PORCUPINE NEWSLETTER

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The recent meeting of 'Porcupine' at South Shields proved highly successful despite the unfortunate clash with the re-scheduled Jubilee/Spring bank holiday weekend and all members present thoroughly enjoyed themselves.

In addition the event received considerable publicity for 'Porcupine' locally in both the press and television resulting in recruitment of new members in the North East and it is hoped that they will initiate a local group this coming autumn.

The present Newsletter contains in essence the proceedings of the meeting.

Membership continues to increase and now numbers some 120 individuals and institutions scattered as far afield as the U.K., Germany, Australia, etc., and a preliminary list of members accompanies this Newsletter. Any additions or corrections to the annotated interest of members should be sent to the Secretary or Editor for inclusion in future issues.

The proposed meeting scheduled for Belfast has had to be postponed due to unforseen circumstances which are beyond our control but is being replaced by a two day meeting at the National Museum of Wales, Cardiff with the theme 'Parasites, Commensals, Symbionts, etc.' Anyone wishing to contribute please contact the local organiser, June Chatfield at the National Museum of Wales as soon as possible.

Finally members are reminded that contributions comprising reviews, notices of forthcoming events, news of personal and joint research projects, requests for information, etc., should be sent to the Hon. Editor of Porcupine, Mr. F.R. Woodward, South Shields Museum and Art Gallery, Ocean Road, South Shields, Tyne and Wear, or to the Hon. Secretary of Porcupine, Dr. Shelagh M. Smith, Royal Scottish Museum, Edinburgh, EH1 1JF.

F.R. WOODWARD.
Hon. Editor.

Committee Notes

It was decided at the Committee Meeting held during the June meeting to widen the geographical distribution and interests of the Committee membership and the following people were co-opted and will come up for formal election at the next Annual General Meeting.

Dr. John P. Cullinane, University College, Cork.
Dr. R. Earll, Manchester.
Dr. W. Eifion Jones, Coastal Surveillance Unit, Menai Bridge.
Mr. Adrian Norris, Leeds Museum.
Dr. John B. Wilson, Institute of Oceanographic Sciences.
Dr. Eve C. Southward, Plymouth.
Mr. Brendan D.S. O'Connor, Ireland.

ACCOUNTS FOR THE YEAR ENDING 5 APRIL 1977

Income and Expenditure Account

Dr.	£	£ p		Cr. £ p
To Donations:			By Stationery	15 - 44
Dr. H.M. Bibby	100		Printing and Duplicating	8 - 52
Dr. A.J. Southward	6		Postage	42 - 66
Anonymous	15	121 - 00	Inaugural Meeting	41 - 82
Entrance Fees		107 - 00	Excess of Income over Expenditure carried to Balance Sheet	347 - 16
Current Subscriptions		215 - 60		
Non-members' Contributions		12 - 00		
		£455 - 60		£455 - 60

Balance Sheet

Dr.	£ p		Cr. £ p
To Subscriptions paid in Advance	9 - 22	By Cash at Bank	349 - 73
Transferred from Income and Expenditure Account	347 - 16	Petty Cash in Hand	6 - 65
	£356 - 38		£356 - 38

David Heppell
Hon. Treasurer
25th April 1977.

Examined and found correct - Charles Pettitt - 12th May 1977
Norman A. Holme - 16th May 1977
Hon. Auditors.

Next Meeting

The next meeting of Porcupine will be held at the National Museum of Wales, Cardiff, on Saturday 29th and Sunday, 30th October, 1977.

The theme is PARASITES, COMMENSALS, SYMBIONTS, etc.

We have not yet heard from all the people we have approached to speak (holidays) but so far the following have agreed to contribute:-.

Dr. Vera Fretter, University of Reading: A Molluscan topic.

Dr. Harford Williams, Open University, Wales: Monogeneans in fish.

Please forgive us our teething troubles!

If any person would like to give a talk (20 mins.) on the above theme at this meeting the Hon. Sec., Dr. Shelagh Smith, The Royal Scottish Museum, Chambers Street, Edinburgh, EH1 1JF, would be delighted to hear as soon as possible.

If you are interested in coming to this meeting please contact Dr. June Chatfield, Zoology Department, National Museum of Wales, Cardiff, or Hon. Sec. for further details and full programme.

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Annual General Meeting

This meeting will be held at Manchester Museum on Friday, 24th February and Saturday, 25th February, 1978. (AGM on Saturday morning).

The theme is a taxonomic one - The Species Problem.

Additional people have already been co-opted onto the Committee, see elsewhere in this Newsletter, but further candidates are welcome, nominations should preferably appear in the next Newsletter, please forward these to the Hon. Sec.

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Following Meeting

The proposed meeting at Belfast and Portaferry has been postponed until June, 1978, exact date not fixed, the theme as before, Interstitial Fauna. (Mostly field work).

Let it be known, we welcome contributions to any meeting.

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Mr. Robert Eden of the Institute of Geological Sciences, Edinburgh, gave an illustrated talk on Saturday, 4th June to the Porcupine members attending the Conference on the mapping of the continental shelf off Burnmouth by the I.G.S.

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Porcupine Meeting

List of mollusca recorded for visit to St. Mary's Island and Cullercoats.

Tonicella rubra (L. 1767).
Lepidochitona cinereus (L. 1767)
Patella vulgata L. 1758
Patina pellucida (L. 1758)
Acmaea virginea (Muller 1776)
Gibbula cineraria (L. 1758)
Lacuna pallidula (da Costa 1778)
Littorina littoralis (L. 1758)
Littorina littorea (L. 1758)
Littorina mariae
Littorina neglecta
Littorina neritoides (L. 1758)
Littorina rudis (Maton)
Rissoa parva (da Costa 1778)
Cingula semicostata (Montagu 1803)
Cingula semistriata (Montagu 1808)
Lamellaria latens (Müller 1776)
Skeneopsis planorbis (Fabricius 1780)
Nucella lapillus (L. 1758)
Nassarius incrassatus (Ström 1768)
Goniodoris nodosa (Montagu 1808)
Cadlina laevis (L. 1767)
Archidoris pseudoargus (Rapp 1827)
Onchidoris fusca (Müller 1776)
Polycera dubia M. Sars 1829
Berthella plumula (Montagu 1803)
Limapontia capitata (Müller 1774)
Hiatella arctica (L. 1767)
Kellia suborbicularis (Montagu 1803)
Mytilus edulis L. 1758
Heteranomia squamula (L. 1758)
Turtonia minuta (Fabricius 1780)
Abra alba (W.Wood 1802)

List of mollusca recorded for visit to Whitburn Steel.

Lepidochitona cinereus (L. 1767)
Tonicella rubra (L. 1767)
Patella vulgata L. 1758
Acmaea virginea (Müller 1776)
Patina pellucida (L. 1758)
Gibbula cineraria (L. 1758)
Margarites helicinus (Fabricius 1780)
Lacuna vincta (Montagu 1803)
Lacuna pallidula (da Costa 1778)
Littorina littoralis (L. 1758)
Littorina littorea (L. 1758)
Littorina neritoides (L. 1758)
Littorina neglecta
Littorina rudis (Maton)
Rissoa parva (da Costa 1778)
Rissoa inconspicua Alder 1844
Skeneopsis planorbis (Fabricius 1780)
Nucella lapillus (L. 1758)
Buccinum undatum L. 1758
Odostomia unidentata (Montagu 1803)
Philine punctata (J. Adams 1800)
Archidoris pseudoargus (Rapp 1827)
Ancula cristata (Alder 1841)
Aeolidia papillosa (L. 1758)
Polycera dubia M. Sars 1829
Doto coronata (Gmelin 1791)
Goniodoris nodosa (Montagu 1808)
Onchidoris muricata (Müller 1776)
Onchidoris fusca (Müller 1776)
Trinchesia foliata (Forbes and Goodsir 1839)
Mytilus edulis L. 1758
Heteranomia squamula (L. 1758)
Hiatella arctica (L. 1767)
Venerupis pullastra (Montagu 1803)
Turtonia minuta (Fabricius 1780)
Zirfaea crispata (L. 1758)
Limapontia capitata (Müller 1774)
Acanthodoris pilosa (Abildgaard 1789)

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Resume of Dr. Steedman's address to the Seminar on Preservation Techniques.

Dr. Steedman explained how he first became interested in preservation techniques, due primarily to his recollection of the time, when at the age of ten he went to sea on a trawler around the Faroes and Orkney's and how he marvelled at the brilliance of colour exhibited by the organisms cascading from the cod end of the nets as they were emptied onto the decks. Subsequently he went to work at Hull with Professor Hardy and then at Bristol and Glasgow with Professor C.M. Yonge.

Recently SCOR, the Scientific Committee on Oceanic Research and UNESCO received a large number of complaints from plankton workers with regard to the use of fixatives and preservatives which were being used. The complaints centred largely on the unpleasant properties of formaldeyhyde when working over a dish with an occular miscroscope. As a result in 1968 SCOR and UNESCO asked him if he would look at the problem and see if he could find an alternative to formaldeyhyde which lead to roughly six years research, the results of which are outlined below.

The first problem concerns the type of animals present, for example, small crustacea, large crustacea, fish eggs, fish larvae, jelly fish and so on. In any mixed samples of plankton one has such a variety of specimens that it is impossible to produce a single fluid as fixative and preservative which would cope with all the requirements of the different components. For instance, animals which look similar, e.g., Medusa and Ctenophores differ, thus if a Medusa is placed in a formaldeyhyde solution of 2% or even 4% it will preserve with reasonable success. Do the same with a Ctenophore and it will fall to pieces in front of your eyes. These difference are due to the different protein compositions of the animals concerned. In addition there are osmotic problems with animals such as Ctenophores, whilst calcareous forms will not keep in any solution that has a P.H. below 8.2. In the case of oil bearing species if placed in a high P.H. solution, such as 8.2 the oil suponifies so easily that inside a year there is no oil left, therefore causing further problems. This then is a typical collection containing calcareous forms which will dissolve below 8.2 and oil bearing specimens which break up and lose their oil if the P.H. is too high.

Therefore, one has to think of the fixation composition and usage. Is the fixative required for five minutes, or 24 hours, also is it advantageous to fix the animal at near freezing point, or at a temperature of 30 or 40 degrees. Osmotic pressure is clearly one of the main problems of fixation. If the fixative has the wrong osmotic pressure then certain organs will either swell up and simply blow themselves to pieces, or shrink to a point where they become unrecognisable. The penetration of the specimen is particularly important, and in the case of insects and crustacea with a vast amount of wax on the surface which delays the penetration, it may be necessary to inject with fixative. One of the pipe dreams is that synchronous fixation could take place for the three major components of living animals tissues simultaneously, we can fix proteins, but to fix lipids seems to be well nigh impossible. One can preserve them. You can keep them, but to produce the new compound without, at the same time destroying the proteins or the carbohydrates is well nigh beyond us. One can keep carbohydrates by using alcohols in which they are not soluble. But then, if you use a high alcohol you then proceed to dissolve the oil in the specimen. The compositions therefore of fixative for marine zoo plankton is no easy matter.

The future use of the material also determines what kind of fixative, to use, since there are any amount of fixatives which can be used for histological purposes, but for taxonomy, formaldeyhyde and alcohol have predominated.

However, there are doubts about alcohol since is it really fixing things, or is it merely preserving them by taking away the water from the specimen.

One of the problems which is forever cropping up is, is it better to fix plankton in one fixative which is excellent as a fixative and then having done so storing it in another fluid. The advantages of using the same fluid for fixation and preservation is that it is a cheaper method, it is quicker, it is easier and less staff are required. Now switching over to the disadvantages, there is a discolouration of the fluid. In due course the pigments and other things ooze out of the specimen causing it to become yellow or brownish in two or three years. Also, it does not give any latitude for subsequent anatomical investigations.

In favour of fixation and storage of marine zoo plankton in different fluids there is latitude of specimen treatment, it is a cleaner and clearer fluid, thus easier for the systematist to use, but against this is the fact that it requires twice the volume of fluid and therefore is a dearer system as well as increasing work for staff. If one thinks of some of the enormous reference collections occupying an area of about 200 yards long by about 40 yards wide, crammed with shelves, absolutely filled with specimens, weighing 10, 20 or 30 tons of material, if one had to change all the fluids, the thing would be a major operation, therefore it is on the whole an advantage, if possible, to use the same fluid for both fixation and preservation.

But what do we require in this preservative? That its fixative condition was continuous, that it is non-toxic, it is pleasant to handle, colourless and low in price with a low evaporation rate, no shrinkage or swelling effect. The P.H. around 7 with a low freezing point, it should be bacteriacidal and fungicidal. One would like to think one fulfilled all the insurance requirements by having fluid which was not inflammable. Let us have a look at low evaporation rate. In this country, as a rule, our temperatures may vary from about 10 centigrade inside buildings to maybe perhaps as high as 25, 30. But if you have high temperatures, as in India, then what about the evaporation of the fluids which are being used for preservation purposes. In places like Kalala Province and Fu Chin or Darwin and the north of Australia, with temperatures of 35° centigrade for a large proportion of the year, it is absolutely essential, if possible, one should have a fluid with no evaporation rate. Low freezing point. A number or workers who have been out in either the Arctic or the Antarctic have had to put containers of fixative out of doors because of lack of space and when they went to use the fixative found it was solid. This is the thing one does not want, therefore, a fixative with a low freezing point is desirable.

Now what are the possible reagents which would be suitable for this purpose, there are the aldehydes, formaldehydes, acid-aldehydes, etc., paraldehyde, glutaldehyde, etc. The alcohols of which ethanol is the most prominent and isopropanol of course has been fairly widely used. Salts and other miscellaneous reagnets, etc. In these days of pollution, toxic substances like mercuric chloride, zinc, etc., are things which should never be used at all. Miscellaneous reagents which have formaldehyde loosely attached in the same way that oxygen is attached to haemaglobins and which will release the fomaldeyhyde in the appropriate conditions. Now we ran through some hundreds of experiments with various types but most of them were discarded. The water soluble acetates appeal in some ways but not in others. It is common knowledge that when you have these weak acetates in water, sooner or later mould will appear at the bottom like white puff balls. In other words, the acetates are such good food for moulds that they just cannot be used for long term preservation. By long term I mean 50 to 100 years or more. The alcohols were also investigated. The problem with isopropanol is that in this country it is dearer than ethanol. At times in the United States isopropanol was produced as a by-product which was astonishingly cheap and which lead many people in the museums to use this (at about 45%) as a substitute for ethanol, which is normally used at about 75%. But that means 55% water which may well have a solvent action on calcium, thus a fish in 45% isopropanol in the long term may have its calcarious deposits

of the bones become softer to produce, what they call in the Smithsonian, soft bone tissue. Ethanol has some disadvantages and on the whole the evaporation rate and price are against using it in bulk.

The aldehydes in recent years have been investigated with some very close scrutiny relative to sectional cutting for the electron-miscroscope. Let us start the process of elimination. Acrulian was one of the best fixatives of all but as the name implies it is so acrid and horribly unpleasant that one would never dream of employing it for this purpose. Buteric is not as bad as all that but it smells of rancid butter which is not quite the odour you want clinging around you all day. Aproprionic again has nothing particularly in its favour. Acetaldehyde in some respects is rather frightening. You buy it by the sealed tin and keep it in the fridge, but when carelessly taken out and put on the bench the thing becomes convex in a couple of hours.

Glutaldehyde is expensive, it produces a hazy sea water solution rather too readily and a floccular material may also appear in the fluid. It lowers the P.H. to just the same extent as formaldehyde but its effects on specimens and on man are not certain. We have already discussed the unpleasantness of working over a petre dish filled with 4% formaldehyde for up to 5 or 6 hours. Now because glutaldehyde is a better cross linking agent than formaldehyde it is another way of saying it will fix your eyes better than formaldehyde and if only for that reason was abandoned as a possible substitute for formaldehyde.

On the other hand for plankton perfect fixation, that is to say 100% reaction between the protein molecules and the fixative is not always necessary. When you get a 100% reaction the animal protein becomes so brittle that the legs simply drop off and fall to the bottom of the jar.

Which brings us to formaldehyde. One may, at times, think harshly of the manufacturer, but it was pointed out around 1883 that formaldehyde acts in two ways. Where you have two molecules in water one molecule oxidises another which is another way of saying that the other is also reducing the first one. The results of that is that your formaldehyde now becomes methalnol and formic-acid. So no matter how pure your formaldehyde if you triple distill it, three times or four, or more, it will begin to produce an acidic reaction inside twenty four hours.

But alas ones troubles are not over here because, when formaldehyde whether neutral,acid or alkaline is used with protein, Sorenson's reaction is the first and the most important one that takes place. If one takes a typical amino acid and add to it formaldehyde this will give a product such as methylamine acetic acid plus water. But methylamine acetic acid acts as a straight forward acid so that you now have acid in the specimen jar which proceeds to digest any calcarious products, softens up tissue, etc.

The extent of the reaction, Sorenson's reaction, will vary according to the amount of protein present. Even with the presence of a so called reagent such as hexamine to control the P.H.

Now and again one comes across this problem of what ratio of protein material should one use to get the best fixation possible. It is generally agreed by histologists and electron-miscroscopists that something in the nature of 10% material to 90% fixative is a reasonable figure or, even better, 5% for 100% fixation. But alas, one has not enough bottles to use for such a small amount of specimens but, if possible, use the 10% i.e., 10 to 90, or 1 to 9% ratio.

Storage pressures often result in overcrowding jars which are filled with specimens. But if you look at those specimens carefully, two or three things

become obvious, even to the naked eye, e.g., at the bottom specimens of calanus will be pink, those at the top practically white. In other words, bulk plays its part in storage and preservation and, as a rule, if one can possibly use a 50/50 ratio and periodically gently invert the jar back again, one will keep better preserved material. It should be borne in mind too that if you fill the jar too much those specimens at the bottom will be pressed upon by the specimens at the top and will end up as pieces.

Investigations of other materials. Let us have a look at the glycols, first ethylene glycol. About 1925 there occurred a series of unexplainable deaths in the United States. The authorities became decidedly worried about it, why were these people dying? There was no obvious cause. But this period coincided with the introduction in the United States pharmacopoeia of ethylene glycol in pills instead of glycerine. In the liver this is broken down to form oxalic acid, therefore ethylene glycol is unsuitable to use in fixatives and preservatives because it is poisonous. But that does not apply to propylene glycol, it was one of the most intruiging of all the glycols because moulds cannot use it. It is used in the British and the United States pharmacopoeia for pills and potions taken internally, being absolutely safe because we break it down to acetic and aproprionic acids which everyone takes every time you eat a jar of pickles.

The results indicated that propylene phenoxetol was the most suitable preservative, although 4% formaldehyde is still the cheapest of the lot. If you use 1% propylene phenoxetol as a preservative for fixed materials the price would be 1.6 of formaldehyde. If however you prefer (I think it would certainly be safer to use the propylene phenoxetol) propylene glycol in water it would be over twice the price. On the other hand if you look at industrial meths 5.5 times the price of formaldehyde and in this country, as distinct from the United States of America, if you use 45% isopropanol you are seven times the price, so that most of us would have to come back to formaldehyde or the triple fixatives which we have already gone for a propylene phenoxetol.

Q. With regard to triple fixatives, does this destroy the colour?

A. The answer is yes it will destroy colour as with formaldehyde, not necessarily in the same way but to the same extent, so colour will go but over a longer period, i.e., it delays the fading but does not keep the colour indefinitely.

Q. Does the triple mixture have any adverse affects if you are considering drying samples afterwards?

A. It is something which you have to consider carefully because if you are drying them and you are presumably drying them at about 60° you would drive off the propylene glycol but it would pay you to dry it for longer than a straight formalin fixed material.

Q. What are the possible toxic properties of propylene phenoxetol?

A. Now, as with every reagent, regard them all as toxic, formalin, propylene glycol, propylene phenoxetol, the lot. Certainly if you were to take a tablespoon of neat propylene phenoxetol you would be a hospital case. It has been administered to horses to enable the animal to be treated surgically but I am quite sure that if we were dabbling in the stuff incautiously you might take some in which would have a narcotic effect upon you. There is only one recorded instance of this and that was by a man who was using strong propylene phenoxetol but there is absolutely no record of anyone using it at 1 or 5% who ever suffered in any way from it.

The point raised here is if you use 1% propylene phenoxetol in water without anything else after it has been fixed the dissection of the animal will be very simple, it will be flexible and easy to cut. When Owen was in New Zealand he sent to me at Glasgow a large number of molluscs which he fixed there in weak formalin then soaked in 1% propylene phenoxetol for perhaps a couple of weeks, then drained and put into polythene bags with bits of cotton wool to stop them sloshing around but no fluid, the bag tied and sent to me just like that. They arrived in perfect condition and I kept them in the bag deliberately until he returned which was two or three months afterwards, we dissected them together and found them in first rate condition.

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Marine Biological Films

Frank Evans, Dove Marine Laboratory

At the South Shields "PORCUPINE" meeting members saw a teaching film called "The Rocky Shore". It was 16 mm, sound, colour, running time 25 minutes and is the most recent of three films I have made for biology students, the others being "Ocean Tides" (1966) and "Ocean Waves" (1972). All three films were made in the Film and TV Section of Newcastle University. "Ocean Tides" and "Ocean Waves" were made as replacements or reinforcements for 1 hour lectures. "The Rocky Shore" was an attempt to give coherence to a marine course for large numbers of first-year university students (over 150 in some years) and to make some sense of their shore collecting.

I think 16 mm films of this kind have to be made by professionals. "The Rocky Shore" had a budget of £850, without costing any equipment, studio space or staff salaries. That is not to say amateurs or lone scientists cannot make interesting and important films on super 8 or videotape: they can. Although technically not comparable to 16mm, such films may be convincing and significant through the force of the subject and the dedication of the film maker.

There are very few good films in marine biology, indeed hardly any on the shore worth showing. The worst thing about most biology teaching films is the commentary; it is pitched too low for student audiences. Scripts, too, are often poor.

16 mm teaching films take a long time to make, part-time: in my experience about three years. Getting the camera crew, the sunshine, the tide, yourself and the funds all together at sea or on the beach is laborious.

Once on location few camera tricks are needed. Only one I found particularly useful when making "The Rocky Shore"; filming down a periscope to give a side view of shore animals normally viewed from above. Aerials are good in any film. They need a friendly light aircraft or (expensive) helicopter. Slow motion photography and time lapse can be helpful. Otherwise it is just slogging away to get as near as possible the shots you want. In the final film, graphics (overlaid words and diagrams) are sometimes indispensible; so, therefore, are the services of a good graphic artist and animation bench.

Of the films I have made "Ocean Tides" (20 minutes) is composed entirely of animated diagrams: the sun, moon, rotating earth, etc. "Ocean Waves" (15 minutes) is a more advanced film, opening with sea, tank and aerial shots to illustrate wave theory, while the second half shows the biological and physical effects of waves, with exposed and sheltered shores and depositing and eroding coastlines.

"The Rocky Shore" is different. It portrays an actor (me) conducting a nature walk over the beach at Cullercoats, Northumberland, pointing out plants and animals, and discussing zonation and the stressful conditions under which shore creatures live. This film is the most suitable of the three for general audiences.

What is the impact of a teaching film? We can only guess, but film makers who are teachers are uniquely placed to find out. The method would be to divide a class in two, show the film to one half, lecture on the same topic to the other half, then test them. I have never done it but would like to. Meanwhile I believe that films do make a powerful impact. Again and again in written exams I get chunks of my own commentaries quoted back at me, often after a lapse of months or years. Amazing!

I expect few "PORCUPINE" members have access to a film unit. But I repeat that good marine biological films are in short suppy and any film, whether made on 16 mm or on lesser equipment, so long as it is sincere and painstaking, can become an important contribution to the teaching of our subject. Come on in, the water's warm and saline.
("Ocean Tides", "Ocean Waves" and "The Rocky Shore" can be purchased; or can be hired from Newcastle University for about £10).

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Marine Isopod Crustaceans

In 1968 the Isopod Survey Scheme was instigated to determine the distribution and habitat preferences of British marine isopods, both terrestrial and aquatic (Sutton, 1972). Due to the large numbers involved the 106 odd marine species are now being dealt with separately by myself and Dr. R.J. Lincoln at the Natural History Museum, London. A special data card has been designed in conjunction with the Biological Records Centre (Holdich and Lincoln, 1974) and these are available free of charge to anybody wishing to participate in the scheme.

Identification problems associated with marine isopods have been alleviated recently by the publication of a key (Naylor, 1972). The main problem remaining is actually finding the species listed as most are small and cryptozoic in nature. The following notes are designed to help collectors find the commonest of the 34 plus species living on our shores.

Sand - only two species are commonly found on British shores i.e. Eurydice pulchra and E. affinis. Both live in clean medium grade sand and can be caught in surf on the incoming tide. Stirring up the sand in pools of water near to rocky outcrops is usually the best way of finding them.

Brackish water habitats - in coastal lagoons Idotea chelipes may be found associated with green algae - often in very large numbers. Members of the Jaera albifrons group of species may be found under stones in estuaries, and as one approaches freshwater these give way to Jaera nordmanni. It is very difficult to tell the species of Jaera apart unless the small triangular-shaped males are collected. Sphaeroma rugicaud-, S. monodi and S. hookeri can all be found under stones and associated with the roots of vegetation in brackish water situations; the former species is often locally very abundant (e.g. in salt marshes). In muddy areas Paragnathia formica may be found living in small chambers in the banks of rivers. The juveniles are ectoparasitic on fish.

Wood - the gribble Limnoria is common on south and west coasts, and records occasionally crop up for the east coast. This genus, which has three species in Britain, L. lignorum, L. quadripunctata and L. tripunctata causes a lot of damage to wooden structures and it would be very interesting to know more of its distribution.

Rocky shores - the diversity of microhabitats makes this zone one of the most productive for the isopod collector. The splash zone may yield Sphaeroma serratum in crevices and under stones, associated with talitroid amphipods and the woodlouse Ligia oceanica (records for which would also be welcome). S. serratum may also extend onto the upper shore where Campecopea hirsuta is to be found amongst Lichina pygmalis, in empty barnacle tests and in crevices. In the middle and lower shore Dynamene bidentata (see Holdich, 1976) may be found in crevices, empty Balanus perforatus tests, and in the summer months on a variety of brown and red algae. Collection of isopods from algae is best carried out by either rubbing ones hands through the weed so that specimens stick to the skin, or by rinsing the weed in a bowl of water and catching the isopods with a small handnet. The parasitic isopod, Ancyroniscus bonnieri, may be found associated with D. bidentata, and Hemioniscus balani sometimes occurs in the mantle cavities of Balanus balanoides and Elminius modestus. The strongly sexually dimorphic species, Gnathia maxillaris, may be found in lower shore crevices, empty barnacle tests, and amongst sponges such as Halichondria. Juveniles of this isopod are ectoparasitic on fish and when they settle in crevices they are often a bright green, blue or red colour depending on what they have been feeding on. In lower shore crevices and empty barnacle tests Cymodoce truncata may be found. As with Campecopea, Dynamene and Gnathia this species is sexually dimorphic with the male being very different from the female. A number of individuals usually occur together with only a single male being present. Stones and empty shells at all levels of the shore may yield specimens of Jaera crawling about on the underside. A fine paintbrush is best used to

pick them up. Perhaps the most ubiquitous isopods on rocky shores are the species of Idotes, which is a fairly large and easily recognisable genus. I. granulosa is commonly found on brown seaweeds on the middle and lower shore; I. baltica usually occurs on algae and in pools on the lower shore; I. neglecta, I. linearis and I. emarginata may all be found on lower shore algae and drift-weed; I. pelagica is commonly found amongst byssus threads of Mytilus and amongst stunted algae on exposed rocky shores. Finally, on the lower shore and sub-littoral fringe Janira maculosa may be found under stones in pools. This species is very delicate but is fairly large and has very long antennae.

Of the species mentioned above most have been recorded from the south-west and west coasts of the British Isles up as far as Handa Island (N.W. Scotland) by Isopod Survey Scheme recorders. Records are few and far between for the north and east coasts of Scotland, the east coast of England, and most of the Irish coast. Only Idotea granulosa, Eurydice pulchra, Jaera nordmanni, species of the Jaera albifrons group, and Sphaeroma rugicauda seem to occur right round our coasts where the right conditions prevail. With more intense collecting, however, a number of other species will probably turn out to have a wider distribution than is apparent at present.

The Isopod Study Group would be very pleased to receive any isopod records if they are accompanied by a specimen and some habitat data, and to undertake any identification of isopod material.

D.M. Holdich, Department of Zoology,
The University, Nottingham, NG7 2RD.

References -

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Holdich, D.M. and R.J. Lincoln (1974). The distribution and habitat preferences of British marine isopods: A Survey Scheme. Field studies 4(1), 97-104.

Naylor, E. (1972). British Marine Isopods. Linnean Synopsis of the British Fauna (New Series), N. 3. 86pp. London: Academic Press.

Sutton, S.L. (1972). Woodlice. 144pp. London: Ginn and Co. Ltd.

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PYCGNOGONIDS

Roger Bamber currently at the Dove Marine Laboratory, Cullercoats has been carrying out studies on the variation and distribution of the British species and will be grateful for any further material or records.

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GUIDE TO FAUNAL LISTS AND SYSTEMATIC KEYS

At the February meeting of PORCUPINE in Edinburgh there was comment on the need for more aids to the indentification of marine species and criticism of some of the available keys. There are undoubtedly gaps in the literature and it is one of PORCUPINE'S aims to encourage the production of satisfactory keys to those groups for which none exist. Part of the problem, however, results from the lack of easily available information about works already published. The Systematics Association publishes a useful Bibliography of Key Works for the Identification of the British Flora and Fauna, but there is also a need for a guide to other works of taxonomic importance, with some evaluation of their content.

To this end, PORCUPINE will produce a Guide to Faunal Lists and Systematic Keys. The format is still to be finalized but it is envisaged that it will be a loose-leaf publication with pages issued as sufficient entries are accumulated. It will be edited by a PORCUPINE sub-committee comprising David Heppell, Geoff Smaldon, Shelagh Smith and Geoff Swinney, all of the Royal Scottish Museum, Edinburgh. The Guide will cover an area of the N.E. Atlantic from 30°N to 80°W to 65°E, and will include the Mediterranean. Information on the literature from this wide area is required if satisfactory taxonomic comparisons are to be made.

To ensure the success of this publication we ask for members of PORCUPINE to contribute suitable references arranged in the manner shown below:

ADEY, W.H. & ADEY, P.J., 1973. Studies on the biosystematics and ecology of the epilithic crustose Corallinaceae of the British Isles.
Br. phycol. J. 8: 343-407.

Up-to-date keys and distribution maps of all the genera and species of rock-dwelling calcareous red algae found in Britain. Keys dichotomous, with separate keys for vegetative, reproductive and anatomical characters. Reprints available, price 85p post free, from Dr. J.C. Green, The Laboratory, Citadel Hill, Plymouth, Devon, PL1 2PB.

GAGE, J., 1972. A preliminary survey of the benthic macrofauna and sediments in Lochs Etive and Creran, sea-lochs along the west coast of Scotland.
J. mar. biol. Ass. U.K. 52: 237-276.

An extensive systematic list of species is given in an Appendix (pp.262-274).

KEEGAN, B.F., 1974. Littoral and benthic investigations on the west coast of Ireland - III (Section A: Faunistic and ecological studies). The bivalves of Galway Bay and Kilkerrin Bay.
Proc. R. Ir. Acad. 74 (B): 85-123.

A very detailed fuanal list which includes data on habitat and density and previous records from the west of Ireland. Some synonymy given.

Please state clearly whether or not the work contains a key or a faunal list, as this may not be evident from the title. Other comments on the content will add to the usefulness of the Guide. It is recognised that some references known may not have been personally consulted; these should still be included, as additions and amendments can be incorporated at a later stage.

A grant towards production costs has generously been awarded by the World Wildlife Fund and it is hoped that the Guide can be offered to members free of charge, at least initially. A sample page and order form will be included with the next issue of the Porcupine Newsletter.

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Notes on photography in the field by Richard Platts.

Place the animal on a small flat rock. Arrange background weed and/or other material to taste. The animal should be horizontally positioned, as far as possible, to obtain the maximum depth of focus. Much of the photography is done at the collecting site, in small pools.

Where the photography is done at home or at the laboratory, it should be carried out in normal sunlight usually out of doors. Use a transparent container (about 12" square as a minimum). Place the container on a piece of plain subdued green paper, which acts as a neutral base colour. Suitable rocks, weed and other material should be collected specifically for use in photographing specimens later.

Use "Kodachrome 25" daylight film and set the camera for film speed 32 ASA. use 1/60 second exposure or the slowest speed at which you can effectively hold the camera really steady. The camera is always hand-held. Use a "Macro" type lens, if possible (i.e. one that will give a film image up to ½ life size). A 50 mm "Macro" lens is a standard type for use with a single-lens reflex 35 mm camera. It is possible to use a standard lens (50-55 mm) with either bellows or extension tubes, but the work then becomes far more awkward and complicated. Pre-set the camera focussing to obtain the desired size of the animal in relation to the whole frame. (N.B. It is better, as a rule, to err on the side of having a relatively small size for the animal, so as to increase the depths of focus and hence the clarity of the animal as a whole, and to increase the amount of visible "natural" background). With a "Pentax" camera and a "Super-Takumar" Macro lens, for example, a suitable focussing distance from lens to object is about 0.8 foot (≃ 0.25 metre).

Bright sunshine is essential. Wind must be at a minimum to eliminate water movement. Position the camera directly above the animal, taking care to eliminate reflections as far as possible. Reflections can be eliminated by using a polarising filter, but this increases the exposure substantially, with consequent loss of depth of focus. With care, reflections need not be a nuisance, even if no polarising filter is used.

Calculate the exposure (i.e. the appropriate aperture for 1/60 sec. or the chosen speed). This is done most easily by means of a through-the-lens (TTL) exposure meter on the camera. Such a meter makes it possible to check the exposure rapidly and without moving the camera. If in doubt as to the correct exposure, err on the side of under-exposure. Slightly under-exposed pictures (i.e. with slightly too small an aperture) look quite good, but slightly over-exposed pictures usually look bad. Bright sunshine, with no filter, will normally produce an exposure of 1/60 sec. at f.4 to f.6.3 with ASA 32 film speed under these conditions. A faster film can be used for better exposures and depth of focus, but this seriously degrades the colour quality. "Kodachrome 25", in my view, gives the best colour rendering. An aperture setting larger than f.4 will produce poor depth of focus while an aperture smaller than f.6.3 is highly desirable but rarely attainable.

Hold the camera very securely with both hands, against the head, so as to obtain maximum steadiness. Move the camera in and out from the animal so that, with the lens focussing pre-set for an appropriate image size, focussing is actually carried out only by movement of the whole camera. Expose when the camera is correctly positioned with the object in focus. It should be possible to take a series of pictures without substantially moving the camera from the head (and thus without losing the distance and focus seriously). It is a good idea to take a reasonable number of pictures of each subject, so that the best ones can be selected later with a near certainty of obtaining some good results. With practice it should be possible to get, say, 70% or more acceptable photographs out of the total taken. But, since the pictures are taken with the camera hand-held, one must accept that a number of pictures will be no good. These should be ruthlessly rejected. A single-lens reflex camera with a TTL meter and an automatic "Macro" lens is the best equipment for applying this method.

A.R.P.
1st June, 1977

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Information, Requests and Sales.

Title	The Rocky Shore. Ref. F.170.
Medium	16mm colour film with optical sound track.
Running time	24½ minutes.
Producer	Dr. Frank Evans, Department of Zoology, University of Newcastle upon Tyne.
Audience	Introductory marine biology classes at universities, polytechnics and colleges of education. School fifth and sixth forms with interests in marine ecology.
Synopsis	An exposition of sea shore zonation as taught to first year zoology students at the Dove Marine Laboratory, University of Newcastle. Photographed on a stretch of rocky coastline exposed to the North Sea, this film explains the conditions of life on the lower and upper shores and examines the characteristic animal and plant life in this physically adverse encironment. An easily understood film to prepare students for introductory work on the shore.

Rental or purchase from:
Department of Photography and Teaching Aids Laboratory, University of Newcastle upon Tyne. (Terms on application)

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BRISC

Biological Recording in Scotland Committee

A Guide to Biological Recording in Scotland.

This Guide is available FREE on receipt of a large, stamped addressed envelope from:-

BRISC, 8 Dublin Street, Edinburgh EH1 3PP

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Dr. Vera Fretter is involved in a research project -'The Prosobranch Molluscs of Britain and Denmark', and requests the opportunity of inspecting prosobranchs relevant to the project. She is willing to sort dredgings to find them. If anyone can help please contact Dr. Fretter at the Department of Zoology, The University, Whiteknights, Reading, RG6 2AJ.

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SCAPHOPODS: Phil, Palmer and Charles Pettitt have now agreed a division of labour for these studies. All material for indentification should be sent to Phil. Palmer at the BMNH in the first instance; Mr. Pettitt will be concentrating on studies of anatomy,parasites and general demography of selected species. All material we are permitted to retain will be deposited in the collections of the Manchester Museum.

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FOR SALE. Journal of Conchology. Vol. 13, nos. 1-4,6,7,9,11,12. Vol. 14, nos. 5-12. Vols. 15-25. Together 11 vols. bound in black cloth and seventeen parts in issues. 1916-65. The lot £65 post free. David Heppell, 7 Comiston Road, Edinburgh EH10 6AA.

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Back numbers of the Porcupine Newsletter are available at 70p. per copy inclusive of postage.

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