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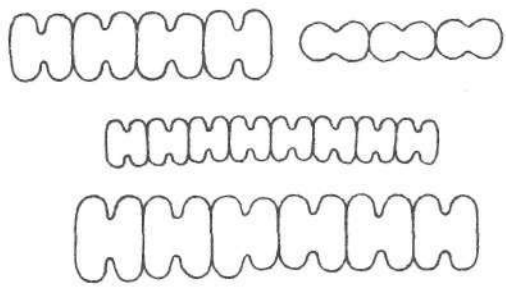
British Phycological Society Newsletter



Editorial

Annual meetings of the Society have probably always taken place in early January; always, at any rate, in the editor's experience. Grumbles about this choice of date have been heard by most of us from time to time, so last year, Council decided to invite members to express their views on the matter. The result was interesting, if dispiriting because only 54 questionnaires were returned. Of these 21 indicated a preference for no change; 12 wished to change to easter, 13 to July and 8 to September. Council decided that it had no mandate for change and therefore we shall continue to meet in January for the forseeable future.

This response, though poor, seemed positively ardent when compared with the outcome of the logo contest (in which we had but two competitors) and that of the field-meeting proposal, which evoked only minimal interest. Perhaps the membership is too busy writing papers and composing grant applications to be moved by initiatives such as these. It is undoubtedly disappointing, however, for those who have the energy and enthusiasm to make them.

Oh well: the Durham meeting was an undoubted and outstanding success with a large (record?) number of papers of consistently high quality. The Society is very grateful to Brian Whitton and his team of expert organisers who ran a very efficient and thoroughly enjoyable conference. Their's will be a difficult act to follow.

The competition for correctly identifying the masthead vignette of the Christmas issue was quickly won. The drawing was "seaweed and periwinkles" by T.A. Stephenson and published in his book Seashore Life and Pattern. Congratulations to Sue Hiscock who won a bottle of claret.

Editor.

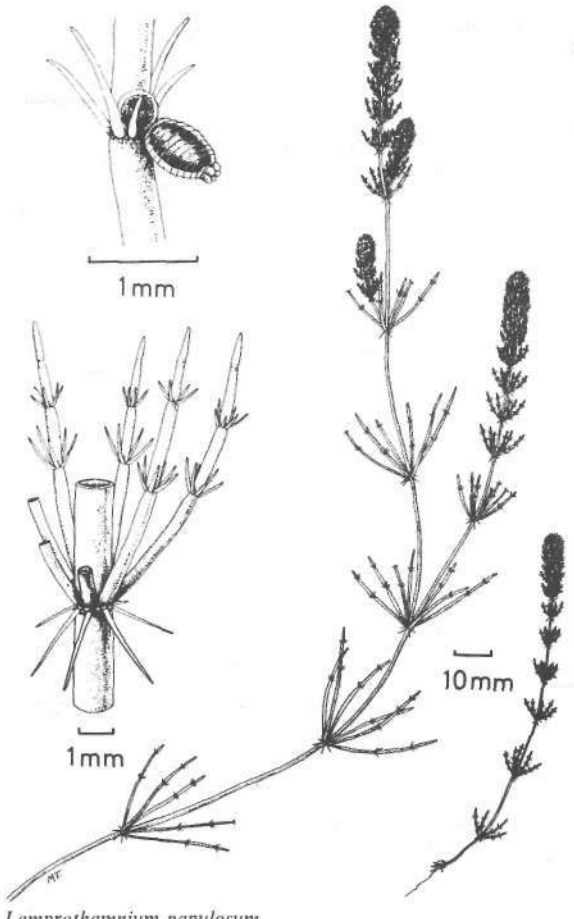
Charophytes — A phycological first and other matters

I wonder if other members of the British Phycological Society have experienced a feeling of mild frustration on being asked if their pet alga has an English name and being unable to provide an answer? Recently I was approached by the Nature Conservancy Council who were seeking legal protection for Lamprothamnium papulosum, a rare charophyte restricted to a few brackish coastal lagoons. So far this is the only lower plant to be proposed by N.C.C. for inclusion in schedule 8 of the Wildlife and Countryside Act (1981) and therefore, in common with the animals and other plants already included in the Act, has to have an English name. I protested that L. papulosum had no such name and to invent one would be meaningless at best and confusing at worst. Eventually I was persuaded and gave Lamprothamnium the semi-descriptive name 'fox-tail stonewort', a concoction which may, at least, have the advantage of preventing Lamprothamnium from being mistranscribed as Lamprothamnion in the pages of Hansard. The criterion under which the plant is to be brought before government is that it is a 'rare species confined to particularly threatened habitats'. It seems strange that a group of neglected algae, of which most graduates have heard little and the general public even less, should achieve a kind of fame (and may even provide a little grisly entertainment on breakfast television in the near future!).

Perhaps the time is right to introduce the Characeae in general and Lamprothamnium in particular, to a wider audience than the handful of aquatic-plant hunters who collect charophytes along with Potamogeton and Ranunculus. If L. papulosum is scheduled in the Quinquennial Review of the Act then all collectors will have to be aware of its appearance so as not to commit an offence by up-rhizoiding it, by mistake or otherwise.

Aquatic-plant enthusiasts tend to be divided into those who are keen on micro-organisms and those who prefer to study angiosperms. Charophytes have usually remained the 'Cinderella plants' ignored by both groups. The Botanical Society of the British Isles, although an organisation primarily devoted to the study of flowering plants and ferns, has done more than any other group to promote interest in British and Irish charophytes. In recent years members of the Society have enjoyed the full co-operation of staff at the British Museum (Natural History) who have undertaken determinations and handled distribution data. This partnership has resulted in the illustrated field guide 'Charophytes of Great Britain and Ireland', BSBI handbook no. 5, published in 1986. The large numbers of records contributed by B.S.B.I. members added significantly to an earlier work, the 'Provisional Atlas of the Characeae of the British Isles' (1983) produced in collaboration with Dorothy Greene of the Biological Records Centre, Institute of Terrestrial Ecology. On completing the Atlas I began work on the Handbook but floundered for a couple of years in the mire of traditional versus revolutionary taxonomy.

Most British and European authors have remained more or less conservative in their approach to charophyte taxonomy whilst the U.S.A. has produced one great exponent of the 'new look', Richard Dawson Wood. His magnum opus 'A revision of the Characeae', illustrated by Kozo Imahori, was published as two volumes in 1964 and 1965. Since it would have taken years of herbarium and experimental work to satisfy oneself as to which of the, often conflicting, views were correct a decision was made to base the book on my own experience but with some reference to the earlier approaches, whether traditional or revolutionary, where these have contributed to an understanding of the plants.

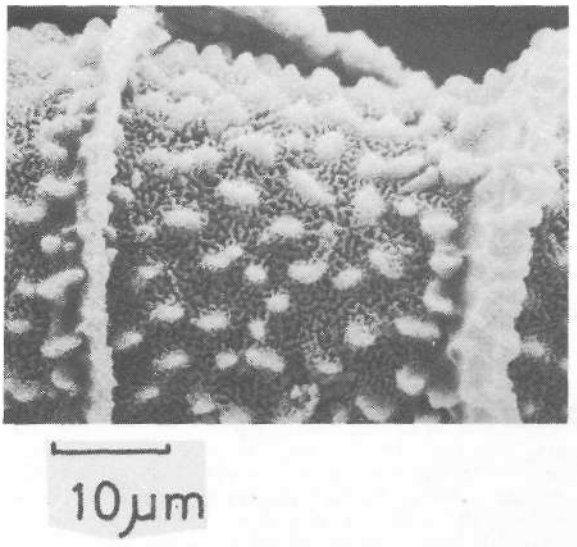


Lamprothamnium papulosum
Showing habit, branchlet whorl and gametangia.

The B.M.(N.H.) has been the main source of information on the Characeae in the British Isles since Guy Oldfield Allen was a regular visitor to the Botany department in the 1940's and 1950's. It houses a fine collection of charophytes including major European and North American exsiccatae as well as the herbarium of H. & J. Groves, G.O. Allen and G.R. Bullock-Webster, amongst others. Many parts of the world are well represented, in particular Europe, North America, southern Africa, the Indian sub-continent and Australia. One part of the G.O. Allen bequest that has proved particularly useful is the large collection of temporary slides in which each specimen is mounted in a little glycerol-formaldehyde mix under a loose cover-glass, the whole preparation being protected by a plastic envelope. The material can be removed from the slides and dissected out more easily than long-dried fragments from herbarium sheets. The collection was also a good source of ripe oospores for scanning electron microscopy in a preliminary investigation of oospore characters recently carried out by David John and myself. This study, especially an examination of the oospores of Nitella species, yielded such satisfying results that we have been encouraged to continue the work during 1987. Another line of research to be followed this year, in collaboration with Leslie Johnson, will be the laboratory culture of charophytes. Our initial attempts in 1986 at transplanting material from the wild have had mixed results. One 'culture' that has done well, more by accident than as a result of our scientific expertise, is a coffee jar containing Chara connivens growing in association with Lemna minuscula, originally collected from Slapton Ley in 1983. Both occupants are doing very well. Whether this co-habitation is mutually beneficial or not is a matter for further investigation.

It is likely that the Characeae will continue to play a major role in the research of the Freshwater Algae Section of the B.M.(N.H.) and we hope that more phycologists will take up the study of charophytes, particularly now that Lamprothamnium is to become a pioneer in algal conservation.

Nitella struthioptila
A portion of the oospore wall as seen under the scanning electron microscope.



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Phycology in Britain III Portsmouth Polytechnic

a) School of Biological Sciences

The School of Biological Sciences is centrally situated in the City of Portsmouth and housed in a modern building that was opened in 1971. The School has 34 full time lecturers and some 29 postgraduates working for higher degrees, distributed in 4 main research groups. Three degrees are offered in the School; B.Sc degrees in Biology and Biomolecular Science and an M.Sc degree in the Biodeterioration of Materials. The B.Sc degree in Biology includes a substantial marine input in the second and third years comprising courses in Marine Ecology, Marine Biology and Applied Marine Biology. A focal point of these courses is the Marine Laboratory situated on the adjacent Hayling Island. Built in the 1930's as a private laboratory for a brewing chemist, Dr Oliver, in order to pursue his hobby of marine chemistry, it was acquired by the Polytechnic in 1965 and permanently staffed in 1969. Initially the laboratory functioned as the principal venue for all marine lectures and practical classes; more recently, however, due to the popularity of the marine options, all teaching was transferred to the main building in Portsmouth, where there is more space for practical classes, and the marine laboratory is now mainly used for research and B.Sc/M.Sc student project work.

The earliest phycological activity associated with the Polytechnic can be accredited to Miss N. Blaikley, a senior lecturer in the then Portsmouth College of Technology. Later, in 1964, Mr Jim Price joined the lecturing staff at the Polytechnic for one year before his appointment as head of the Marine Algae Section at the British Museum (Natural History) and was subsequently replaced in 1966 by Dr W.F. Farnham. Since that time and under the guidance of Professor E.B. Gareth Jones's

Applied Microbiology Research Group the School has become a centre of phycological research in the country. At present Portsmouth has 4 post-doctoral phycologists, 3 of whom are based at Hayling, all actively engaged in teaching and/or phycological research - they are Dr W.F. Farnham (Senior Lecturer), Dr R.L. Fletcher (Senior Research Fellow), Dr Y.M. Chamberlain (Research Fellow) and Dr D. Oppenheim (Research Associate).

Much of Dr Farnham's early work was concentrated on the Rhodophyta in particular the taxonomy, life history and ecology of species of the genus Grateloupia. He also developed a keen interest in the local marine algal flora of the Solent and Isle of Wight and has over the years discovered and subsequently investigated a number of introduced or alien algae including Grateloupia spp., Sargassum muticum and Solieria sp. As a keen diver he has contributed to numerous sublittoral surveys both in the British Isles and abroad and is currently editor of the Underwater Association's newsletter. More recently he has acquired a special interest in the flora of lagoons, particularly species of charophytes. Other interests include algicolous fungi, sponge-inhabiting algae and weed-rafting of shingle.

Dr Fletcher joined the School as a Research Associate in 1971 and since that time and in conjunction with Professor Jones, has been associated with a number of mainly applied research contracts. During the early years he was supported by a Ministry of Defence (MOD) Navy-sponsored contract investigating the ecology, distribution, life history, spore settlement and attachment of marine ship-fouling algae. It is an interest he has maintained throughout his period at Portsmouth and more recently has worked on algal communities developing on toxic surfaces and the influence of surface properties of substrata (e.g. texture, surface energy) on spore and algal settlement. With financial support from the Department of the Environment (DoE) a short study was also undertaken of reproduction in Sargassum muticum. In recent years with support from the Natural Environment Research Council (NERC) (one full-time and one half-time grant) and Portsmouth Polytechnic (half-time support) a taxonomic investigation is being undertaken of the Fucophyceae (brown algae) of the British Isles. The results from this study will form the basis of a contributory volume (Vol. 3) to the series "Seaweeds of the British Isles" sponsored jointly by the British Phycological Society and the British Museum (Natural History). Within the Fucophyceae, the smaller discoid and crustose genera (e.g. Chilionema and Ralfsia, respectively) have received particular attention, especially aspects of their development and life history and possible relationships with larger, brown algal genera.

Dr Y. Chamberlain joined the School in Feburary 1975; she was on the staff of the British Museum (Natural History) from 1954-62 in charge of the Marine Algae Section but 'family reasons' had prevailed for the intervening 13 years. Dr Chamberlain took up work at the Hayling Laboratory on the coralline algae and studied the taxonomy of the small, mainly epiphytic genera Fosiella and Pneophyllum for her Ph.D. degree which was awarded in 1982. This work was mainly voluntary, but a Science Research Council (SRC) Instant Award for the year 1978/79 enabled the final practical work to be completed. Since 1982 she has been on a NERC contract (awarded to Professor Jones and Dr Farnham) to work part-time on "Seaweeds of the British Isles" Vol.1, Part 2B Corallinales and Hildenbrandiales in collaboration with Mrs L. Irvine. In conjunction with this work, she has co-operated in recent years with Dr Wm. J. Woelkerling of La Trobe University, Australia on aspects of algal taxonomy. In 1983 she founded "Coralline News" and is about to produce the eighth edition of this newsletter.

Dr D. Oppenheim joined the School from the University of Bristol in 1985 and is currently employed as a Research Associate on a three year British Antarctic Survey/NERC contract awarded to Professor Jones. She is working on the ecology of epiphytic diatoms growing within the algal felts of the freshwater lakes of Signy Island in the maritime Antarctic. The aims of the project are to determine the seasonal and spatial changes within two different lakes. A 4 month field trip to the Antarctic was undertaken between January and April 1987.

Despite the strong bias towards taxonomic, ecological and floristic studies within the School, it has also become well known for its contributions to applied marine research and has been successful in obtaining industrial funding for postgraduate and postdoctoral research projects. Phycology-related projects undertaken include: "Studies on ship fouling algae with particular respect to attachment" (M.O.D. Navy contracts, 1971-1977 awarded to Professor Jones; Research Associate, R.L. Fletcher): "Studies on microbial slime formation on toxic and non-toxic surfaces with special reference to diatom fouling of ships" (Research Organisation of Ships' Compositions Manufacturers (ROSCM) contracts, 1981-1985 awarded to Professor Jones; Research Assistant/Associate, S. Pyne): "Marine diatoms as fouling organisms" (SRC CASE award, 1977-1980 to Professor Jones; Research Assistant, G.F. Daniel); "Slime fouling on submerged surfaces with particular respect to the influence of hydrodynamic forces" (ROSCM contract, 1984-1987 awarded to Professor Jones; Research Assistant, D.C. Woods): "The effect of low energy surface coatings on algal attachment and development" (Shell Research contract, 1985 awarded to Dr. Fletcher) "The immobilisation of copper by marine fouling micro-organisms" (International Copper Research Association (INCRA) contract, 1983-1986 awarded to Professor Jones; Research Associate, G. Blunn); "Studies on fouling algae with particular reference to Ceramium rubrum" (MOD Navy contract, 1977-1980 awarded to Professor Jones; Research Assistant, A.M. Jones); "Effect of sewage effluent on the growth of micro-organisms in the marine environment" (Portsmouth Polytechnic, 19??-19?? awarded to Professor Jones; Research Assistant, D.F Kane); "The mariculture of marine Rhodophyta in seawater enriched with sewage effluent" (SRC contract, 197?-197? awarded to Dr C.H. Thorp in conjunction with Civil Engineering; Research Associate, M.D. Guiry); "Secondary rhizoid production in the marine red algal genus Polysiphonia" (Portsmouth Polytechnic, 1987-; Part time Assistant, P. Bond); "An investigation of the biology of marine fouling micro-organisms (Hemple Technology contract, 1984-1987 awarded to Professor Jones; Research Assistant, S.M. Jackson).

A number of industry-sponsored projects have also been carried out by students on the School's M.Sc course, particualarly relating to the development and testing of antifouling paints. More recently the School has been offering a number of 'Biotechnical Services' involving field and laboratory use of marine algae as test organisms in toxicity trials. Very similar work is also in progress using non-target marine algae to determine the environmental impact of organotin compounds released from antifouling coatings.

Undoubtedly, however, it was the arrival of S. muticum in the British Isles which had the biggest impact on phycological research in the School. Altogether a total of 10 research personnel were employed between 1973 and 1984 on various grants and contracts awarded to Professor Jones and Drs Farnham and Fletcher from the DoE, NERC, Portsmouth Polytechnic, Hampshire County Council and local harbour authorities. Research Projects and personnel involved include: "Studies on the reproduction of S. muticum" (J. Hales and R.L. Fletcher); "Studies on the ecology, distribution and control of S. muticum" (S.A. Lewey, N. Jephson, A. Critchley and S.L. Morrell); "Studies on the fauna associated with S. muticum" (P.W.G. Gray); "Laboratory growth studies on S. muticum" (A.H.L. Chamberlain, D.F. Kane, S.A. Lewey and J. Gorham); "Biochemistry and physiology of S. muticum" (J. Gorham and S.A. Lewey); "Ultrastructural studies of vegetative and fertile thalli of S. muticum" (A.H.L. Chamberlain, J. Hales and R.L. Fletcher).

At present only the distribution and spread of S. muticum is being monitored by Dr Farnham.

Phycological activity in the School has, therefore, comprised a mixture of both fundamental and applied research topics and it is hoped that this will continue in

the future. Undoubtedly an important contributory factor to the varied nature of the research undertaken is the strong experimental, taxonomic background of the staff which has lent itself very readily to both ecological, and experimental field and laboratory studies. The School is also serviced with good culture, analytical and electron microscope facilities whilst geographically it appears to be uniquely placed with respect to the introduction of new and exotic species. For these reasons both the School and the Marine Laboratory have played host to a number of visiting phycologists and we would like to issue a cordial invitation to any colleagues wishing to work on aspects of the Solent marine flora.

R.L. Fletcher, Y.M. Chamberlain, W.F. Farnham

b) School of Pharmacy and Biomedical Sciences

Research involving marine algae started in the School of Pharmacy and Biomedical Sciences in 1964 when a study was undertaken of the uses and biological activity of commercial seaweed extracts. During the ensuing years several different commercial products were used in field trials and beneficial effects were recorded. These include increased crop yield of potatoes, increased sugar content of sugar beet, increased protein levels in grass, and increases in the "degreening" time of limes. The presence of growth regulatory compounds was investigated and the cytokinin-like activity of commercial seaweed extracts was demonstrated for the first time. Subsequently a number of cytokinins have been characterised.

The presence of betaines in seaweed extracts has been established and the possible beneficial effects of these compounds is being investigated. Analytical methods for these compounds have been developed.

In addition to work on seaweed extracts, collections of British marine algae have been made and the species tested in co-operation with pharmaceutical companies for a wide range of biological activities. The results have been somewhat disappointing as most of the "active" compounds isolated have been known. One success area has been in the area of lectins. Lectin-like activity has been demonstrated in many marine algae, especially in the Chlorophyceae and Florideophyceae. Significant results include the finding of an α-(1, 3)-linked-D-galactose specific lectin in Ptilota plumosa, an anti-sialic acid lectin in Solieria chordalis and an anti-N-acetyl-D-galactosamine lectin in Codium fragile subsp. tomentosoides.

The chemistry, distribution, taxonomic value and biological function of betaines in marine algae are being investigated. All species so far tested have been shown to contain either betaines or tertiary sulphonium compounds. Several of the compounds isolated have been new natural products. A striking feature has been the consistency in the occurrence of particular betaines and tertiary sulphonium compounds in different species of the same genus. Nuclear magnetic resonance spectroscopic and fast atom bombardment techniques have been devised which enable very small quantities of the compounds to be characterised.

Surveys have been undertaken of the economic uses of seaweeds. In particular, the collection and processing, composition and uses of calcareous red algae (maerl) have been investigated.

Currently, research is in progress in collaboration with groups in Tunisia and Venezuela on potentially-economic products from algae of the Mediterranean and Caribbean. The presence of lectins and compounds which inhibit blood coagulation are receiving particular attention.

Staff members involved in the marine work include Professor G. Blunden, Drs D.J. Rogers, C.J. Barwell, S.M. Gordon, D.S. McLellan, T. Mason, W.F.H. McLean and Miss B.E. Smith.

G. Blunden, School of Pharmacy, The Polytechnic, Portsmouth.

Phycology in Britain IV The British Museum (Natural History)

The British Museum (Natural History) originated from the natural history departments of the British Museum. In 1880 they were transferred from Bloomsbury to the present fine Romanesque-style building in South Kensington. These departments were formed in 1856 when each of the so-called branches of the single Natural History Department became autonomous. The collections of Sir Joseph Banks and Sir Hans Sloan form the history basis of the Botany Department. The herbarium and library of Sir Joseph Banks was transferred in 1827 to the custody of the Trustees of the British Museum. Its former custodian, Robert Brown, accompanied the collections and was officially appointed Under-Librarian with the designation of "Keeper of the Sir Joseph Banks' Botanical Collection" (the Banksian Collection). In 1835 it formed the Botanical Branch of the Natural History Department when the Sloane Herbarium and other botanical collections were added to it. Today the Museum has five scientific departments (Botany, Zoology, Entomology, Palaeontology, Mineralogy) whose general aim is to curate the national collections and to engage in research in the field of taxonomy, or systematics. This is a far cry from the original function of the natural history departments at Bloomsbury - "the enlightenment of the philosophically curious".

History of Phycology in the Museum (1850 to present)

Robert Brown was succeeded in 1859 by J.J. Bennett as Keeper of the Department of Botany. The first Keeper to have an interest in algae was William Carruthers (1871-1895) who when an assistant in the Department wrote the account of the Diatomaceae in J.E. Gray's "Handbook of British Water-weeds" published in 1864. Gray was Keeper of Zoology (1840-1875) at the time and his wife, Emma, was interested in seaweeds and assisted Bennet in the curation of the British and of the general collections of algae. She was commemorated by her zoologist husband who named a green algal genus after her. This genus, Grayemma, is now placed in the synonymy of Anadyomene Lamouroux. Carruthers was succeeded as Keeper by G.R.M. Murray who was primarily a phycologist with an interest in diatoms as well as other algae. He published over forty papers on cryptogams and oceanography and retired due to ill-health in 1905. Antony Gepp was appointed (as an assistant in charge of cryptogams) in the same year (1896) Murray became Keeper. So began a long association with the Museum which continued almost to his death (1955) at age ninety three; this was occasioned by a fall down Museum stairs. One of his interests was marine algae and many of his publications are jointly authored with his wife (nee Ethel Sarel Barton). She was an unofficial worker in the Department, both before and after their marriage in 1900. Murray acknowledges the help given by Gepp and another departmental assistant, James Britten, in completing the Department of Botany's entry in The History of the Collections contained in the Natural History Departments of the British Museum published in 1904. Much of the above information and that given concerning the early collections is taken from this important work.

The four Keepers of Botany (Rendle, Ramsbottom, Taylor, Dandy) to follow Murray were not phycologists. Algal studies were undertaken by the Gepps and by Geoffrey Tandy, who joined the Department as a cryptogamist in 1926. Tandy, like the Gepps, had an interest in tropical and subtropical marine algae, but his publications were few in number. Professor Lily Newton (nee Batten) made use of the extensive seaweed collections in the Department when writing a Handbook of the British Seaweeds; this was published by the Trustees of the Museum in 1931. In the preface to this work is acknowledged the assistance given by both Antony Gepp and Geoffrey Tandy. During the time of Gepp and Tandy many diatomologists came to study the diatom collections including John Rattray, N. Ingram Hendey, among others. Hendey first came in the early 1930s to work on the R.R.S. Discovery collections and his association with the Department continues to the present. In 1936 Robert Ross joined the staff and became responsible for the diatom collections. He succeeded Tandy in 1966 as Keeper of Botany and was the first phycologist to hold this position since Murray. Ross held the presidency of the British Phycological Society in 1969-1970. Some of the greatest changes in the organisation and structure of the Department took place during the keeperships of Tandy (1956-1966) and Ross (1966-1977). These included the creation of three separate algal sections (Marine Algae, Freshwater Algae, Diatoms) and the insertion of a mezzanine floor in the east wing of the Museum, so placing an exhibition gallery, library and laboratory above what is now the Cryptogamic Herbarium. The planning of the gallery was entrusted to John Cannon who is the present Keeper of Botany. On completion of the mezzanine floor in 1958 all the algal collections were transferred from the central towers to the new herbarium although the Diatom Section moved back there in 1973.

The beginnings of three separate algal sections can be traced back to 1936 when Robert Ross was appointed to deal with the diatom collections, Tandy remaining nominally responsible for the rest of the algae. Tandy left in 1939 to join the RN and did not return to the Museum. In 1949, Linda Irvine (nee Newton) joined the staff, taking over many of Tandy's responsibilities. For some of those intervening 10 years the curation of the algae along with most of the other cryptogams had been undertaken by Mr A.H. Norkett. Yvonne Chamberlain (nee Butler) replaced Linda when she resigned in 1954 and Yvonne left in 1962. The present incumbent, Jim Price, was appointed in 1963; two years later, Ian Tittley joined the Section on transfer from the Lichen Section. Ross had been joined in 1951 by Pat Sims and they shared responsibility for the freshwater algae with Linda Irvine and later Yvonne Chamberlain. Indeed, Yvonne's assistant Shirley Phillips spent a good deal of her time curating the charophytes. This group of freshwater algae had previously been dealt with by G.O. Allen, a regular visitor to the Herbarium from the time of his retirement from the colonial service in 1936 to within a few years of his death (1963). Soon after the appointment of Jim Price, the collections of marine algae were separated from the freshwater algae and responsibility for the latter passed to the Diatom Section. Ross became Keeper of Botany in 1966 and a year later Barry Paddock was appointed as the new head of the Diatom Section. Linda Irvine rejoined the Department and began work in 1964 on the red algae for the project Seaweeds of the British Isles, firstly as research assistant to Peter Dixon and later as permanent member of staff and co-author. A Freshwater Algae Section was formed in 1967 with David Hibberd appointed as its first head. He resigned four years later to take up a position at the Cambridge Culture Centre of Algae and Protozoa. His position remained unfilled and the Diatom Section again became nominally responsible for overseeing the activities of the Freshwater Algae Section; David's last assistant, Mrs Jenny Moore (nee Monk), was responsible for its everyday running. A report by a visiting group of scientists to the Department of Botany recommended the appointment of a new head to the Freshwater Algae Section. In 1980 the position was filled by David John and two years later Leslie Johnson joined the Section on transfer from the Department of Mineralogy. All the algal sections have a staff of three, Stuart Honey having joined the Marine Algal Section in 1971 and David Williams the Diatom Section in 1979.

The Algal Collections

It seems that algae were poorly represented in the collections before about 1850. The Keeper of Manuscripts is reported as having been angry and disgusted to find no collections of seaweeds in the Department of Botany when he visited it in May 1847 with his children to look for specimens. It was not until the second half of the nineteenth century that the Department through bequest or purchase began to acquire a number of important collections of algae. Some of the most noteworthy of these collections are as follows: G.O. Allen (Characeae), E.A. L. Batters (marine algae), F.E. Fritsch (mostly freshwater algae), R.K. Greville (diatoms), H. and J. Groves (Characeae), A.H. Hassall (freshwater algae), E.M. Holmes (marine algae), E. Jenner (mostly desmids), F.T. Kuetzing (diatoms), E. O'Meara (diatoms), J. Ralfs (mostly diatoms, desmids also well represented), W. Smith (diatoms), W.B. Turner (mostly desmids), F.M.J. Welwitsch (many algae including diatoms), W. and G.S. West (freshwater algae). In 1961 an important agreement (the Morton Agreement) was signed between the Trustees of the Museum and the Royal Botanic Gardens, Kew, for the division of accession and research activities. As part of this agreement it was decided that the Museum should be responsible for taxonomic work and enquiries on algae, Bryophyta, and lichens, and Kew should be responsible for fungi, Gymnospermae, Orchidaceae and Gramineae. This resulted in the transfer by 1969 of the Kew specimens of algae, bryopyta, and lichens to the Museum and of the fungi to Kew; these specimens for legal purposes are regarded as being on permanent loan. A preliminary list of the algal herbaria in the Museum was published by Linda Irvine (as L. Newton) in the first issue of the British Phycological Bulletin (1955: 14-19) whilst in this same issue Carola Dickinson (1955: 11-14) listed the collectors who had contributed seaweeds of Great Britain and Ireland to Kew (now in BMNH).

The superb collections of algae and other cryptogams in the Museum are due in large part to the policy, instigated in the second half of the nineteenth century, of enlisting staff to deal with particular groups. Also to the encouragement given to them to organize or participate in expeditions and field meetings with a view to developing and diversifying still further the collections. For instance, in the late 1960s and early 1970s there was an expansion in the collections of the Marine Algal Section as a consequence of the strong support they gave to area field meetings of the British Phycological Society. There is now a collection of living algae housed in a culture laboratory in the Freshwater Algae Section. These cultures are mainly green algae (principally 'chaetophoralean' algae or Spirogyra spp.) used in the Section's own research programme. The sections are usually willing to accept well-organised collections of algal material in good condition for incorporation into the Herbarium. Acceptance is at the discretion of the sections and so the relevant Section should be contacted first if you wish to deposit algal material in the Herbarium.

Phycological Research (1980 to present)

Marine Algae Section: This Section specializes in the preparation of species check-lists, distributional bibliographies, county mapping, shore surveys, and generic monographs. Many parts of Britain (e.g. Cornwall, Lincolnshire, Kent, Sussex, Essex) have been studied by the Section. Recently it has been involved with contracted surveys along the south-east coast of England especially in connection with the Channel Tunnel and driftweed problems. Mr J.H. Price has published the findings of shore and subtidal surveys he has undertaken in various parts of the north and south Atlantic including mainland coasts and various islands (Antigua and Ascension, with Dr David John; Faroes, with Dr W.F. Farnham). For 20 years, he has been re-appraising the marine algae of West Africa (with Professor George Lawson and Dr David John) and last year the fourth part (dealing with the Rhodophyta, Florideae, genera A-F) was

published. He is involved in a long-term investigation into the biology and taxonomy of the complex, virtually pan-Atlantic filamentous red alga Callithamnion (6 papers so far published). To assist in resolving difficult taxonomic problems in this genus he has undertaken electrophoretic studies, in collaboration with John Pettit and Steve Russell of the Fine Structure and Histochemistry Section (now Cell Biology) and is soon to begin DNA analysis with Dr Peter Gacesa of the Department of Biochemistry, University College, Cardiff. Jim has also published historical works on such eminent phycologists as Harvey (including Phycologia Britannica), Dawson Turner (Fuci . .) has been involved with shore surveys in various parts of the British Isles, as well as the Faroes and in Canada. He has written papers on such surveys in the Firth of Forth in Scotland (with Dr M. Wilkinson), Sullom Voe in Shetland (with Drs D.E.G. Irvine, W.F. Farnham and R.L. Fletcher), and in the Faroes (with Ds W.F. Farnham and P.W. Gray). Ian has also researched and published on the algal flora associated with man-made structures in the southern North Sea. In co-operation with Professor Robin South he has recently published a check-list of the marine algae of the North Atlantic and is currently subjecting the data to biogeographic analysis using a cladistic method. He has been involved in producing catalogues of the algal types in the collections and geographic indices. Mr Stuart Honey has been involved with Jim Price investigating the distribution of marine algae around the Lizard peninsula as a precursor toward a marine Flora of Cornwall. He has also assisted Ian Tittley in preparing the type and geographical catalogue of the collections.

Since the 1960s the Museum and the British Phycological Society have co-operated in producing Seaweeds of the British Isles with the Deputy Keeper of Botany (Mr Peter James) chairing the 'Committee for Marine Algal Flora' between 1978 and 1983. Mrs L.M. Irvine has been involved with the research for and the compilation of parts of the first volume of this Flora (dealing with the Rhodophyta), initially with Professor P.S. Dixon and more recently with the assistance of such specialists as Drs W.F. Farnham, M.D. Guiry, and C.A. Maggs. The next part, on the Corallinales and the Hildenbrandiales, is currently being written in collaboration with Dr Y.M. Chamberlain. Mrs Irvine has co-authored, with the specialists mentioned above and others, many papers dealing with the taxonomy of certain difficult groups and with complicated problems of nomenclature. Research is in progress on Hildenbrandia (with Dr C.M. Pueschel), on geniculate corallines (with Dr H.W. Johansen) and on generic concepts in non-geniculate corallines (with Dr W.J. Woelkerling).

Diatom Section: This Section curates the largest diatom collection in the world, with over 200,000 slides and large numbers of bottle and boxed samples. Its three members between them cover marine, freshwater, recent and fossil diatoms. Research in the Section uses the Field Emission Scanning Electron Microscope to make a close study of the structure of diatoms and applies this knowledge to the revision of genera. Mr T.B.B. Paddock has completed light and SEM studies on a number of genera of raphid diatoms including Stauropsis, Surirella, Amphiprora, Nitzschia, Auricula, Undatella, and Proboscidea (the last four jointly with Pat Sims). He is presently researching the Fastuosa group of Surirella and reviewing the genera Tropidoneis and Mastogloia; the latter with Klaus Kemp. Miss P.A. Sims previously worked with freshwater diatoms but now researches fossil marine diatoms. She has published accounts of the structure and taxonomy of Epithemia, Aulacodicus (with Professor R. Holmes), Gomphonitzschia and Gomphotheca (with N.I. Hendey), the Biddulphiaceae (with R. Ross), fossil Biddulphioid diatoms (with N.I. Hendey), and various other genera with Barry Paddock (see above). She is presently continuing work with Professor G. Hasle and Dr G.A. Fryxell on a major revision of the Coscinodiscaceae. Mr David Williams studies araphid diatoms and has published a review of the genus Diatoma and a paper on Synedra. He is currently investigating Tetracyclus and is re-evaluating the generic boundaries of Synedra and Fragilaria, partly in conjunction with Professor F.E. Round.

Freshwater Algae Section: The Section has been carrying out research into the taxonomy and ecology of freshwater green algae, principally belonging to the families Characeae and Chaetophoraceae. In addition, it has undertaken ecological surveys of marl-rich lakes in the Irish midlands, the non-tidal reaches of the River Thames, and a spring-fed pool in the Pang Valley (contracted survey). These surveys provide important additions to the Section's collections of preserved and of cultured algae. Dr D.M. John has a long standing interest in African algae and has recently published a review of the aquatic plants of the inland waters of tropical West Africa, completed a second edition of a book on the region's marine algae (with Professor G.W. Lawson), and is preparing an account of the desmids of Ghana (with Dr J.F. Gerrath). He wrote a review of the chaetophoralean algae which was published in the proceedings of a symposium entitled Systematics of the Green Algae organised by David Irvine and himself in 1983. In collaboration with Dr L.R. Johnson he has been studying the biology and taxonomy of Pseudendoclonium and other related genera of green algae using video-recording techniques they have recently developed. He and Mrs J.A. Moore are undertaking a scanning electron microscope examination of the oospores of selected Characeae species in order to study the little-known details of their wall ornamentation and to assess its possible taxonomic importance. Mrs J.A. Moore has produced with Mrs D.M. Greene a catalogue of the Characeae collections in the BMNH and a provisional atlas of the distribution of Characeae in the British Isles. Last year the Botanical Society in the British Isles published her handbook of the Characeae of the British Isles and Ireland. She is currently preparing a catalogue of the Characeae types in the BMNH and a geographic index (with Ian Tittley). Dr L.R. Johnson recently published with David John a review of the genus Microthamnion and is currently investigating in culture several chaetophoralean algae (some jointly with David John) and the genus Spirogyra. He has also been undertaking an investigation of the Museum's holdings of the historical collections of W. and G.S. West, probably the two most eminent British freshwater phycologists.

Phycological research in the Museum thus extends back beyond the turn of the century to when Murray was the Keeper of Botany. Nevertheless, it is only since the last war that significant resources have been channelled into phycology and have led to the establishment of three sections involved with the curation and research of algae. This development is reflected in the great increase in research papers on algae emanating from staff of the Department of Botany (6 in the 1963-1965 triennial report of the BMNH, 31 in the 1981-83 report). In the last twenty years various service sections and units (Electron Microscope, Biometrics and Computing, Cytology and Histochemistry) have been formed, playing an important role in certain aspects of phycological research. Financial constraints are increasingly affecting the research programmes in phycology and the sections are actively looking for ways of generating income including undertaking contract work. Despite such constraints the sections remain responsive to the need to supply reliable taxonomic information on the algae and much collaborative research still takes place between Museum phycologists and those in other major institutions.

Acknowledgements

I wish to extend thanks to all my colleagues in the phycological sections for giving me every assistance in preparing this article and to Robert Ross (former Keeper of Botany and Head of the Diatom Section) for useful information on the post-war history of the Department of Botany.

David M. John, Department of Botany, British Museum (Natural History), Cromwell Road, London SW7 5BD, U.K.

Letters to the Editor

Dear Colleague

I am working on a series of review papers concerning algae-metal interactions. Zinc has already appeared in Acta hydrochim. hydrobiol. (13, 185 and 14, 1986), cadmium will appear in Toxicity Assessment and other metals, such as Pb, Cu, Cr, Ni and Hg are in preparation. In order to gather as much as possible data I would greatly appreciate receiving papers concerning algae-metal interactions (i.e. toxicity, accumulation, cellular compartmentalization as well as occurrence and chemistry of metals in freshwaters).

Thank you very much for your co-operation.

Van Vymazal, Water Research Institute, Department 232, Podbabska 30, 160 62 Praha 6, Czechoslovakia.

Dear Dr Russell

A new exsiccata (supervised by Prof. J.L. Perez-Cirera)

Algae Ibericae containing benthic marine algae from the N.O. part of Iberian Peninsula is prepared for exchange to those institutions or phycologists interested. We have only 8 stocks.

Series I of this exsiccata will contain 25 numbered specimens of benthic marine algae of the region Galicia (Spain) on the labels are mentioned: title, family, algal class, name, authority, date, locality, ecology, collector, identificator, annotations. The material for a second series, also containing 25 numbers, is already collected and ready for shipment and a third series is in preparation.

Please sent requests to: Prof. J.L. Perez-Cirera, Departamento de Biologia Vegetal, Universidad de Santiago de Compostela, Santiago de Compostela, Spain.

New Publications

A NEW JOURNAL FOR THE LATEST RESEARCH IN ALL ASPECTS OF MICROBIAL, PLANT AND ANIMAL FOULING

Next autumn, Harwood Academic Publishers will publish the first issue of BIOFOULING, an international interdisciplinary journal covering pure and applied aspects of biofouling in the aquatic (freshwater and marine) or aerial environments and process plant. Medical, industrial and agricultural biofouling are also included. The journal will contain a broad range of papers, with emphasis on the effects of fouling, studies relevant to fouling, and on fouling prevention. BIOFOULING will be of interest to biologists, microbiologists, biomedics, chemists, engineers, metallurgists and naval architects.

The editors and the publisher invite contributions to the journal, which will contain original research papers, short communications of new results, review articles on topics of current interest, news items and book reviews. Manuscripts can be sent to the editor-in-chief or one of the regional editors, and notes for contributors are available from the publisher or any of these.

Dr Len Evans (Editor-in-Chief), Department of Plant Sciences, The University, Leeds LS2 9JT, U.K.

Dr Paul Boyle (Regional Editor), Edgerton Research Laboratory, New England Aquarium, Central Wharf, Boston, MA 02110, U.S.A.

Dr Maureen Callow (Regional Editor), Department of Plant Biology, Birmingham University, P.O. Box 363, Birmingham B15 2TT.

Dr Madilyn Fletcher (Regional Editor), C.O.M.B., University of Maryland, 600 E. Lombard Street, Baltimore, Maryland 21202, U.S.A.

Dr Kevin Marshall (Regional Editor), School of Microbiology, The University of New South Wales, Kensington, N.S.W. 2033, Australia.

Harwood Academic Publications, P.O. Box 197, London WC2E 9PX, U.K.

ALGAL BIOFOULING

The book Algal Biofouling, edited by L.V. Evans and K.D. Hoagland has recently been published by Elsevier Science Publishers, Amsterdam, 318 p. (Dfl. 190 £60). This volume is the result of an international symposium on algal biofouling sponsored by the Phycological Society of America at the 1985 meetings in Gainesville, Florida. It consists of 18 chapters covering both marine and freshwater aspects.

L.V. Evans, Department of Plant Sciences, Baines Wing, The University Leeds LS2 9JT

SEAWEEDS OF THE BRITISH ISLES : NEW TITLES

Two new titles are now available in this standard reference work.

Volume 3 Part 1 Fucophyceae (Phaeophyceae) R.L. Fletcher. £30.00

Volume 4 Tribophyceae (Xanthophyceae) T. Christensen. £7.50

SPECIAL OFFER to members of the British Phycological Society: both books available at the reduce price of £32.00, post free.

Payment with orders should be sent to: Publications Sales, British Museum (Natural History), Cromwell Road, London SW7 5BD

News and Announcements

MARINE ALGAL RECORDS FOR BERWICKSHIRE?

Dr Gavin Hardy is compiling an inventory of the marine algae of Berwickshire and would be grateful to receive any algal records from members who may have worked on its famous coastline. Records should be sent to Dr F.G. Hardy, Department of Plant Biology, The University, Newcastle upon Tyne, NE1 7RU.

PROCHLORON

We have a number of freeze-dried samples of Prochloron cells, obtained from several hosts in several locations, which are available for specific biochemical analyses. If you want small samples (tens or hundreds of mg) for research on this prokaryotic green alga, please write to: Ralph A. Lewin, A.002, UCSD, CA 92093, U.S.A.

CONSERVATION ASSOCIATION OF BOTANICAL SOCIETIES (CABS)

The British Phycological Society is a member of this Association formed in 1985 to bring together the various botanical societies and other organisations concerned with the flora of the British Isles. It aims to coordinate its membership to respond to national issues having implications for botanical conservation and to threats to plant species and sites of botanical interest. In furtherance of its aims the Association is to publish a newsletter known as Plant Press. This publication will inform on current, planned and anticipated conservation activities by the societies and other bodies, cover debate on conservation issues, and provide a medium for the exchange of information. The full time Conservation Officer, Nick Stewart, would welcome receiving from members of our Society news, views, and other information concerning conservation issues. All communications should be addressed to Mr Nick Stewart, CABS, South London Botanical Institute, 323 Norwood Road, London SE24 9AQ.

The Society's representatives are Ian Tittley and David John, British Museum (Natural History), London who can be contacted for further information.

CHROMOPHYTE ALGAE : PROBLEMS AND PERSPECTIVES

Systematics Association Symposium,
Plymouth 5-9 April 1988

The aim of this international symposium is to draw together phycologists, protozoologists, mycologists and other biologists to consider the current status of the Chromophyta (chlorophyll a and c containing algae). Particular attention will be given to the ultrastructure, biochemistry, physiology, systematics and phylogeny of this diverse group of organisms. Sessions will include keynote addresses and volunteered contributions. There will be poster sessions and informal workshops.

For further information and for submission of talks, posters and workshops contact: Dr J.C. Green, Chromophyte Symposium, Marine Biological Association UK, The Laboratory, Citadel Hill, Plymouth PL1 2PB, U.K, tel: 0752-221761 or Dr B.S.C. Leadbetter, Chromophyte Symposium, Department of Plant Biology, University of Birmingham, P.O. Box 363, Birmingham B15 2TT, U.K., tel. 021-472 1301, ext. 2573.

7TH SCIENTIFIC MEETING OF THE INTERNATIONAL SOCIETY FOR EVOLUTIONARY PROTISTOLOGY

Royal Holloway & New Bedford College, London
20th - 23rd/24th July, 1987.

Cost: Estimated £180 for full package (4 days accommodation, meals, banquet & registration fee)

Proceedings: To be published in Biosystems (eds. D.J. Patterson, M.A. Sleigh, Ø. Moestrup, S. Moss, P. Rizzo

Programme themes include:

The evolution of flagellar and ciliary systems
(Chairmen: M. Melkonian, M.A. Sleigh)
The evolution of the genome and of nuclei
(Chairmen: T. Cavalier-Smith, M. Sogin)
Organellar evolution & Symbiosis
(Chairmen: L. Rothschild & J. Whatley)
Evolution around the species level
(Chairmen: P-M. Daggett, A.N. Other)
Major lines of protistan evolution
(Chairmen: M. Ragan, F. Spiegel)
Evolutionary Protistology, concepts & techniques
(Chairmen: A. Adoutte & D. Lipscomb)
Phylogeny of rumen fungi
(Chairman: I.B. Heath)

Co-ordinating organizer: D.J. Patterson, Department of Zoology, University of Bristol, Bristol BS8 1 UG, England

INTERNATIONAL PHYCOTALK SYMPOSIUM

DECEMBER 18-21, 1987

The Centre of Advanced Study in Botany, Banaras Hindu Univesity is organizing an International Phycotalk Symposium from December 18-21, 1987. The number of participants/delegates will be restricted to 125.

The Symposium will cover invited lectures, keynote addresses, popular talks, contributed papers, topical reviews, phycology curriculum improvement aspects and poster presentations. Sessions will be devoted, inter alia, to the following broad themes : Developmental phycology, Applied phycology, Environmental phycology, and General phycology.

Professor Dr H.D. Kumar, Convener, International Phycotalk Symposium, Botany Department, Post Box 14, Banaras Hindu University, Varanasi-221005, India.

Dr S.P. Singh, Co-Convener, I.P. Symposium, Botany Department, Banaras Hindu University, Varanasi-221005, India.

MELBOURNE '88

The official conference travel agents for the 3rd International Phycological Congress are Sunset International, 102 Pendlebury Road, Swinton, Manchester M27 1AZ. Members requiring information on travel arrangements for the congress should contact Mr G. Oliver or Mr J.R. Harding at the above address or telephone 061-793 0058.

Editorial address **G. Russell, Department of Botany, The University, Liverpool L69 3BX, England.**

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