meetings take place every two years and aim to bring together as many people as possible who are interested in research on scallops. Previous meetings have been held at Baltimore, Ireland (1976) and Brest, France (1978).

Contributions are invited on any aspect of the ecology, behaviour and physiology of scallop species. A programme of papers and discussions will be arranged, and during the meeting there will be visits to local fishing boats and shellfish processing factories, and it may be possible to arrange aqualung diving for anyone interested.

Further details are obtainable from: Dr A.R. Brand, Department of Marine Biology, University of Liverpool, Port Erin, Isle of Man, U.K.

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THE CRUSTACEAN SOCIETY

A formal society to serve as a focal point for studies on all aspects of crustacean biology has been established. One of the Society's goals will be the prompt publication of members' shorter manuscripts on any aspect of crustacean biology. The Society's journal will begin publication in 1981. Membership of the Society is open to anyone interested in Crustacea. There are no prerequisites. Those interested in joining the Society should write to: The Crustacean Society, c/o R.B. Manning, IZ-NHB-W323, Smithsonian Institution, Washington, D.C. 20560, U.S.A.

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PORCUPINE MEETING AT EDINBURGH, 1 - 2 MARCH 1980

This 9th Meeting of PORCUPINE attracted the usual numbers (38) and early fears that difficulties in getting speakers might cause problems were not realised. Support, in the form of last-minute contributions, and faith that the programme would be interesting and enjoyable, showed the strength of PORCUPINE. There was a varied programme, the bias towards Mollusca was fortuitous and not a reflection on the interests of the organisers. The theme "Predation and Survival" (12 papers) was loosely adhered to, and talks generated animated and useful discussion. The social aims of PORCUPINE - to provide facilities for informal discussion - were realised in a buffet supper held in the University of Edinburgh Staff Club.

Shelagh M. Smith

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PORCUPINE ANNUAL GENERAL MEETING, 2 MARCH 1980

PORCUPINE Office Bearers

The following have been elected / re-elected:

Hon. Secretary	Shelagh Smith
Hon. Treasurer	David Heppell
Hon. Editor	Fred R Woodward
Hon. Records Convener	Bob Earll

Bob Earll, through his activities with the Underwater Association and the Underwater Conservation Society is in close contact with many people, particularly divers, who are being encouraged and trained to observe and collect data on the marine environment, especially as regards recording the presence and habitat of species. It is hoped that contact between these organisations and PORCUPINE will develop, taking the form of joint indoor meetings and less formal occasions such as workshops and field expeditions.

Election of Council Members

Roger Bamber, already co-opted, and Celia Pain were elected as new Council Members and David W McKay was elected to the Council following his retiral as Records Convener. The following are Council Members:

Roger Bamber	Adrian Norris
Roger Brehaut	Celia Pain
Frank Evans	Eve Southward
John Gordon	Geoff Swinney
David W McKay	John B Wilson

Business of the meeting included possible changes in the method of publication of the Porcupine Newsletter caused by Fred Woodward's removal to Glasgow. It is likely that publication costs will rise and the best way of covering these is to increase the membership. To this end publicity posters will be prepared and circulated and new leaflets describing PORCUPINE and spare membership application forms will be sent to all members in the hope that they will encourage their friends and associates to join.

Hon. Secretary's Report — Shelagh Smith

PORCUPINE has had another successful year, with enthusiasm maintained. Membership is approximately 110. At present there is a considerable turn-over in membership; each year about 20 people leave and a similar number join. Most people join at or after meetings, expressing their enjoyment of the meeting and agreement with the aims and arrangements of PORCUPINE in a gratifying manner. There are about 20 foreign members and about 15 from Ireland. The index to members' interests as given in the membership list for July 1979 is based on information given on the application form. If this is now out of date, please inform me.

There were two meetings in 1979. The 7th PORCUPINE Meeting was at Edinburgh on 31 March and 1 April, for which the theme was "Biological Frontiers". Speakers contributed interesting and varied papers, many of which were published in the Porcupine Newsletter. About 40 people attended, including 7 non-members. Nine people enjoyed unexpectedly springlike conditions on a field excursion. The highlight of the meeting was the election of Sir Maurice Yonge as PORCUPINE's first Honorary Member.

The second meeting of 1979 (PORCUPINE's 8th) was held at Leeds, on 27-28 October, on "Developmental Stages of Marine Organisms". Papers from this meeting, an unusual theme, will be published in the next Porcupine Newsletter. 35 people attended of whom half were non-members (5 have since joined).

A glance at the lists of participants for each meeting (including those of the previous years) shows that local interest, while strong, has not predominated, and people have travelled considerable distances. The change of venues has added to the enjoyment of meetings, giving each a different flavour.

The year has been a quiet one for PORCUPINE's other activities, and it has ended on a temporarily confused note due to insufficient attention by office-bearers. Domestic preoccupations now dealt with, we look forward to an active and successful fourth year.

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SUBSCRIPTIONS for 1980 (£2-00) became due on 1 January. Those members who have not yet renewed their membership this year as asked to send their subscriptions to the Hon. Treasurer (David Heppell, Royal Scottish Museum, Edinburgh, Scotland) as soon as possible to avoid the expense of postage on reminders, which will be send at the end of April. Would Irish and overseas members please send sterling notes, a sterling draft, or pay by international Giro cheque, as bank commission on foreign (including Irish) cheques is now £0-50 each cheque. This is the last Newsletter that will be sent to members who have not paid their 1980 dues.

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EDITOR'S CHANGE OF ADDRESS. Would contributors to the Porcupine Newsletter please note that Fred Woodward, the Hon. Editor, is now Depute Keeper of Natural History at the Museum and Art Gallery, Kelvingrove, Glasgow G3 8AG, Scotland.

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FORTHCOMING MEETINGS

The following meetings are being arranged:

1. A field meeting in the Channel Islands, based on Guernsey, organized by Roger Brehaut, from Monday 22nd to Monday 29th September, 1980. Details are given on the next page, an application form is enclosed, and any further information required may be obtained from Roger Brehaut, La Canurie, Collings Road, St Peter Port, Guernsey, Channel Is.

2. A meeting at the Marine Laboratory, Plymouth, on Saturday and Sunday 21st-22nd February 1981. The theme will be "Ecological Results from Underwater Photography", and it is hoped to combine the indoor meeting with opportunities for fieldwork in the area as there are good tides that weekend. Details will be given in the next Newsletter but any preliminary enquiries should be sent to Eve Southward.

3. The possibility of an additional meeting in October or November 1980 is still under investigation. Details will be notified to members if it is possible to arrange this meeting.

The Hon. Secretary would be pleased to hear from any member who would be willing to host and organise a future meeting, or arrange for a join meeting between between PORCUPINE and another Society with some common interest.

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PORCUPINE FIELD MEETING IN THE CHANNEL ISLANDS

A meeting is being organised for the period 22nd to 29th September 1980. This week coincides with spring tides, the time of low water varying from 1153 on Monday 22nd to 1710 on Monday 29th September. There is of course no reason why those with knowledge of or friends in Guernsey should not make their own travel and accommodation arrangements, and join the excursions. However, for others, the following offers are made. Rooms have been booked provisionally at two places. The Belvoir Farm Hotel is in the Guernsey countryside, about 10 minutes walk from a west coast beach, and offers a good standard of food and accommodation. The Ashdown Lodge Guest House is in St Peter Port, and provides bed and breakfast only. Arrangements have been made for participants staying at Ashdown Lodge to be transported to the Belvoir Farm for dinner each day. The Belvoir Farm will provide a room to be used as a laboratory. This will have tables and chairs, water and electricity. Several monocular and low-power binocular microscopes will be available, together with slides, cover slips, petri dishes, etc. Special apparatus, instruments and books should be brought by participants, but if requested in advance every effort will be made to meet particular requirements.

The prices quoted below include a discount on normal fares:- One week at the Belvoir Farm Hotel (without lunches) including use of laboratory and travel from your home would cost from £114 (by boat from Weymouth) to £167 (by air from Edinburgh). One week at the Ashdown Lodge Guest House (bed and breakfast only) including use of laboratory and dinners at Belvoir Farm Hotel and necessary transport would cost from £91 (by boat from Weymouth) to £142 (by air from Edinburgh). A few single rooms are available but most participants would be sharing twin bedded rooms.

Transport in Guernsey. If participants intend to bring their own cars, offers of lifts to others would be welcomed. Space on the boats is limited and booked early, and it would be necessary to enquire now about travel from Weymouth or Portsmouth (British Rail "Sealink").

A minibus and driver will be available to participants. The driver will be a local ornithologist, with a good general knowledge of the island natural history. He will take the party wherever they wish to go. This will naturally be a suitable beach for the period of low water, but there will be a chance to visit sites of general, historical and archaeological interest as well. The cost of the minibus depends on the number using it, but about £3 per day per person should be adequate.

Visits to other Islands. It is proposed to organise at least one - probably two - day trips to the island of Herm. Herm has a number of excellent beaches, less disturbed by human activity than those on Guernsey. On Herm is the best beach in the Channel Islands for burrowing organisms, where animals such as Chaetopterus, Spatangus, Thia polita and Lutraria species together with Balanoglossus sarniensis may be dug. There is also the Shell Beach which is composed of fresh and worn mollusc shells, the selection changing daily. The minibus driver will accompany the party to Herm and ensure that everyone reaches the right areas with no delay.

Another day will be spent on the island of Sark. The main attraction here is the Gouliot caves, which are only accessible on a very low tide and where the walls are covered with many species. Among these may be mentioned Metridium, Corynactis, Alcyonium and hydroids, particularly Tubularia among the coelenterates, together with a large variety of sponges, ascidians, ectoprocts, and the predators - pycnogonids, molluscs, etc. - of the above. I will do my best to get a day off from school to lead the trip to the Gouliot caves myself.

Total cost of the two trips to Herm and one to Sark, including transport from the hotels, etc., should be less than £8 per head.
DO NOT DELAY - send in your completed application form as soon as possible.

Roger Brehaut

CONSTITUTION.

1 The name of this Society is PORCUPINE.

2 This Society shall consist of Hon. Secretary, Hon. Treasurer, Hon. Editor, Hon. Records Convener, an appropriate number of Council members, in addition to ordinary members.

3 The object of this Society is to promote interest in the ecology and distribution of marine fauna and flora in the N.E. Atlantic.

RULES OF PROCEDURE

1 Any change in standing orders must be ratified by a simple majority of members at a general meeting.

2 The maximum and minimum number of members on the committee shall be left open.

3 Committee meetings shall be held when necessary, at least once a year. Quorum at committee meetings shall be five. Prior notice of committee meetings shall be at least 21 days.

4 Office-bearers retire annually and are normally available for immediate re-election. Prior notice for Annual General Meetings shall be at least 21 days and will be normally in the preceding newsletter.

5 Council members shall at present serve for three years, at least two retiring each year, who are not normally available for immediate re-election. Until rotation is established, those who shall retire may be chosen by lot.

6 Voting shall take place at the A.G.M. and will be restricted to members present.

7 Names of persons seeking election to the Committee (as chosen by the Committee) will appear in the Newsletter prior to the A.G.M. together with an intimation that proposals from ordinary members of additional candidates are welcome.

8 Sudden vacancies in the Committee shall be filled at the discretion of the Committee. A person so appointed shall serve until the next election and shall be elegible to stand.

9 The Committee shall co-opt additional helpers as necessary. Among these will be local events organisers (who may or may not be Committee members already). The duty of an events organiser is to run the meeting held in his/her district and such a person may be invited to attend any committee meeting at which items concerning that meeting are on the agenda.

10 Membership is open to all persons interested in the aims of PORCUPINE upon payment of the entrance fee plus the annual subscription. The amounts of these shall be determined by the Committee. Audited accounts shall be circulated annually to all members,

11 Activities of the Society shall include:
(a) Meetings held approximately three times a year, normally lasting for two days and open to non-members. Meetings will be held with as wide a rotation of venues as is reasonable. Proposed venues are normally to be ratified by Committee.
(b) A Newsletter published usually following each meeting, which shall, in addition to other items, carry a report of the previous meeting.

ACCOUNTS FOR THE PERIOD 6 APRIL - 30 NOVEMBER 1979

As decided at the Committee Meeting of 31 March 1979 the accounting year now ends on 30 November, and accordingly the accounts presented here are for the period 6 April 1979 until that date. The amount shown for "Accommodation" in these accounts represents payment for accommodation of members attending the 7th meeting in Edinburgh, the amount collected having been shown as Income in last year's figures. The main reason for changing the dates of the accounting year was to be able to show all the subscriptions for one calendar year in the same set of accounts.

Income and Expenditure Account

Dr.	£ p		Cr. £ p
To Donations	1 - 00	By Printing and Stationery ...	8 - 68
Entrance Fees	9 - 00	Postage	14 - 78
Subscriptions for 1979 ...	76 - 40	Meetings	8 - 21
Sale of Newsletters ...	10 - 50	Accommodation	195 - 18
Accommodation fees (balance) ...	28 - 24	Bank commission	0 - 91
Excess of Expenditure over Income carried to Balance Sheet ...	102 - 62		
	£227 - 76		£227 - 76

Balance Sheet

Dr.	£ p		Cr. £ p
To Subscriptions paid in Advance	12 - 00	By Cash at Bank (deposit a/c) ...	500 - 00
Balance at 6 April 1979 ...	918 - 87	Cash at Bank (current a/c) ...	320 - 26
		Petty Cash in Hand ...	7 - 99
		Transferred from Income and Expenditure Account	102 - 62
	£930 - 87		£930 - 87

Charles Pettitt, Auditor. 21 February 1980
N. A. Holme, Auditor. 23 February 1980

David Heppell
Hon. Treasurer, 2 February 1980