NUMBER 29 NOVEMBER 1990

British Phycological Society Newsletter

EDITORIAL

The council (that mysterious body that runs this organisation) met over the summer and I duly sent in my report (though without any financial accounting - I prefer to slip that into the backdoor of the MBA - or now, the Central London Polytechnic - see the back page for our new treasurers address). I received a message by a devious route from our leader to the effect that, despite his rapidly advancing years and the toll that attendance at so many winter meetings (with their long days and even longer bars) had taken on him, even he did not require a special "large print" edition of the Newsletter. As the rest of Council agreed with him (and as I have now found out how to change the type size) this issue has reverted to a typeface similar to previous issues. Any further comments on presentation or content of this newsletter will be accepted with the enthusiasm typical of all editors.

That aside the big development of this issue is its timing to preview the next winter meeting. I hope this will become a regular feature of the end of year issue with more space devoted to the meeting. This year it's at Heriot-Watt University Edinburgh 2-4 January 1991. For more details see page 3. - EDITOR.

All articles, notes etc. for the BRITISH PHYCOLOGICAL SOCIETY NEWSLETTER can now be submitted on computer floppy disc and by electronic mail. Our publishing system is IBM compatible MS.DOS Microsoft word 5. Both 5.25 and 3.5 inch floppy discs can be handled and it is probable that most common word processing languages are acceptable, but please always include an ASCII file of your article on the disc as well. It would be best if the original is as simple as possible in layout (ie. avoid justification etc. This reduces the amount of editing. Electronic mail can be sent via the UK JANET network to the following address: CHE6RGJE@UK.AC.LEEDS.UCS.CMS1 (CHE6RGJE@LEEDS.UCS.CMS1 if sending from within the UK) Type, pen and ink, tablets of stone are still acceptable!!!

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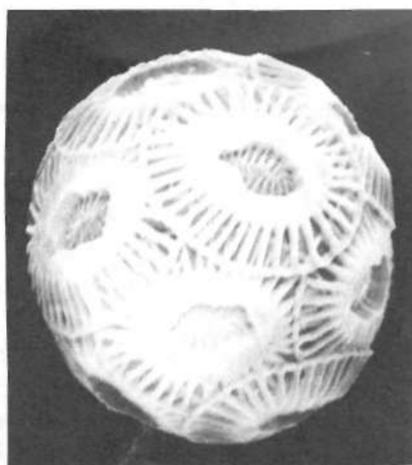

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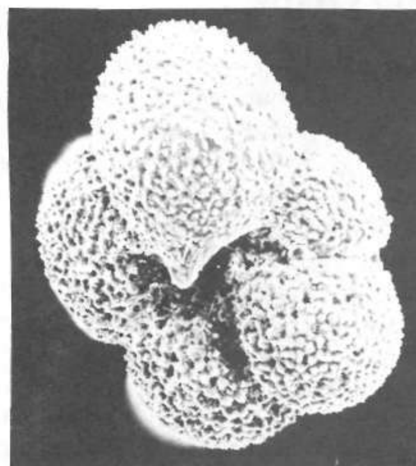

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HERIOT-WATT, JANUARY 2-4 1991

For 1991, the Winter meeting of the Society is moving North to Heriot-Watt University in Edinburgh with Dr. Martin Wilkinson kindly acting as local secretary. Yet another sparkling occasion is anticipated in the format that has proved so successful over the last few years. The preview below might just whet your appetites - and don't forget the auction!

SPECIAL SESSIONS!!! SPONSORSHIP!!!!

The meeting will start on the evening of Wednesday, 2nd January with a poster session sponsored by Dr W.Junk, Publishers of the Hague. The two full days of papers on the 3rd and 4th of January will include the Presidential Address by Prof. T.A.Norton, an update lecture on "The flagellate algal cell" (Prof.M.Melkonian) and two sessions devoted to special topics.

The first of these is "Algae and Pollution", organised by Dr.B.A.Whitton. Pharmacia-LKB Biotechnology are generously providing sponsorship for the second on "Cyanbacterial Physiology and Biochemistry" which is organised by Dr. N.W.Kerby.

We have had an excellent response to the call for papers in both the special session and other areas of interest so the meeting promises to be both busy and lively. For full details of the papers and how to register see the documents being sent to members, or contact the Secretary (address on back page).

Pharmacia-LKB will be demonstrating some new, and as they claim, "revolutionary" technology for micropreparative separations of proteins, peptides polysaccharides etc. Technical specialists will be available on the 3rd and 4th January to discuss your applications.

AUCTION!!!!!

The society is looking for ways to raise money to expand its activities. We already help research student speakers by providing a contribution towards travel money, but there are many other things we would like to do, which are seldom O.K.'ed by the treasurer from ordinary funds. Obvious possibilities are to pay the fare of an overseas speaker, help more students, institute annual prizes and make small grants for urgently needed surveys.

As a first step towards raising funds, Trevor Norton has been persuaded to act as auctioneer at an auction to be held immediately after the banquet. We now need donations of suitable items - anything remotely biological that someone might buy. Items with a phycological slant would be especially welcome: old or surplus floras, interesting reprints or samples, signed photos or paintings of algal dignitaries, coloured slides, souvenirs of exotic conferences, posters, sampling equipment, packets of edible algae etc. If everyone brought one item, this would get money-raising off to a good start. Please hand over your items as soon as you arrive, so that they can be on display on the first evening. If you are unable to come to the meeting, Martin Wilkinson, the local organizer, or I (Biological Sciences, Durham) would be pleased to receive them by post.

For those who think the committee may be going slightly daft, all we can say is that other societies like the Society for Theoretical and Applied Limnology and the Phycological Society of America have for some time run very enjoyable auctions and seem to make a lot of money in the process.

Brian Whitton

(I'm donating a copy of Woelkerling's "The Coralline Red Algae" - Ed.)

THE GREAT MUSEUM DEBATE

The article in the last issue of the newsletter on the changes at the British Museum (Natural History) prompted a good deal of correspondence both to the Newsletter and to the Museum. I was particularly pleased to receive a fighting letter from Wm. Randolph Taylor, who has contributed greatly to phycology and to the British Museum to the tune of 125 books and papers. He will be celebrating his 95th birthday on 21st December this year and I'm sure that all members would wish to join me in sending our best wishes on such a special day. I also hope that the following update from David John at the museum will reassure both Wm. Randolph Taylor and others that all is not lost for phycology at the Museum. Another view on the general situation is given by David Mann who we congratulate on his new job as Deputy Regius Keeper at the Royal botanic Gardens, Edinburgh, EH3 5LR.

Phycology at The Natural History Museum: a statement of the position.

David M.John

The last issue of the Newsletter commented on announcements made in the Natural History Museum's Corporate Plan concerning the loss of science posts, the new staffing structure, and the concentrating of research effort into six subject areas. The editorial naturally focused on the effects these changes would have on phycology in the Department of Botany, particularly in view of the disbandment of both the Division of Algae and the traditional algal sections. The phycologists are now distributed amongst the research programmes but I retain responsibility for co-ordinating the activities of the phycological group.

Despite the inevitable disruption caused by the changes the Department continues to run a vigorous programme of algal research firmly rooted in taxonomy and systematics. New areas of research continue to be developed, with interest turning towards molecular palaeontology and the use of DNA analysis as a means of investigating taxonomic problems in ecological indicator algae and those of economic importance. Some of the changes in direction of our research programme stem from the successful outcome of applications to the Museum's Interdisciplinary Research Fund and to the development of collaborative links with universities and other institutions.

Recent appointments include a research assistant to undertake DNA analysis of both freshwater and marine algae and a CASE student to work on fossil diatoms in the North Sea. There is every likelihood that phycological research will be further strengthened with the promise of the recruitment of research fellows on 3-year appointments.

We are endeavouring to ensure that phycological research continues in those areas where we have established considerable expertise but realised that it is necessary to move into areas where the scientific potential for development and funding is greater. Finally, curation of the algal herbaria is the responsibility of the staff within the Curation and Advisory Programme. All enquiries concerning specimens or requests to visit the Herbarium should now be sent to Mrs Jenny Moore.

David M. John, Co-ordinator of the Algal Group, Department of Botany, The Natural History Museum, Cromwell Road, London, SW7 5BD

Phycological Phoenix

David Mann

Much has been written and said about the recent changes at the British Museum and their impact on research into cryptogams, especially algae and bryophytes. People not previously noted for their devotion to systematics have wagged their heads and declared that taxonomy is essential, that its a disgrace that taxonomic research is being cut back, that taxonomists have never been more necessary. The British Museum has been criticized for abandoning its primary role in collection-based research and for attempting instead to do more 'fashionable' research, with up-beat titles. The Museum, it has been said, should not ape the universities, nor research stations that specialize in environmental monitoring. But in some ways is it any wonder that the Museum chose, or felt forced to choose its new plan? Where have the friends of taxonomy been these last few decades? Haven't you heard the excuses taxonomists have had to make for being what they are? "Oh I'm not really a taxonomist, more an evolutionary biologist". "I know its not front-line research, but it interests me and its cheap", "Well, I'm a taxonomist (sotto voce, spoken fast!), but (growing louder and more confident) I'm also interested in ecology", "Its the philosophical side that provides the challenge; the rest is just the bread-and-butter".

I wonder whether there will be any substantial new funding for taxonomy as a result of all the fuss, and I don't mean for the occasional, expensive molecular study but for good quality, long-term monographic and floristic work, producing user-friendly taxonomic products. Will it be possible for ecologists, pharmacologists, physiologists, biochemists to obtain fast, reliable taxonomic services, in their own language, for any plant or animal group, without sending material halfway around the world? Will we ever know what some of those small colourless amoebae and flagellates are? Taxonomists need money, material, a chance of promotion over those engaged in show-biz science, and good morale, as well as sympathy.

Meanwhile, I'd like to report what I hope some will see as a positive move, a phoenix of sorts. The Royal Botanic Garden Edinburgh has long had interests in cryptogams, with well-established strengths in mycology, bryophytes and pteridophytes, to compliment its work on Asian and S. American floras and various angiosperm and conifer families. It has also for a long time held important collections of algae, notably the Greville collection, but there has been no recent history of phycological research. This policy has now changed and the Garden will in future take an active and increasing part in research into the taxonomy of algae and related disciplines.

David G Mann, Deputy Regius Keeper Royal Botanic Garden, Edinburgh EH3 5LR

IN THE NEXT ISSUE.....

An appreciation of A A Korshikov, by J.W.G. Lund

Book Review - The Chromophyte Algae, Problems and Perspectives, edited by J.C.Green, B.S.C.Leadbeater and W.L.Diver. Oxford Scientific Publications, 1990.

and.. Yes! its back!.... The Ralph A. Lewin page!. This time "The complete snorkeller".

PHYCOLOGY AND MOLECULAR GENETICS; ESSENTIAL FIRST STEPS.

Paul Hayes.

In my update lecture at the Bangor meeting in January my intention was to introduce you to some of the more commonly used gene cloning techniques. I am grateful to Rob Edyvean for providing me with the opportunity to publish this slightly modified version of my talk.

At the outset it is instructive to consider what we mean by gene cloning. Two pieces of DNA, one a vector molecule and the other a target fragment, are prepared in such a way that they can be joined *in vitro* to produce a hybrid (generally referred to as a recombinant) molecule. The resultant recombinant molecule is introduced into a suitable host cell where it replicates and produces many copies of itself. As the host cell divides copies of the recombinant molecule are passed on to each daughter cell. Eventually a colony of identical cells is produced (a clone) where each cell in the clone carries several copies of the original recombinant DNA molecule.

Of the component parts in this generalized scheme the vector molecule will either be a plasmid or a bacteriophage; the enzymes used to prepare the vector and target fragments will be type II restriction endonucleases; the enzyme used to join the two fragments together will be T4 DNA ligase and the host strain will usually be a crippled *Escherichia coli*. All of these components are available commercially, what the researcher has to provide is a source of the target fragment. Initially this target fragment will probably have one of three origins:-
1) It will be a fragment of DNA generated by in vitro amplification of a particular region of the alga's genome; this amplification process will make use of the polymerase chain reaction(PCR).
2) It will be a restriction fragment generated by digestion of total DNA isolated from the alga.
3) It will be a cDNA fragment generated by making a double stranded DNA copy of mRNA molecules isolated from the alga.

Dealing first with gene amplification (figure 1). Total DNA from the alga (this is the template DNA) is rendered single stranded by heating to 95½. This thermal denaturation is carried out in the presence of two synthetic oligonucleotides (referred to as amplification primers) one of

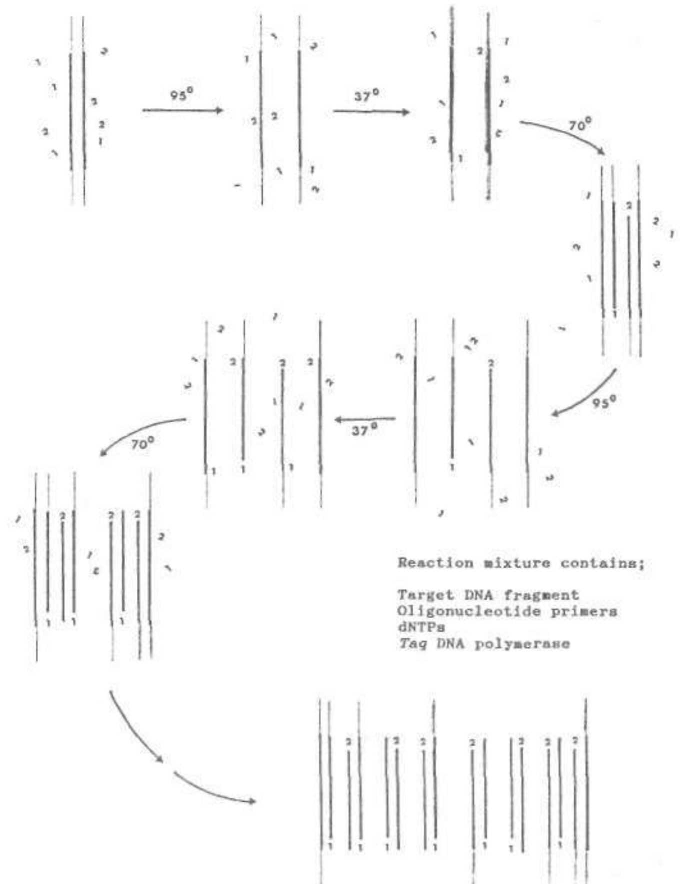

Figure 1. Gene amplification using the polymerase chain reaction. The target gene is shown as bold vertical lines; the amplification primers are represented by the numbers 1 and 2.

which is complementary to the coding strand at one end of the gene and the other one of which is complementary to the non-coding strand at the other end of the gene. As the mixture is cooled the primers anneal to the template (they base pair to their complementary sequence, one at either end of the gene). The temperature is raised to 70½; at this temperature DNA polymerase from the extreme thermophile *Thermus aquaticus*, will synthesize two new strands of DNA, one starting from each of the two primers, using the original DNA strands as templates. The denaturation/ annealing/strand synthesis cycle is repeated many times; after each cycle the number of copies of the target sequence is doubled. By the end of the third cycle a discrete DNA fragment is produced that is bounded at either end by one of the two primers. At the end of the amplification process enough of the target

fragment will have been produced to allow direct cloning into a plasmid vector such as pUC or into the sequencing vector bacteriophage M13.

One added refinement that simplifies the cloning process is to make the 5'-termini of the amplification primers carry sequences that will be recognized by a number of restriction enzymes (ie. add on little polylinkers). In choosing the sites that are included in these polylinkers it is important to attempt to ascertain before hand whether or not any of them occur within the region to be amplified. An actual example of this procedure is to be found in the work of Medlin *et al* (1988, Gene, 71, 491). The primers these workers used to amplify the 18S rRNA from *Skelatonema costatum* were as follows:- primer 1 (sequence CCGAATTCGTCGACAACCTGGTTGATCCTGCC AGT) consisting of 21 nucleotides that will base pair to the 5'-end of the gene plus an additional 14 nucleotides that include recognition sites for the restriction enzymes Sal I and EcoR I; primer 2 (sequence CCCGGGATCCAAGCTTGATCCTTCTGCAGGTTC ACCTAC) consisting of 24 nucleotides that will base pair to the 3'-end of the gene and 15 additional nucleotides that include recognition sequences for the enzymes Hind III, BamH I and Sma I. The introduced restriction sites at either end of the amplified 18S rRNA gene were used as follows:- the gene was digested with the enzymes BamH I and Sal I and then ligated directly into the sequencing vector M13mp19 that had been cut with the same pair of enzymes. To design these primers it was obviously necessary to know the base sequence at either end of the target gene; for the rRNA genes this does not represent a problem as there are sequences that are known to be conserved across widely divergent taxonomic groupings. By comparing the base sequence for the 18S rRNA gene from a wide variety of organisms it possible to draw inferences about the phylogeny of particular groups; the relative merits of molecular systematics as applied to phycology has recently been discussed by Olsen (1990, J. Phycol, 26, 209).

In addition to the work of Linda Medlin on the cloning and sequencing of algal rRNA genes we also heard during the course of the meeting how Nigel Robinson, Brian Whitton and co-workers have used PCR to amplify and clone a metallothionein gene from *Anacystis nidulans*. The primers used by Robinson et al were synthesized using their knowledge of the sequence of amino acids in the protein and then working back from the genetic code to obtain the possible base sequence for the gene.

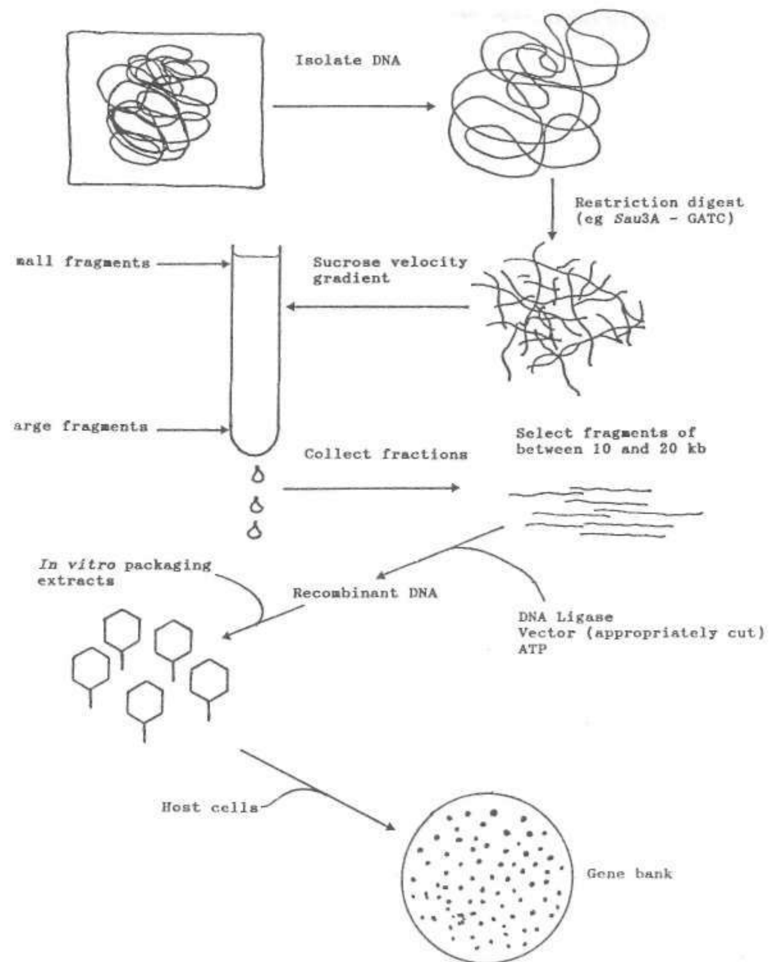

Figure 2. Preparation of a gene bank.

Moving on to the cloning of genomic and cDNA fragments. These are essentially random approaches that generate a bank of clones very few of which will carry the genes of interest. Figure 2 outlines the way in which a bank of genomic DNA fragments can be generated. DNA is isolated from the alga and digested with limiting amounts of a restriction enzyme that has a four base pair recognition sequence; the partially digested DNA gives an essentially random assortment of genomic fragments. The mixture of restriction fragments is size fractionated through a sucrose velocity gradient and those in the 10 to 20 kb size range are pooled. The pooled fraction is ligated into an appropriately cut vector (a bacteriophage lambda derivative) to produce recombinant viral genomes that are then mixed with the protein components needed to produce infectious phage particles. The population of recombinant phage is used to infect host cells producing a gene bank

consisting of clear plaques in a lawn of uninfected host cells. Over the past few years most of the component parts of this reaction scheme have become commercially available; in particular the vector arms and the in vitro packaging mixes used to produce the infectious, recombinant phage particles can be obtained from a variety of sources.

The main problem in library construction may lie in the initial isolation of the algal DNA. For both cyanobacteria and *Chlamydomonas* the techniques of DNA isolation are pretty well established; the cells are lysed in SDS and pronase (plus lysozyme for cyanobacteria), deproteinated with phenol and chloroform, concentrated by ethanol precipitation and then finally purified by CsCl/EtBr density gradient centrifugation (exact details of these procedures can be obtained from a wide variety of sources eg. chapters in Shaw, C.H. (ed) "Plant Molecular Biology, a practical approach" (1988) IRL Press). DNA isolation from seaweeds can also be achieved using standard techniques but the presence of large amounts of carbohydrate can cause serious problems (see Olsen, 1990 for references). It seems that with seaweeds it may be much better to isolate nuclei, or plastids, prior to carrying out the DNA isolation. It might also be possible to separate the DNA from the carbohydrates using CTAB (hexadecyltrimethylammonium bromide) which is used in the preparation of DNA from carbohydrate rich animal tissues and from a variety of plant sources (eg. Rogers and Bendich (1988) in "Plant Molecular Biology Manual" eds. Gelvin, Schilperoort & Verria. Kluver Academic Publishers).

There are often other problems associated with the purified DNA. Many plant DNAs are highly methylated making them difficult to clone; to overcome this problem it may be necessary to move away from conventional hosts to such strains such as *E. coli* MB406 where methylation does not cause such a problem. It is also important to ensure that the removal of epiphytes and bacterial contaminants from algal samples is as thorough as possible. Fortunately, for all of us, the genome sizes for algae and cyanobacteria are rather small. This means that to get a representative gene bank one needs rather a small number of clones; the actual numbers being calculated using the equation of Clarke and Carbon (1976, Cell, 9, 91): For cyanobacteria only about 4,000 clones are needed (where each clone carries about 15 kb of cyanobacterial DNA) to cover the genome such that there is a 99.9% chance that all clonable sequences present in the genome will be included in the gene bank. For the genetically more complex algae the corresponding figure may be increased by at least an order of magnitude up to about 32,000 clones. To identify the clones that carry the genes of interest one uses a probe to screen the gene bank. The probe used must be a nucleic acid molecule; either a similar gene already cloned from another organism, or a synthetic oligonucleotide made on the basis of the known amino acid sequence of the product of the target gene (see below, figure 4).

The preparation of a representative gene bank and the identification of the clones of interest in that bank is only the first step along the path towards characterizing the gene(s) under investigation. What happens next is beyond the scope of this article but some ideas regarding the possibilities can be obtained by a cursory glance through any good laboratory cloning manual (eg. Sambrook, Fritsch & Maniatis (1989), "Molecular Cloning; a Laboratory Manual" 2nd edition. Cold Spring Harbor Laboratory Press).

One way of reducing the number of clones that needs to be looked at (screened), and this is only really appropriate for algae and not cyanobacteria, is to construct a bank of cDNA clones. The overall process is summarized in figure 3. mRNA is isolated from cells that are actively expressing the gene of interest. Poly-dT is annealed to the poly-A tail of the mRNA and a DNA copy of the mRNA is then made using the poly-dT as a primer for reverse transcriptase; this gives a cDNA/mRNA duplex. Ribonuclease H is used to introduce nicks in the mRNA strand of the duplex, DNA polymerase will then bind at each of these nicks and synthesize a second DNA strand, digesting away the mRNA as it does so. The klenow fragment of DNA polymerase I is then added to the mixture to produce flush ends on the molecules which are purified by gel filtration. To make the cDNA easier to clone, adaptors are added to either end of the molecule to produce sticky ends that are compatible with those produced by *EcoR* I digestion of the vector. Reagent kits containing everything needed to make and clone cDNA are available from a number of companies.

In isolating and manipulating the mRNA one needs to take certain precautions:- Glassware should be rinsed with DEPC (diethyl pyrocarbonate) treated water and baked at 180½; all plastiware should be rinsed in DEPC treated water and autoclaved; all solutions should be sterile and made up in DEPC treated water. These precautions are necessary to reduce possible RNase contamination.

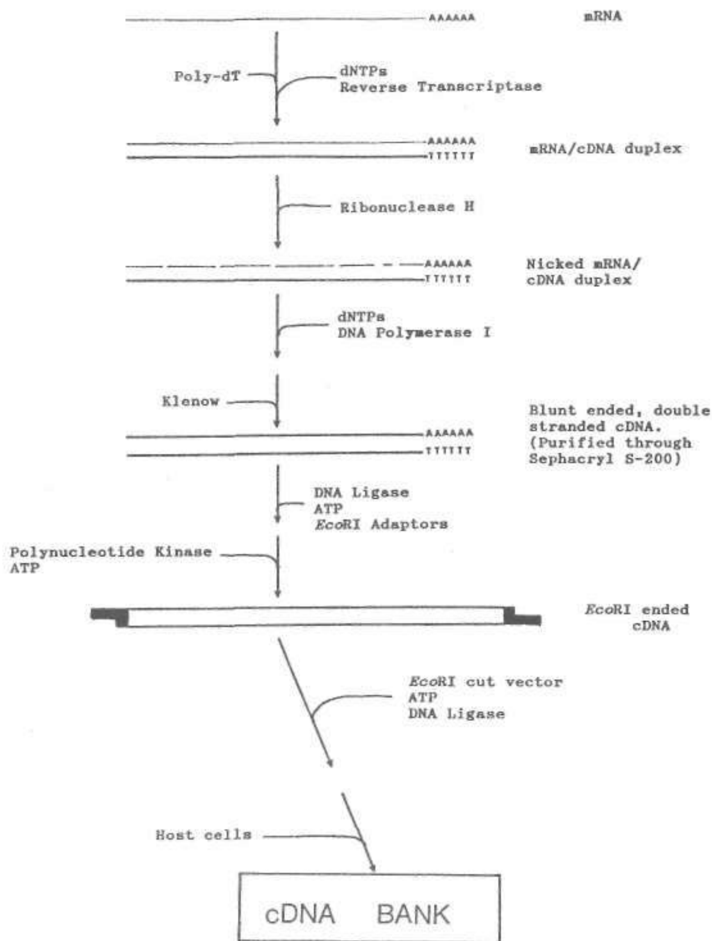

Figure 3. Preparation of a bank of cDNA clones.

For cDNA cloning it is common to use vectors that are derivatives of bacteriophage lambda. The recombinants produced are packaged *in vitro* as described before and plated out on a suitable *E. coli* host. Two of the most commonly used vectors are lambda gt10 and lambda gt11. In lambda gt10 the cDNA is inserted into an *EcoR* I site within the phage repressor gene. A disrupted repressor gene prevents integration of the phage genome into the host cell chromosome removing any possibility of lysogenic growth. Where lysogeny is possible (in the non-recombinant phage) the plaques formed will have a turbid central region, where lysogeny has been prevented (in the recombinant phage) the resultant plaques are clear. In lambda gt11 the cDNA is again inserted into an EcoR I site, this time in the coding region of a Ã-galactosidase gene; a recombinant phage is produced in which the expression of the polypeptide encoded by the cDNA is controlled by the promoter of the Ã-galactosidase gene. This means that the host cells can be induced to accumulate the polypeptide encoded by the cDNA when appropriately stimulated.

As was the case for the bank of genomic DNA fragments, cDNA banks constructed in gt10 need to be screened with nucleic acid probes; cDNA banks constructed in gt11 can be screened using antibodies raised against the target gene product. Figure 4 depicts the sort of strategy that can be adopted in generating probes. A sample containing the polypeptide encoded by the target gene is subjected to polyacrylamide gel electrophoresis in the presence of the detergent SDS. The band of interest is excised from the gel and the protein present electroeluted. Following dialysis the purified protein is used in one of two ways; either it is injected into a rabbit for antibody production (or used to produce a series of monoclonal antibodies) or it is further purified and used for amino acid sequence analysis. A region of the amino acid sequence is selected where there are relatively few multi-codon encoded amino acids and then a mixed oligonucleotide is made that covers all possible codon combinations.

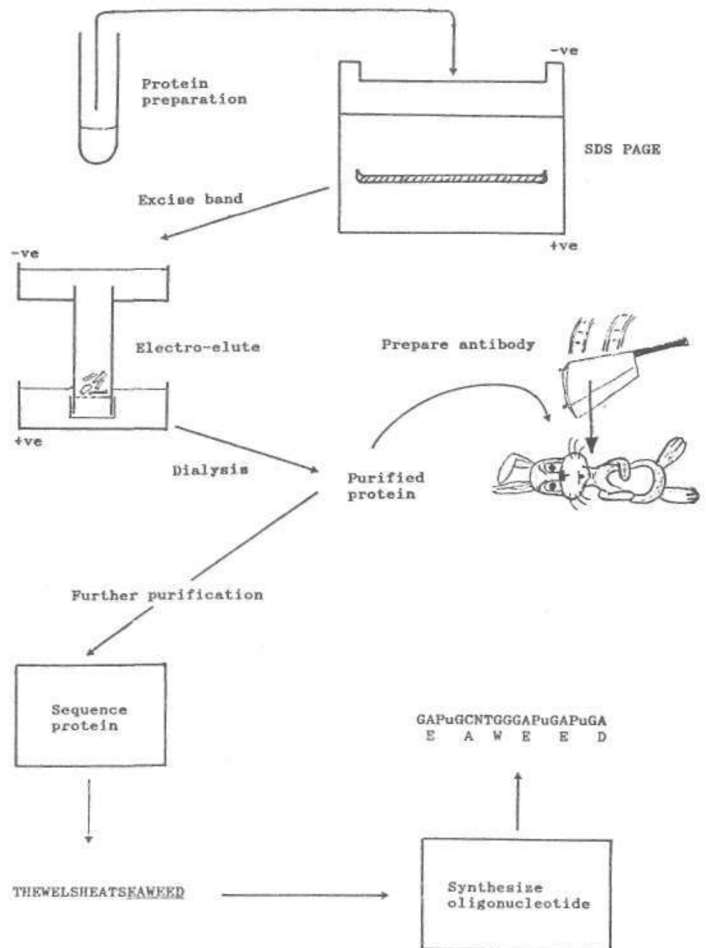

Figure 4. Preparation of probes for screening banks of genomic or cDNA clones.

Having cloned the gene what can you get out of it? You are all in a position to answer this question yourselves; in my talk I looked at a couple of easily understood examples.
1) Before gas vesicle protein genes had been cloned it was thought that gas vesicles were made up from just a single type of protein and it was suggested that this protein self assembled to produce the final structure. Now that the genes involved have been cloned and characterized we are aware that there are at least two, and possibly many more, proteins involved in gas vesicle production. We would never have been able to address the questions about gas vesicle structure that now occupy our minds had it not been possible to clone the genes.
2) Perhaps of more immediate use to many phycologists will be the use of cloned DNA fragments in studies of population structure using RFLP analysis (restriction fragment length polymorphisms).

Figure 5 shows how this analysis works in a very much simplified and purely hypothetical example. DNA is isolated from two cyanobacterial strains, A & B, and in each case digested with the restriction endonucleases Hind III and EcoR I. The digestion products are size fractionated by electrophoresis through an agarose gel and then blotted onto a membrane by Southern transfer. The membrane is probed using a labelled DNA fragment that binds to and lights up homologous sequences producing bands on the blot that can be visualized, usually by autoradiography. If the hybridizing fragment is carried on the same size restriction fragment in each of the two strains then the position of the band produced on the blot will be the same for the two DNA samples; a shift in the position of the band in one of the strains indicates that a mutational event has occurred, perhaps a modification in a restriction site. The difference in band mobility gives us a character that can be used to distinguish between the two strains.

The sort of mutational event mentioned above is illustrated in the lower half of the figure (the DNA probe binds to the hatched area of the sequence). For both strains the region of homology to the probe is carried on a 2.3 kb EcoR I fragment (recognition sequence GAATTC, bands in similar positions on the blot). In strain A the probe binds to a 4.9 kb Hind III fragment (Hind III recognizes and cleaves the sequence AAGCTT); in strain B it binds to a 9.3 kb fragment. Strain B has lost the central Hind III site (C to T transition) and is therefore no longer cut at this position; the next site is 4.4 kb away which accounts for the observed band size of 9.3 kb. The difference in hybridization pattern allows us to distinguish populations of strain A from populations of strain B. There are many published examples of how this works in real life. For example in January I referred to the work of Goff and Coleman (1988, J. Phycol, 24, 357) who have used the plastid gene that encodes the large sub-unit of ribulose-1,5-bisphosphate carboxylase as a probe in their investigations of speciation and population structure in red algal communities.

There is undoubtedly much that can be learnt using these relatively simple techniques. More fundamental developments in the molecular biology of the algae (other than for Chlamydomonas, it's close relatives and the cyanobacteria) depends on the production of vectors that will allow the transfer of genes back into the organisms from which they originate. What we also need is a concerted effort to look at fundamental aspects of algal biochemistry to allow the identification of those areas of phycology that would benefit from the attention of gene jockeys.

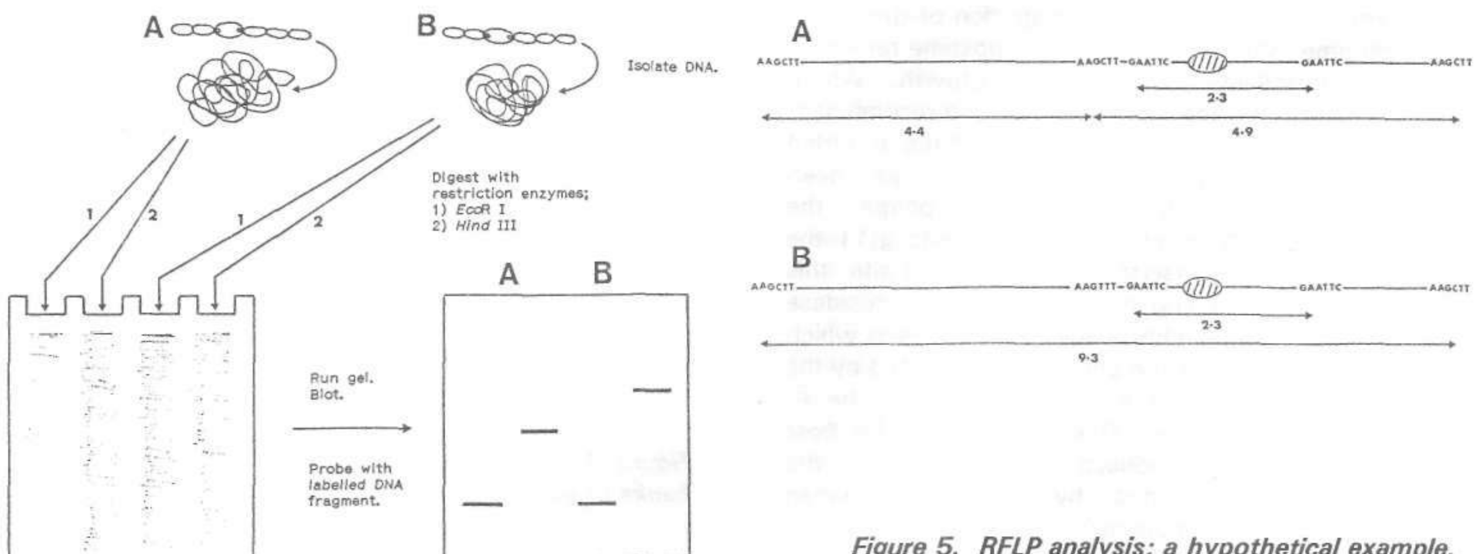

Figure 5. RFLP analysis; a hypothetical example.

Seaweeds of the British Isles

A collaborative project of the British Phycological Society and the British Museum (Natural History).

Following some omissions from the previous issue (No 27, back page) which were noticed by several readers, I am taking this opportunity to bring up to date the position with regards to these volumes.

Volume 1 Rhodophyta.

Part 1 Introduction, Nemaliales, Gigartinales, by P.S. Dixon & L.M. Irvine, 1977. Price: £13.00 ISBN 0-565-00781-5

Part 2A Cryptonemiales (sensu stricto), Palmariales, Rhodymeniales, by L.M. Irvine, 1983. Price: £13.00 ISBN 0-565-00871-4

Volume 3 Fucophyceae (Phaeophyceae).

Part 1 by R.L. Fletcher, 1987. Price: £30.00 ISBN 0-565-00992-3.

Volume 4 Tribophyceae (Xanthophyceae)

by T. Christensen, 1987. Price: £7.50. ISBN 0-565-00980-X

New Title

Volume 2 Chlorophyta by E.M. Burrows, 1990. Price to be announced. ISBN 0-565-01114-6.

Volume 3(1) and 4 are available at a reduced price of £ 32.00 to members of the British Phycological Society.

Copies may be obtained post free (UK and overseas) from Publication Sales, Natural History Museum, Cromwell Road, London SW7 5BD, with payment in advance.

BOOK REVIEWS

NORTHWEST EUROPEAN MICRO-PALAENONTOLOGY AND PALYNOLOGY.

Batten, D.J. and Keen, M.C. (eds).

23.5x15.5cm. pp.298. Numerous plates and figures. general and taxonomic index. Published by Ellis Horwood Ltd. Chichester for the British Micro-palaeontological Society. 1989. ISBN 0-7458-0498-5 Price£69.95

Essentially the proceedings of a British Micropalaeontology Society Conference held in Aberdeen in 1987 with the intention of bringing together oil company and academic personnel with a mutual interest in the relationship of microfossils to the geology of hydrocarbon exploration in the UK continental shelf. As the preface suggests, this aim was only partially realised as, with the exception of BP and Britoil, the oil companies were "restrained" in coming forward with significant contributions. Thus the book has more of a peripheral rather than direct, relevance to hydrocarbon exploration.

Glancing through one soon realises that this is not a book for the faint hearted beginner in the subject - even the microfossils shown in the plates are dauntingly difficult to distinguish apart, let alone pronounce! However, even if some of the phrasing and nomenclature used is a bit impenetrable to the non-specialist, what delighted me was how such detailed stratigraphic maps of the strata and past sea movements etc. can be built up for such relatively small areas from micropalaeontological data. Undoubtedly of

great importance to specialists, oil company and service geologists and others working in the field, I found, even as a non specialist, that once into the subject and with a good science dictionary to hand, it is a fascinating book.

Though in hardback and very well produced (as I find all Ellis Horwood productions are) this books price is not going to put it on many non-specialists shelves but I do hope that it will be seen in most libraries.

LIGHT AND LIFE IN THE SEA.

Edited by P.J.Herring, A.K. Campbell, M.Whitfield and L.Maddock.

Cambridge University Press. May 1990. £30 ($59.50) Hardback ISBN 0 521 39207 1. 357 pp.

"This is a change from the rather staid presentation from the Cambridge University Press I knew and loved in the past" I thought to myself when I opened the packaging around this book (a feat in itself as book packaging now certainly keeps the post office at bay but can cause severe damage to the recipients finger nails and letter openers!). Light and life in the Sea has a glossy full colour cover and frontispiece and, while arising out of a symposium organised by the marine Biological Association in Plymouth in April 1989, the editors have worked hard to integrate the various parts into a satisfying whole.

The volume is divided into 18 chapters, a summary, a complete bibliography (so you don't have to find the end of each chapter for the references) and an index. The chapters are in groups of 3 to 5 under 5 headings:- Physics of light in the sea, Photosynthesis and development, Vision, Behaviour, and Bioluminescence. Chapters range from the use of lights as attractants in fishing and bioluminescent communication to light harvesting in algae, optics of the eyes of marine animals and the use of bioluminescence in medicine. Space does not permit a detailed report on all the chapters, suffice to say that their content ranges from broad (eg "the photic zone" by P.Tett) to highly specific (eg "Photoreception in squid" by H.R. Saibil). The chapters are by well known experts, including M.J.Dring, C.Brownlee, E.J. Denton, J.H.S. Blaxter, the editors and others whose contributions are of equal merit.

I was speculating as to whom the book was aimed. The glossy cover, excellent quality of presentation and (relatively) competitive price seem to be suggesting a broad readership. Indeed the backcover blurb states "Intended for all with an interest in the marine environment, this book aims to present the reader with a sampler of the exciting research that is underway and to provide an introduction to its broad compass". However, the contents would not excite, or be well understood by non scientists, but for all practising scientists, marine or otherwise, with an interest in light it's a bargain (even more so if you are a member of the Marine Biological Association and can get it at a five pound reduction!).

The editors, especially Linda Maddock who I understand did most of the detailed editing, and the publishers are to be congratulated on producing a book of such quality in almost exactly a year from the conference.

Dictyocha speculum **(Silicoflagellata, Dictyochophyceae), studies on armoured and unarmoured stages.**

by O.Moestrup and H.A.Thomsen.

The Royal Danish Academy of Science and Letters. H.C. Andersens Boulevard 35, DK-1553 Copenhagen V Denmark. Biologiske Skrifter 37 1990. DKK 100. Softback ISBN 87 7304 207 2. 57 pp.

The (to most) unalluring title belies a little gem of a story unravelling the complexity of the life cycle (but still with question marks) of this species. It also has commercial and ecological importance as heavy rain and fertiliser run off are blamed for seasonal blooms which have caused considerable kills of trout in fish farms (possibly due to a bacterial parasite/symbiont toxin, the irritating properties of the exoskeleton or what? (how about mucilage?). The monograph not only describe (with excellent S and TEM photographs) the armoured stage but also a uninucleate unarmoured stage, a multinucleate unarmoured stage some 50,000 times the volume of the others and an amoeboid stage. Even if you take exception to the proposed relationship between these different stages this monograph certainly shows how much we still have to learn about the life cycles of much of the plankton.

FORTHCOMING EVENTS

5TH INTERNATIONAL CONFERENCE ON TOXIC MARINE PHYTOPLANKTON

UNIVERSITY OF RHODE ISLAND
NEWPORT, RHODE ISLAND.
28 OCTOBER - 1 NOVEMBER 1991

This conference will focus on toxic, harmful and nuisance blooms and species of phytoplankton and their consequences. The scientific program will consist of invited plenary lectures and contributed papers presented either orally or as posters. workshops are also under consideration. Suitable topics include taxonomy, cellular and molecular biology, physiology, biochemistry, toxicology, ecology, environmental regulation, public health, aquaculture and mariculture issues.

Conference proceedings will be published following peer review.

The nearest airport to Newport is at Providence, Rhode Island, about 45 minutes by air from Boston or New York. Newport is located 45 minutes south of Providence, and is served by limousine shuttle.

For more information contact:
Dr. Theodore J. Smayda
Conference Convener
GRADUATE SCHOOL OF OCEANOGRAPHY,
NARRAGANSETT, RHODE ISLAND 02882-1197
USA
Fax 401 792 6160
Tel 401 792 6171

THIRD INTERNATIONAL CHRYSOPHYTE SYMPOSIUM AUGUST 12-16, 1991

An International gathering of scientists interested in chrysophyte algae will be held at Queen's University in Kingston, Ontario, Canada, on August 12-16, 1991. the scientific programme will include three and a half days of plenary lectures, contributed papers and posters, together with various excursions. Each of the full days will focus on one of the following themes: "Phylogeny, Systematics and Evolution", "Development, Physiology and Nutrition" and "Ecology, Paleoecology and Reproduction".

Detailed information regarding the scientific sessions, costs, registration and excursions can be obtained by writing to the Programme Chairman:

Dr. Craig D.Sandgren
Dept. Biological Sciences,
PO Box 413, University of Wisconsin - Milwaukee
Milwaukee, WI 53201, USA.

PS. Anyone wanting to know about cheap flights from the UK to Toronto and car hire etc. contact the editor who has just come back from that region.

VII ASPAB CONFERENCE, ADELAIDE, SOUTH AUSTRALIA JULY 17-20, 1991

The conference will provide a forum for the presentation of papers which either review the status within disciplines or detail new work in areas of interest to the society. Conference symposia are:

Biology of algae and aquatic macrophytes.
(a) Physiology
(b) Taxonomy.
The Ecology of algae and aquatic macrophytes.
(a) Community structure in marine benthic systems
(b) Phytoplankton in coastal and oceanic systems
(c) Ecology and conservation of wetland systems.
Applied issues in phycology and aquatic botany.
(a) Aquaculture.
(b) Biotechnology.
(c) Water quality management.
(d) Coastal pollution and eutrophication.

The conference will include field trips to Kangaroo Island, Robe and sites to the south, Bool lagoon and wetlands of the south east, the Port River, Barker Inlet and a workshop on sampling and experimental design. Accommodation will be in local hotels, University Halls and Caravan and camp sites as required.

CONTACT:

DR. ANTHONY CHESHIRE
CHAIRMAN, 1991 VII ASPAB CONFERENCE
BOTANY DEPARTMENT, UNIVERSITY OF ADELAIDE BOX 498 GPO ADELAIDE SA 5001
AUSTRALIA

SITS VAC

RESEARCH ASSISTANTSHIP, UNIVERSITY OF MAINE

A vacancy exists for a research assistant for a 3 year, National Foundation funded project on the effects of freezing on intertidal macroalgae. Applicants for this full-time professional position which includes full fringe benefits, will be considered from persons with either a B.S. M.S. or Ph.D. in Botany, Biology or a related field. Salary will be between $15,000 and $20,000 depending on prior experience. The position is available starting on Jan 1, 1991. The research is in the area of physiological ecology and would be suitable for someone with an interest or background in benthic (especially intertidal) ecology and/or physiological adaptation and acclimation (eg. of the photosynthetic apparatus) of macroalgae to physical stresses. Applications or requests for further information should be sent to:-

Dr. Ian Davison
Department of Botany,
University of Maine,
Orono ME 04469 USA.
Tel: 207 581 2983
Fax: 207 581 2969

Applicants should enclose a curriculum vitae and arrange for 2-3 letters of recommendation to be sent to Dr. Davison. Applications will be accepted until a suitable applicant is found. The University of Maine is an affirmative action equal opportunity employer.

THE MARY PARKE BURSARY

Mary ('Mamie') Parke, FRS, who died last year, was for almost forty years the senior phycologist at the Laboratory of the Marine Biological Association in Plymouth. She was a founder member of the BPS and was active in the society for many years as Council member, member of the Flora Committee, President and editor of the Journal. Dr. Parke was a leading international figure in the world of algal research, probably being best remembered for her pioneering work on the laboratory culture of species of phytoplankton, though she always retained an active interest in the macroalgae. she therefore had a wealth of phycological experience and she was always prepared to share her knowledge freely with anybody.

As a memorial to Mamie Parke, the Marine Biological association of the United Kingdom and the British Phycological Society have established a joint fund, the Mary Parke Bursary, which will provide financial contributions towards travel or subsistence of scientists wishing to pursue research on phycological topics at the Plymouth Laboratory of the Marine Biological Association. The only condition will be that the recipient should be a member of either the MBA or the BPS. The Fund will be managed jointly by the two Societies.

Mamie Parke always readily welcomed visitors to the Laboratory and such a scheme would have met with her full approval. You are cordially invited, therefore, to subscribe to the fund. Cheques or money orders (payable in **sterling** please) should be made payable to the **'Mary Parke Bursary'.** They may be sent either to the Bursar of the MBA (Dr. G.T.Boalch) or to the Hon. Treasurer of the BPS (Dr. J.Lewis) at the addresses below. Alternatively, for payment by credit card, please complete the authority below (photocopy it so as not to ruin your Newsletter!) and return it to **Dr. Lewis**.

Dr. G.T.Boalch,
The Laboratory,
Citadel Hill,
Plymouth PL1 2PB

Dr. J. Lewis,
School of Biological and Health Sciences
Polytechnic of Central London
115 New Cavendish St.
London W1M 8JS

....

THE MARY PARKE BURSARY

PLEASE CHARGE THE SUM OF .... TO MY *VISA/ACCESS/MASTERCARD/EUROCARD ACCOUNT.

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EXPIRY DATE:.............................SIGNATURE:...

CARDHOLDER'S ADDRESS:..

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NEW HONORARY TREASURER

The Society has a new Honorary Treasurer. She is Jane Lewis. A bright young thing (at least by the socks she used to wear in Oban) she graduated from UCNW Bangor (where else) in 1981 (this is making your editor feel very old) with a degree in marine biology and oceanography. She went on to do a PhD under John Dodge and Paul Tett (winters in London, summers in Scotland, a highly satisfactory arrangement that she thoroughly recommends). The work was concerned with the ecology and taxonomy of dinoflagellates in sea lochs. During her time in Oban she managed to stay relatively sane (well she was there in the summer, unlike the editor who was snowed in for virtually two months in 1978!) although she did develop a partiality for mud (more particularly the dinoflagellate cysts in the mud). and followed her PhD with a NERC postdoctoral award on the subject. After that, and via a stint at the National Audit Office, her interests turned geological, with a two year fellowship to work on Quaternary dinoflagellate cysts from the upwelling area off Peru. She claims this has prepared her to take London by storm again and she now lectures at the Polytechnic of Central London. For hobbies she dives (SCUBA) and is a Rainbow Guide leader (something about those socks again).

She will accept any money that you care to send and her address is given below.

I'm sure that all members of the Society will want to join me in thanking John Green for his excellent contribution and very hard work in keeping the books straight and in the black over more years than he cares to remember. He hands over with the accounts in very good order and the Society in a healthy financial situation. - EDITOR.

Where *are* your officers?

Several offices of the Society have recently changed hands or the holders have moved. We try to give a profile of new officers as they are elected but, as they spend your money (as well as giving a great deal of their time free to the Society) it is useful to have an update of their whereabouts as follows:

Dr. L.A.Terry,
MEMBERSHIP OFFICER
52 Bruce Crescent
Ellon
Aberdeenshire
Scotland
AB4 9BW

Dr. J. Lewis,
HONORARY TREASURER
School of Biological and Health Sciences
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115 New Cavendish St.
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