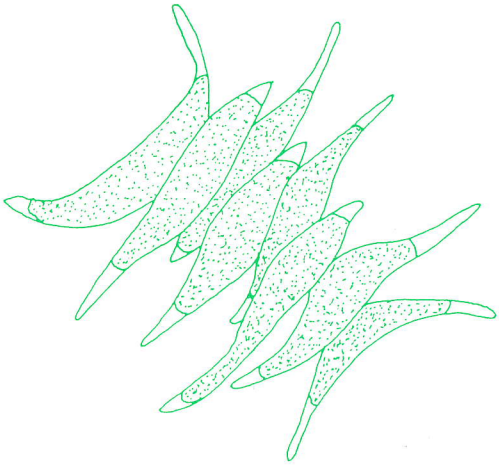
The Phycologist



The Newsletter of The British Phycological Society

NUMBER 32 - JULY 1992

CONTENTS OF ISSUE 32

EDITORIAL - SUMMER MADNESS

This summer number is the "flexible" issue of The Phycologist". Here we are not bound by the (welcome in many ways) constraints of having certain contents that we must include (see issue 31 for details). Thus, I hope, the summer issue will become the place for interesting articles of all kinds. I must particularly commend my associate editors for all the hard work they have already put in to begin to build this issue into an interesting and important vehicle of phycological information. While we are not trying to create a new Journal of any sort, there is a wide variety of phycological information that has no easy resting place elsewhere.

I would particularly like to bring to your attention the article by Gavin Hardy on the Newcastle and Sunderland Museum phycological collections. Some time ago the newsletter published an annotated list of the known phycological collections in the British Isles. David Williams, with the help of Gavin Hardy and, I hope, others has taken on the task of revising and updating this list and "commissioning" a series of articles on at least the main collections. Not only will this series be, I hope, interesting, but also be an important reference work to the extant collections.

Of more immediate interest perhaps, as I have already this year had reports of the "scum" is the article by Michael Attwood of the NRA, Anglian Region on the NRA's research and development work into the prediction and control of toxic blue-green algal blooms. This article was a result of the highly successful applied day at the Winter Meeting in Birmingham in January.

Apart form notices of future meetings in this and the other two issues of The Phycologist each year we hope to more formally establish sections on the following topics:

Book reviews:

The Phycologist is becoming ever more recognised by publishers as a suitable vehicle fo book reviews. If anyone out there fancies themselves as a critic, then please contact me with some idea of the areas they would be happy to review.

A Regular Correspondence Column:

Well, this one is really up to you. However, do remember that with three publications per year your carefully thought out arguments will no longer have to wait years to get into print!

A Guest Editorial:

Know anyone who wants to sound off about their subject or their views? Any suggestions? any offers?

NEW COPY DEADLINES:

JANUARY 31
MAY 31
SEPTEMBER 30

CORRESPONDENCE

Europe still in the running

Leiden, 13 May 1992

Dear Editor,

In his report in The Phycologist on the Winter meeting of the BPS, January 6-9 1992 dr. M.J. Dring gave a personal view about the Foundation Meeting of the proposed 'European Federation of Phycological Societies'. That was a frustrating event because it became a non-meeting: too few participants from continental Europe were attending. In his report Dr. Dring suggests European members should send in their views about why so few of them attended this meeting and about whether there is really a need for a EFPS. Well, I will try to explain:

In the first place, funds for travel are diminishing also in other European countries. Thus, shortly after the Durham meeting, it is almost impossible to find funds to travel to another country for another scientific meeting.

In many countries teaching starts in the second week of January, thus travel is almost out of the question.

Although Trevor Norton had suggested to hold the Federation foundation meeting with the January 1992 BPS meeting, it was only agreed at the preliminary 1991 meeting in Germany that 'a formal founding meeting of the Federation must be held in the near future.' However, it was also agreed that a small committee of representatives of Germany, France and the United Kingdom should draft the statutes, that it should be tried to have some draft version ready before the August 1991 Durham meeting and that the draft statutes would be sent to local societies for commentary. During the Durham meeting the draft version was not yet ready and I have not seen one until now. Thus there was no possibility to have a Federation founding meeting - those international activities take more time than often expected. Nevertheless, the initiative for the foundation of a EFPS resulted in activities in several countries. In my country we formed a Phycological section of the Royal Dutch Botanical Society, intentionally founded to become a member of the European Federation. We think such a federation can stimulate phycology and phycologists in many European countries as well as the necessary internationalization of our activities. In my country we are in favour of the future federation and we hope to join and found it in near future, although we understand that founding such an international structure takes some time. We are looking forward to participate and hope to see many of the BPS members at the Seaweed symposium in Brest or at other meetings. If funds and time are available, we may even come to Swansea next year.

Dr. W.F. Prud'homme van Reine
Rijksuniversiteit Te Leiden
Rijksherbarium/ Hortus Botanicus
P.O. Box 9514, 2300 RA Leiden, The Netherlands

Colour Blind

Editors,

I note that you have chosen to retain the previous lurid green for the new style newsletter. I suppose people like it but green is not the only colour Phycologists get excited about. I have heard that red, brown and even an eye-boggling blue can get a phycologist into a frenzy of professional excitement. How about ringing the changes, at least now an again.

C.B.Chroma, Greenham.

The Editor Replies:

I only publish this letter in the interests of free speech - someone might take it seriously and then hours of Council time will be taken up in discussing shades. - Remember C.B., it all looks different to the fish - and your name and address is decidedly fishy!

THE IRENE MANTON PRIZE FOR THE BEST RESEARCH STUDENT TALK

Council of the Society have agreed that a prize in the region of £150, together with a Certificate, will be awarded annually for the best paper delivered at the Winter Meeting by a research student. The paper should be delivered during the student's PhD (or other degree) period, or within one year of the degree being awarded. The prize will be awarded on the evening of the Conference Dinner, starting at the Swansea meeting, 4-7th January 1993. The following points should be borne in mind.

1) The Secretary should be informed at the time an abstract is submitted if the author wishes the paper to be considered for the prize. At this time the supervisor(s) should also provide a letter stating that the work to be reported was essentially carried out in its entirety by the research student, although one or more supervisors names may appear on the list of the authors of the paper.

2) Papers will be judged by a panel of 5 senior members of the Society, and the programme will be organised such that no two contenders speak simultaneously.

L.V.Evans, Chairman: Evaluation Panel.

WINTER MEETING 1993

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THE BRITISH PHYCOLOGICAL SOCIETY WINTER MEETING

SWANSEA, JANUARY 4-7 1993

The BPS Winter Meeting 1993 will be held at the University of Wales, Swansea from Monday 4th January to Thursday 7th January 1993. The local secretary is:

Dr. Kevin Flynn. Biological Sciences
University of Wales, Swansea
Singleton Park Swansea SA2 8PP

Tel: 0792 295726 Fax: 0792 295447

The format of the meeting will be similar to that in Birmingham in 1992, with an "Industry Day" on the Tuesday. That day will see the consideration of topics appropriate to water companies and other bodies associated with the well being of inshore and coastal areas.

Topics which could be considered include:-

"Nuisance" algae (by appearance, odour, toxicity etc.) and changes in algal communities with respect to dissolved and particulate discharges (domestic, industrial, agricultural).

The effects of thermal pollution, barrages and other coastal engineering projects and the introduction of alien species.

Fouling and antifouling

Mariculture, including feed for fish and shell fish and macrophyte production.

Any offers, or suggestions for the content and promotion of this meeting would me much appreciated. Please send any comments either to the local secretary or to:-

Dr. R. Fletcher
The Marine Laboratory, Portsmouth Polytechnic
Ferry Road Hayling Island, Hants PO11 ODG

100 YEARS OF MANX MARINE BIOLOGY

By Trevor Norton

Liverpool University's Marine Laboratory at Port Erin on the Isle of Man celebrates its Centenary this year. It was founded by Sir William Herdman, F.R.S., who was the first to show that there was a spring plankton bloom in the sea. He also demonstrated the patchiness of plankton distribution and the relevance of plankton to fisheries.The Laboratory has long been famous for its work on algae. Although Herdman's daughter Catherine carried out pioneering work on sand-dwelling dinoflagellates, the phycological tradition was inaugurated largely by Margery Knight and her protege, Mamie Parke. Together they produced "Manx Algae" in 1931, a comprehensive account of all the local seaweeds, and also an excellent paper on the biology of *Fucus*. Dr Parke published a superb account of the growth of *Laminaria saccharina* - the first extensive study of the growth and reproduction of a subtidal plant.

Thanks to Herdman Port Erin was the first centre for aquaculture in the British Isles. Among the organisms cultured were oysters and Mamie Parke was asked to grow algal food for the shellfish. As a first step she isolated flagellates from the plankton and was surprised to find that she could not identify most of them. Thus began her lifelong interest in flagellates that eventually led to an F.R.S..The work on seaweeds was continued by Sheila Lodge and Bunny Burrows who studied zonation and hybridization in *Fucus* on experimentally disturbed shores, and later, George Russell worked on the Ectocarpales.

Burrows also conducted a pioneering investigation of the subtidal loose-lying communities of Port Erin Bay, and her students produced detailed ecological studies of the major species of subtidal algae - *Chorda*, *Desmarestia* and *Saccorhiza*. However, it was Joanna Jones who studied *Laminaria hyperborea*, ecologically the most important local subtidal alga. In a long series of papers on its distribution, growth, reproduction and ecology, she produced probably the most complete account of the ecology of any subtidal plant. Not content with that, she then went on to investigate the seasonal "behaviour" of subtidal red algae in relation to light, and to develop methods for seaweed cultivation in the sea. Joanna was also a pioneer of scientific diving - she was probably the first woman in Britain to hold a first-class diving certificate. It is thanks largely to her that the department now has one of the best University diving units in the British Isles, and that underwater research is commonplace in the Laboratory. The paper with her husband, Norman Jones, on the effects of Echinus on the lower limits of the *Laminaria* forest was the first clear demonstration of the importance of urchin grazing in the subtidal zone.

Phycology at Port Erin has never been stronger than at present. There are three phycologists on the staff and the algal ecology group contains eight research students.

The Centenary is being celebrated in a number of ways. Five commemorative postage stamps, and first day covers are available from the Laboratory, price £5. An exhibition entitled "The Surrounded Sea" explores the state of the Irish Sea, its ecology, fisheries, pollution and conservation. The work of the Port Erin Laboratory is the thread that links these diverse themes. The exhibition is at the Manx Museum until the end of June and then moves to Liverpool City Museum until January 1993. It will then probably transfer to the Ulster Museum and finally to Dublin. A duplicate of the historical part of the exhibition is displayed at the Biologische Anstalt Helgoland, which is also celebrating its Centenary this year.

An international conference will be held at Port Erin from 16-18th September 1992. Four topics will be discussed: The marine resources of the Irish Sea; experimental ecology; ecophysiology and behaviour; evolution and genetics. These are all areas of marine biology in which researchers at the Port Erin Marine Laboratory have made major contributions. The scientific proceedings of the conference will be published as a commemorative volume.

In addition a small book is to be published, giving a brief account of the history of the Port Erin Marine Laboratory and of some of the important biological research which has been carried out here. This is aimed at a wide audience and includes some of the amusing, entertaining and notorious experiences of the famous and not-so-famous in the pursuit of knowledge and other things!

Social events have not been neglected. Following the conference a reunion has been planned for past staff, students and scientific visitors to the laboratory, together with their families. Many people are planning to come from as far as Canada, Australia and New Zealand. A programme of social events and tourist trips is being organised.

In recognition of the Laboratory's Centenary, the Mannan Music Festival have this year included a number of marine themes in its programme and the Isle of Man Photographic Society is presenting an exhibition

entitled "Sea and Shore". During June (on the 27th) a very special evening cruise has been organised in association with the Isle of Man Steam Packet Company. The ship will cruise around the Calf and the south of the island. After dark the boat will be in Port Erin Bay, so that participants can watch a firework display from the sea. The cruise will include complementary champagne and a superb seafood buffet. Various musical entertainments are planned, including a Peruvian folk group.Dr Jeremy Paul, a well known wildlife artist (also a graduate of the Marine Laboratory), has kindly donated a painting to be used to raise money for the Centenary Fund. This magnificent painting, of a Fulmar Petrel flying over rough sea with the Laboratory visible in the background will be auctioned by Professor David Bellamy during the June cruise. A limited edition print of the painting is also available from the Marine Laboratory at £29.50.If my staff and I survive this hectic year the Laboratory can look forward to its next 100 years.

Professor Trevor Norton
The Marine Laboratory
Port Erin
Isle of Man

ASPAB VIII CONFERENCE 1992
UNIVERSITY OF NEW SOUTH WALES
SYDNEY

The 1992 ASPAB conference will be held at the University of New South Wales from Sunday 6th December until Tuesday 8th December 1992. The University is close to the centre of the city and there is excellent public transport from the Colleges to the city.

Registration will take place on the afternoon and evening of December 6th with a full programme of papers on Monday 7th and Tuesday 8th. The conference dinner will be on Tuesday 8th.

Each session will include a special conference paper and these will address the following issues:

Freshwater botany
Seagrass ecology
Microalgae
Modern techniques and taxonomy

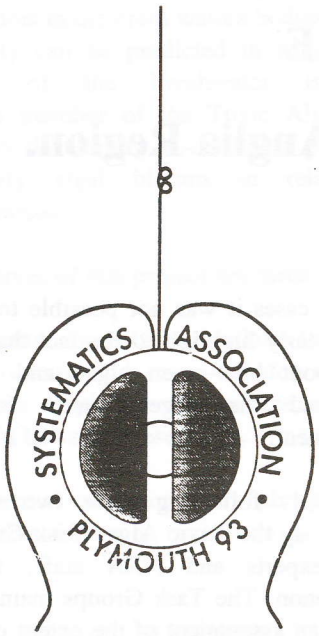
Students should note that there will be a Student Prize for the best presented paper and travel grants will be available.

College accommodation will be available at a cost of approx $35 for bed and breakfast.

Contact:

Peter Richards
1992 VIII ASPAB Conference
Royal Botanic Gardens
Mrs Macquaries Road
Sydney, NSW 2000
Australia.

Provisional titles of papers or posters should be sent to the above.



The BIOLOGY of the PRYMNESIOPHYTA

Plymouth, UK,

29th March - 1st April, 1993

The aim of this international symposium is to bring together phycologists, marine and freshwater ecologists, biochemists, and all others who have an interest in this important group of organisms. Contributions on any aspect of prymnesiophyte biology, ecology, physiology or biochemistry will be welcome. Sessions will include invited and volunteered contributions, and there will be poster sessions and opportunities for informal workshops.

For further details, please contact:

Dr. J.C. Green, Plymouth Marine Laboratory,
Citadel Hill, Plymouth PL1 2PB,

Tel: 0752 222772 Fax: 0752 226865

RESEARCH AND DEVELOPMENT FOR TOXIC BLUE-GREEN ALGAE

by Michael Attwood, NRA Anglia Region.

1) THE TOXIC EVENTS OF 1989

Rutland Water is one of Europe's largest potable supply reservoirs (situated in the agricultural surrounds of Leicestershire). During August 1989, Anglian Water Services received notification from a farmer that six of his sheep had died after allegedly entering the water. Results of post-mortems showed that the rumens contained a large quantity of blue-green algae.

During most of August and September Rutland Water had supported a thick shoreline scum of the blue-green alga *Microcystis aeruginosa*. Shortly after the sheep deaths reports were received of dog deaths, also associated with ingestion of the scum.

Samples of the scum were sent to Dundee University where they were identified as being highly toxic. Further analysis of the rumen content of the sheep revealed the presence of the blue-green algal hepatotoxin, microcystin-LR.

By mid September as many as twenty sheep and fifteen dogs had died after drinking water containing the shoreline blue-green algal scum.

That same year a separate incident occurred at Rudyard Lake in Staffordshire, again associated with a scum of *M. aeruginosa*, but this time involving humans. As part of their training course, sixteen junior soldier cadets were practising swimming and canoeing exercises. The ingestion of scum during these exercises resulted in the hospitalisation of two cadets with symptoms including abdominal pains, vomiting, diarrhoea, blistering of the mouth and sore throat. Eight other soldiers in the group reported influenza like symptoms but did not require hospital treatment.

During the same year 68% of the waters sampled by the National Rivers Authority (NRA) were found to be toxic. The NRA were regularly confronted with questions from owners of recreational waters, conservation groups, Environmental Health Officers and the general public, such as:

Why are they toxic?
How toxic are they?
What are the health implications to humans
How can you prevent it from re-occurring?

In many cases it was not possible to provide answers, which clearly highlighted the fact that there is much to learn about blue-green algae and their toxins and, emphasised the urgent need for research and development.

Immediately following these two major events, the NRA set up the Toxic Algae Task Group, consisting of national experts and NRA staff, to appraise the phenomenon. The Task Groups main functions were to conduct an assessment of the extent of toxic blue-green algae in the United Kingdom, to establish an annual sampling programme based on these results, and to identify long-term measures, including research and development needs to resolve the problem.

2. RESEARCH AND DEVELOPMENT

The NRA report "Toxic Blue-Green Algae" Water Quality Series No.2, provides a number of R&D recommendations encompassing many topic areas. Since its publication in 1990, the NRA have established contracts with the Freshwater Biological Association, the University of Dundee and Biocode.

These topic areas fall into four categories:

a) The formation and control of blooms.

b) The characterisation of blue-green algal toxins.

c) The fate and biological significance of toxins.

e) The production of an immunoassay test kit for Microcystin-LR.

a) The formation and control of blooms

The most effective means of avoiding any further toxic events on the scale of Rutland Water in 1989, is to prevent blue-green algae bloom formation. The control of nuisance algal blooms is a subject that has been widely published in the literature concerning eutrophication. Several options including chemical, physical and biological methods exist but they are all long term.

The Task Groups report discusses a number of novel treatments as far as possible but there still remains the need to appraise the efficacy of these methods on a site

and Wales. In relation to toxic blue-green algae, this involves sampling waters for algae and advising water users of the potential dangers. In the event of a bloom or scum or in a situation where a toxic event has occurred, the use of a field toxicity test kit would be of great value. The Task Group have recommended the development of a field operated testing procedure for rapid screening of water samples. Biocode are currently are progressing the development of a simple, field test kit for the most commonly occurring toxin microcystin-LR.

On successful completion of the test kit, the NRA aims to enter into a licensing agreement with Biocode to manufacture, distribute and market the test kit. This also, in part, satisfies one of the recommendations of the Toxic Blue-Green Algae report, i.e. that a molecular alternative to the mouse bioassay test for determining the toxicity of algal blooms needs to be developed and evaluated.

3. MANAGEMENT OF TOXIC CYANOBACTERIA SINCE 1989

Following the Rutland Water and Rudyard Lake events the National Rivers Authority identified significant water bodies, in terms of size and degree of recreational use, which should be carefully monitored.

The 1989 survey demonstrated the magnitude of the problem which led to the establishment of a routine monitoring programme in 1990. This provided the NRA with a list of waters that are most likely to develop significant populations of potentially toxic species.

The year to year changes of lake ecology and blue-green algal populations, are relatively minor, fluctuating with climatic variations. In light of this, the NRA's future sampling policy will be to sample only those waters that have not been identified as having significant populations of potentially toxic blue-green algae in previous years. It has been suggested that owners of high risk waters, which have been found to support significant blue-green algal populations in the past, should make regular inspections for the presence of blooms and scums and take the necessary procedures to prevent the public from having contact with the water.

The Task Group are currently developing guidelines for implementation of Action Plans to combat the incidence of blooms and scums for specific water bodies. These plans will ultimately provide options for the control of blue-green algae, taking into consideration the specific attributes of a particular water body.

4. NRA ANGLIAN REGION R&D FOR EUTROPHICATION CONTROL

Internationally, research on methods of controlling blue-green algal populations are already at an advanced stage. In the NRA's Anglian Region, eutrophication has for many years been accepted as a difficult problem, a case in point is the Norfolk Broads.

The Anglian Region is carrying out research work concerning the restoration of the Norfolk Broads. The control of phosphorus is seen to be the key to this work but numerous other approaches including the role of nitrogen, biomanipulation and phosphorus recycling are also being investigated.

The control of phosphorus has been identified as the most effective means of reducing eutrophication in some of the Norfolk Broads. Despite this phosphorus control of sewage effluents has not reduced phosphorus concentrations in the Broads or substantially reduced phytoplankton growth: this is due to remobilization of phosphorus from the sediments to the overlying toxic waters. Research aims to assess the potential for preventing this by directly dosing the sediments with iron salts.

The use of ferric sulphate is well known as an organic phosphorus precipitant and has been used in lakes and reservoirs, with variable degree of success, in Britain and other parts of Europe. Most studies have involved dosing the water body with iron salts and allowing the particulate organic phosphorus/iron salt floc to sediment. Work on the Broads aims to dose directly into the sediment thus avoiding water column/iron salt interactions. Ultimately this will provide information critical to the restoration of shallow lakes.

The use of biomanipulation techniques for reducing the effects of eutrophication have generated much interest in Europe. Biomanipulation relies on artificially-induced changes in the trophic structure of a lake ecosystem by the removal or addition of particular species or groups of species, ultimately increasing the grazing pressure on the cyanobacteria. However, most of these studies have been based on small lakes. The Anglian Region are investigating the use of biomanipulation in three small broads, however, before biomanipulation studies are conducted on whole lakes in this country, the effectiveness and environmental impact of biomanipulation needs to be assessed. A literature review is presently being undertaken so that recommendations can be make concerning the possible use of biomanipulation in Britain.

Studies related to cultural eutrophication of the Norfolk Broads have generated much information concerning the cycling of nutrients in shallow water bodies. To complement this work, research is in progress concerning the nutrient cycling at Rutland Water, a much larger water body, in which nutrients are expected to behave in a different way. The research on these large reservoirs aims to provide information to estimate the recovery of eutrophication and possible remedies.

Knowledge of the environmental effects of toxins is largely based on circumstantial evidence. The research work currently in progress, as outlined above, aims to identify basic environmental factors that will aid control of blue-green algal populations and the toxins they form. It must be emphasised that there are no short term solutions to controlling blooms and scums and the toxins they produce.

Further Reading

Further details are given in the NRA report "Toxic Blue-Green Algae" Water Quality Series No. 2. This report is available from: Public Relations of the National Rivers Authority, Anglian Region, Kingfisher House, Goldhay Way, Orton Goldhay, Peterborough, PE2 5ZR. Price: 15.00 (including postage and packing).

Michael Attwood
National Rivers Authority
Anglian Region
Kingfisher House
Goldhay Way,
Orton Goldhay
Peterborough PE2 5ZR

FIFTH INTERNATIONAL SEAWEED BIOGEOGRAPHY WORKSHOP
UNIVERSITY OF CAPE TOWN, SOUTH AFRICA
JULY 1993
FIRST ANNOUNCEMENT

THEME - Seaweed biogeography in the Southern Hemisphere.

The FIFTH International Seaweed Biogeography Workshop will take place in the week of 10-17 July 1993 at the University of Cape Town, South Africa.

It is proposed that the workshop should concentrate particularly on seaweed biogeography of the southern hemisphere - a topic which has been neglected in past workshops. Studies on other areas will not, however, be excluded, as input of biogeographers working in the northern hemisphere is essential at this stage.

For further details contact the convener:

Dr. John J. Bolton
Botany Department
University of Cape Town
Rondebosch 7700
South Africa

Tel 021 650 3402
Fax 021 650 3726

The Phycological Society of Southern Africa was founded in 1983 and currently has over 90 members. The Botany Department at UCT has John Bolton on the Faculty, and also houses the Seaweed Research Unit of Sea Fisheries, with three full time scientists (Richard Simons, Rob Anderson and Graham Levitt). Dr. Derek Keats's research group is housed at the University of the Western Cape, a few kilometres away in Bellville.

NOTES ON THE ALGAL HERBARIA AT NEWCASTLE UPON TYNE, SUNDERLAND AND EDINBURGH.

By F.G. Hardy

Introduction

There are three principal algal herbaria in north-east England and southern Scotland: the Hancock Museum, Newcastle upon Tyne (University of Newcastle upon Tyne); the Sunderland Museum (Tyne and Wear Museums Service); and the Royal Botanic Garden, Edinburgh (see Hardy, in press). In addition, there are small collections in local museums, such as those at Darlington and Hartlepool. Details of these latter may be obtained from Davis and Brewer (1986).

The collections at Newcastle and Sunderland are the result of the amalgamation of the herbaria of local botanists, particularly of the nineteenth century. The herbarium at Edinburgh is a major collection of international importance, and was estimated to contain 15,000 sheets in 1970 (Hedge & Lamond, 1970).

In the past five years these three herbaria have been the subjects of considerable curatorial effort; specimens have had their determinations checked, their nomenclature updated, and have been stored in more orderly arrangements. Previously, the most recent order and nomenclature was that of Newton (1931); now specimens have, as far as physically possible, been re-arranged (according to the order of Parke and Dixon, 1976, at Newcastle and Sunderland, and into alphabetical order at Edinburgh), and the nomenclature has been updated, at least to that of the most recent check-list (Parke & Dixon, 1976), and in most cases to the level of the new *Seaweeds of the British Isles*, where the relevant parts of that work have been published (Burrows, 1991; Christensen, 1987; Dixon & Irvine, 1977; Fletcher, 1987; Irvine,1983). Updated nomenclature for the crustose coralline red algae has been provided in personal communication by Yvonne Chamberlain.

Newcastle upon Tyne

The principal algal collections at the Hancock Museum are those of William Robertson (died 1846), George Stewardson Brady (1832-1921), Sir Walter Calverley Trevelyan (1797-1879), and the author.

Brady was a distinguished amateur phycologist who wrote several papers on marine algae, most notably a check-list of those found in Northumberland and Durham (Brady, 1861). He was a graduate of the Newcastle College of Medicine but spent most of his professional life as a zoologist, and his collection of Crustacea (which contains many type and figured, specimens) is also in the Hancock Museum. In 1876 he was appointed to the Chair of Natural History (i.e. Zoology) at the College of Physical Science, Newcastle upon Tyne (which, after several name changes, became the University of Newcastle upon Tyne in 1963) and, although a separate Chair of Botany was established in 1892, Brady remained Professor of Natural History, growing steadily more out of touch with the development of the College, until his retirement in 1906 (Bettenson, 1971).

Trevelyan was a local landowner (his estate at Wallington, Northumberland, now belongs to the National Trust) and his herbarium includes specimens from the various parts of the British Isles where he had estates or the family holidayed, such as Devon, and Portobello, Midlothian. (Some specimens of *Gastroclonium ovatum* (Huds.) Papenf. in his herbarium are mounted on the reverse side of letters sent to him by Messrs. Drummond, Bankers, of Charing Cross, commenting on his overdraft).

The author has collected algae from the coast of Berwickshire, and from the estuaries of the Rivers Tyne, Wear and Tees, and these are stored at the Hancock Museum. The author's phycological correspondence relating to Northumberland, Durham, and Berwickshire is also stored there.

In addition to the above collections, the herbarium at the Hancock Museum contains four substantial volumes labelled 'A friend of Brady', two devoted to the Rhodophyta and one each to the Phaeophyta and Chlorophyta. A fairly recent addition to the collection is a volume of seaweeds from Alnmouth, Northumberland, collected by Andrew Amory (1841-1921) and directly related to the records published in his papers (Amory, 1884, 1885, 1887; Hardy, 1989). Amory was another fine amateur phycologist: by profession a wood-carver, he ultimately became keeper

of the pictures and works of art belonging to the Duke of Northumberland at Alnwick Castle (Hodgson, 1921). Other small collections include the algal sections of the herbaria of Nathaniel John Winch (1768-1838), of Ushaw College, Durham and of the Department of Biological Sciences, University of Durham (the most recent addition), and specimens collected by university undergraduates in botany. A small number of sheets of foreign algae from all parts of the world are included in the Brady herbarium, some originating from Cherbourg, France, and collected by Auguste Francois Le Jolis (1823-1904).

In common with a substantial part of the museum's collections, the data relating to the British marine algae are stored in a database on the mainframe computer at the University of Newcastle upon Tyne.

There are no records of there ever having been any algae in the herbarium of the former Department of Botany of the University of Newcastle upon Tyne.

Sunderland

Sunderland Museum houses the herbarium of the Tyne and Wear Museums Service, the algal collections of which date from the nineteenth century. There are approximately 170 specimens from Sunderland (149 in a bound volume, the rest on loose sheets) collected by Edward Backhouse (1808-1879). The information about these algae is stored in the computer of the Tyne and Wear Museums Service. The herbarium also contains the algal collections of the Reverend Canon Alfred Merle Norman (1831-1918), the sheets of which lack details of localities; of W. M. Wake (donated 1880), the specimens from Plymouth, Devon, mounted on glass; and 39 sheets from the herbarium of the Reverend William John Wingate (1846-1912).

Edinburgh

As befits a major international botanical institution, the Herbarium at the Royal Botanic Garden, Edinburgh, is considerably larger than the above-mentioned collections and contains a number of type specimens. It is the result of the amalgamation in 1839 to 1840 of the collections of the Botanical Society of Edinburgh and the University of Edinburgh, together with specimens from many individual collectors (some details of which are given in Hedge and Lamond, 1970). It became Crown property in 1863. It also has the distinction of including a considerable number of specimens collected in the present century and of having been studied by experts in various groups. (For example, the red algae have been examined by Linda Irvine).

The algal section of the Edinburgh Herbarium is divided into two parts. The British algae are arranged in alphabetical order of genera within each group (Chlorophyta, Chrysophyta, Phaeophyta, Rhodophyta), the exception being the Cyanophyta which, at present, remains in the Newton (1931) order and nomenclature. The foreign algae are arranged in an alphabetical series which does not take these groups into account, and these specimens are the subject of current attention.

In addition to the systematic collection there are a few small collections in bound volumes. For example, the herbarium of the Berwick upon Tweed naturalist Dr. George Johnston (1797-1855) contains the specimens which correlate with the records and information published in his *Flora of Berwick-upon Tweed* (Johnston, 1831). Sadly, few of these specimens are localised (so that one is unable to state whether they originate from Berwickshire or Northumberland): the only specimen unequivocally from Berwickshire is labelled *Ulva defracta* and is a (drift?) specimen of *Plocamium cartilagineum* (L.) Dixon from Coldingham. This particular specimen seems to be referred to in a list of plants supplementary to his flora (Anon, 1834), as follows:

> "*Ulva defracta*, Withering. Coldingham shore, after a storm; Rev. Mr. Campbell. It is in some respects an interesting seaweed - mostly so in this; that no one seems yet to have detected a specimen with the slightest appearance of a root. Mr. C.'s specimens were equally imperfect.... Dr. Hooker says it is very unlike any other ulva, "and has rather the appearance of animal matter", but the opinion here hazarded has no foundation. It is a true vegetable, as I am perfectly satisfied by a careful examination of it, possessing in fact the character of the genus *Dumontia* of Greville, who, however, takes no notice of this species in his Algae Britannicae: Dr. Johnston."

Perhaps the most important algal collections at Edinburgh are those of Robert Kaye Greville (1794-1866), which the Garden began purchasing in 1845, and of George William Traill (1836-1897). An Orcadian by birth, Traill worked in the Head Office of the Standard Life Assurance Company in Edinburgh for 42 years, during which time he gained a considerable reputation as an amateur botanist, in particular for his work on the marine algae of the Firth of Forth and the Orkney Isles. However, his herbarium is not limited to specimens from these areas: he acquired a collection of algae from all parts of the world, especially North America, although there is no evidence that he ever travelled abroad himself (Matthews, 1963). His name is commemorated in the genus *Trailliella* (now known to be the tetrasporangial phase of the genus *Bonnemaisonia*) named thus by Batters in 1896 in order "to connect the name of my friend Mr. G. W. Traill, the well-known algologist of Edinburgh, with the British marine Flora for which he has done so much" (Batters, 1896).

of the pictures and works of art belonging to the Duke of Northumberland at Alnwick Castle (Hodgson, 1921). Other small collections include the algal sections of the herbaria of Nathaniel John Winch (1768-1838), of Ushaw College, Durham and of the Department of Biological Sciences, University of Durham (the most recent addition), and specimens collected by university undergraduates in botany. A small number of sheets of foreign algae from all parts of the world are included in the Brady herbarium, some originating from Cherbourg, France, and collected by Auguste Francois Le Jolis (1823-1904).

In common with a substantial part of the museum's collections, the data relating to the British marine algae are stored in a database on the mainframe computer at the University of Newcastle upon Tyne.

There are no records of there ever having been any algae in the herbarium of the former Department of Botany of the University of Newcastle upon Tyne.

Sunderland

Sunderland Museum houses the herbarium of the Tyne and Wear Museums Service, the algal collections of which date from the nineteenth century. There are approximately 170 specimens from Sunderland (149 in a bound volume, the rest on loose sheets) collected by Edward Backhouse (1808-1879). The information about these algae is stored in the computer of the Tyne and Wear Museums Service. The herbarium also contains the algal collections of the Reverend Canon Alfred Merle Norman (1831-1918), the sheets of which lack details of localities; of W. M. Wake (donated 1880), the specimens from Plymouth, Devon, mounted on glass; and 39 sheets from the herbarium of the Reverend William John Wingate (1846-1912).

Edinburgh

As befits a major international botanical institution, the Herbarium at the Royal Botanic Garden, Edinburgh, is considerably larger than the above-mentioned collections and contains a number of type specimens. It is the result of the amalgamation in 1839 to 1840 of the collections of the Botanical Society of Edinburgh and the University of Edinburgh, together with specimens from many individual collectors (some details of which are given in Hedge and Lamond, 1970). It became Crown property in 1863. It also has the distinction of including a considerable number of specimens collected in the present century and of having been studied by experts in various groups. (For example, the red algae have been examined by Linda Irvine).

The algal section of the Edinburgh Herbarium is divided into two parts. The British algae are arranged in alphabetical order of genera within each group (Chlorophyta, Chrysophyta, Phaeophyta, Rhodophyta), the exception being the Cyanophyta which, at present, remains in the Newton (1931) order and nomenclature. The foreign algae are arranged in an alphabetical series which does not take these groups into account, and these specimens are the subject of current attention.

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More recent collections at Edinburgh include those of W. Edgar Evans, James Sinclair and Roy Watling, and the Garden is actively concerned in building up the herbarium (for example, specimens have recently been added from Berwickshire, a county hitherto very poorly represented in the collections).

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BRITISH PHYCOLOGICAL JOURNAL

FORTHCOMING PAPERS

SEPTEMBER 1992 - SPECIAL ISSUE

THE BIOLOGY OF SEAWEED PROPAGULES

All the papers in this issue are dedicated to various aspects of a single theme. They attempt to plot a biography of seaweed propagules and to describe the world they inhabit.

I have long felt that there was a need for a comprehensive account of spore biology. Spores or gametes are often mentioned in passing, but they are rarely the focus of an investigation. This is surprising, for many phycologists are obsessed by algal reproduction. Unfortunately, they often belabour life history eccentricities of obscure algae of no ecological significance. In contrast propagules often fail to merit a mention in phycological text books that leave no trivial topic unturned.

Propagules are the mainsprings of algal life. They are the emissaries of sex and the progenitors of proliferation, dispersal and establishment. Propagules determine algal distribution. Few seaweeds can manage without them, but if a propagule permanently abandoned its seaweed phase we would mearly call it a microalga.

The papers in this issue of the British Phycological Journal spring from a special session organised by Bob Vadas and myself at the International Phycological congress at Durham, North Carolina in August 1991. The versions published here are brief reviews bolstered with original data and original ideas. They cover several aspects of propagule biology from their production to their settlement and germination to produce a new plant.

I hope that the collection will stimulate the reader to research the strange world of the microscopic spore, where water feels like treacle and there are environmental gradients of terrifying steepness. It is an exciting and mysterious world that we have only just begun to explore.

From the Introduction to the special issue by Trevor A Norton.

M.N.Clayton.	Propagules of marine macroalgae: structure and development.
S.H.Brawley	Gametogenesis, gametes and zygotes: an ecological perspective on sexual reproduction in the algae.
C.D.Amsler, D.Reed and M.Neushul	The microclimate inhabited by macroalgal propagules.
A.C.Mathieson and Z. Guo	Patterns of fucoid reproductive biomass allocation
T.A.Norton	Dispersal by Macroalgae.
R.L.Fletcher and M.Callow	The settlement, attachment and establishment of marine algal spores.
R.L. Vadas Jr., S.Johnson and T.A.Norton	Recruitment and mortality of early post-settlement stages of benthic algae.

For further information contact Dr. R.I.Jones, Editor, British Phycological Journal, Division of Biological Sciences, Institute of Environmental and Biological Sciences, University of Lancaster, Lancaster, LA1 4YQ.

BOOK REVIEWS

THE CHROMOPHYTE ALGAE - PROBLEMS AND PERSPECTIVES.

J.C.Green, B.S.C.Leadbeater and W.L.Diver (eds). Systematics Association Special volume No. 38, Oxford Science Publications, Oxford. 1989. pp 429. Price £60.00 ISBN 0 19 857713 3.

This publication is based upon an excellent scientific meeting, held in Plymouth in April 1988 and sponsored by the Systematics Association, which was concerned with the chromophyte algae, i.e. those containing chlorophylls a and c. In addition to the traditional algal groups of dinoflagellates, chrysophytes, prymnesiophytes, raphidophytes, eustigmatophytes, xanthophytes, chrysophytes, diatoms and phaeophytes, the volume includes discussion on the closely related Oomycetes and Hyphochytridiomycetes in the fungi and Stramenopiles in the protozoa. Thus, although aimed mainly at phycologists, there is valuable information in this book of wider appeal and interest to Mycologists, Protozoologists and all "students and researchers of eukaryote microbial evolution".

The book contains the texts of twenty-one keynote papers given by a wide range of international researchers at the conference. These review the current state of knowledge of general chromophyte biology such as pigment chemistry, phylogeny of chloroplasts and ultrastructure together with recent applications of molecular approaches to examining chloroplast evolution followed by chapters on particular cell processes, major algal groups, fungi and protozoa. Finally there is a re-examination of the status of the whole chromophyte assemblage and a review of the Conference presentations.

The first paper presents the taxonomic history of the Chromophyta (Christiensen). This is followed by two papers dealing with pigment chemistry, chlorophyll c pigments (Jeffrey) and carotenoids (Bjornland and Liaaen-Jensen). The next four papers discuss the photosynthetic apparatus as a phyletic character (Raven, Johnston and bin Surif), the possibility of polyphyletic origin of chromophyte chloroplasts (Whatley) and molecular approaches to chloroplast evolution (Cattolico and Loiseaux-de Goer) and plastid genomes (Kowallik). Ultrastructural reviews reveal that both flagellar hairs (Leadbeater) and flagellar roots (Preisig) are of phylogenetic importance whereas we are not yet in a position to draw up the phylogeny of the chromophyte algae as a whole, based on the mitotic process (Green).

The subsequent six papers discuss algal groups; including the dinoflagellates, their plastids and close relationships with the Ciliata (Dodge), brown algae (Clayton) motile cells of brown algae (O'Kelly) and Raphidiophycede (Heywood, a comparison of Corethron and Mallomonas (Crawford and Round) and finally, the origins of the diatom and its life cycle (Mann and Marchant). In a non-phycological context, the relations of the Oomycetes (Beakes), Hyphochytridiomycetes (Barr and Desaulniers) and protozoans with tripartide tubular hairs 'stramenopiles' (Patterson) follow in chapters 17-19.

In chapter 20, Cavelier-Smith discusses the characteristics of the Kingdom Chromista which was first established in 1981. Finally, in the concluding chapter, Round has the unenviable task of summarising the 'problems and perspectives of the chromophyte algae". He emphasises the similarities of the traditional chromophyte algae together with colourless forms such as the 'pseudofungi' and certain Protozoa, all of which he stresses should be included in the Kingdom Chromista. But (heaven help those of us who try to unravel the complexities of algal-protistan form and phylogeny to students!) he calls for a new name for the "brown and colourless series".

This is an excellent text, carefully edited with only a few typographical errors. Three features of the book deserve special mention. Firstly, the variety of information on this diverse group of 'brown and colourless microbes' from phylogeny and evolution to biochemistry, ultrastructure and molecular approaches: surely something of interest for everyone whether a full-time researcher or student grappling with the complexities of microbial flagellates. Secondly, in producing the book, the editors have maintained the lively interest in the subject of the keynote speakers created at the conference in Plymouth.

Finally, it is a pleasure to see such a book dedicated to Irene Manton and Mary Parke for their respective contributions to the understanding of Chromophyte Algae. Perhaps, however, they in their wisdom, might have been able to suggest a new title for the Chromista to include both the chromophyte and the colourless forms, such as Chrometincolourista!

CHRIS HAPPEY-WOOD

THE BIOLOGY OF THE RED ALGAE

K.M.Cole and R.G.Sheath (editors). Cambridge University Press, Cambridge, 1990. pp 517. Price £65.00 ISBN 0 521 34301 1.

This book contains a great diversity of information about the red algae. The contents are divided into eighteen chapters with contributions from twenty-six authors of international renown. These chapters are organised into a sequence involving levels of organisation, starting with cells and constituents, followed by growth, reproduction, ecology, systematics and finally evolution. As the editors comment in the preface the book does not contain applied topics - (perhaps a subject suitable for another volume).

All chapters are provided with contents at the beginning and the majority are concluded with a summary. Illustrations are frequent, although the quality of the paper does not do justice to many of the photographic figures. References are positioned at the conclusion of each chapter and both a taxonomic and subject index are included at the end of the book.

In the short introductory chapter Woelkerling outlines the biological significance of the red algae and points out that even among professional biologists, their knowledge of the red algae is minimal. Lets be honest! How much time now is devoted to Phycology in many undergraduate Biology degrees? And within that time the red algae might, just, feature!

The next three chapters cover the topics of Cell structure (Pueschel). DNA: microspectrofluorometic studies (Geoff and Coleman) and Chromosomes (Cole). These are followed by reviews of Genetics (van der Meer) and Cell division (Scott and Broadwater) in chapters five and six.

The theme of the book then changes to physiological aspects. These start with a detailed account of Solute accumulation and Osmotic adjustment by Reed. It seems that in their Carbon metabolism (Chapter 8, Raven, Johnston and Macfarlane), there is little evidence to suggest that red algae function in a radically different way from other algae in similar habitats, apart from the differences in storage products. Gantt must be congratulated on her approach to Pigmentation and photoaccumulation (Chapter 9). All culprits of teleology, whether at undergraduate or professional level, should "read, learn and inwardly digest" their first paragraph, which clearly defines the difference between "acclimation" and "adaptation"!

The subsequent chapter on Cell Walls (Cragie) bridges a change from the topic of physiological processes to discussions on Development (Waaland) and Vegetative growth on organisation (Coomans and Hommersand). The complex web of red algal morphology and development is clearly explained and excellently illustrated throughout chapter 12, with the phylum divided into three major groups based on patterns of mitosis and cytokinesis which relate to the mode of vegetative growth and level of thallus organisation, i.e. the Bangiophycidae, lower Florideophycidae and higher Florideophycidae. All those who pale at the thought of explaining reproduction and life cycles of the red algae to students must read chapters 13 and 14 - sexual reproduction and cystocarp development (Hommersand and Fredericq) and Sporangia and spores (Guiry). Therefore all non-red algal researchers who teach this group are recommended to read chapters 11-14 as an excellent, well illustrated, concise update on red algal morphology and reproduction.

Next the theme of the book is directed to ecology and it is interesting to have a chapter on Freshwater ecology (Sheath and Hambrook) as well as one devoted to Marine ecology (Kain and Norton), the longest single chapter in the book. It is encouraging to see the ecology of aquatic environments, both with and without salt included, as all too frequently algae and/or phycological students are perceived as either wholely marine or freshwater.

This text is concluded with chapters on Reproductive strategies (Hawkes) and finally Taxonomy and evolution (Garbary and Gabrielson).

I thoroughly enjoyed reading this book and, as a non-specialist in red algae, learnt much. I am sure that this volume contains information of interest to many researchers and students, representative of a much wider readership than the book's title might suggest. It may appear a little overpowering for undergraduates, but even they, by reading only the chapter introductions and summaries, could gain much. Several chapters ended on the note that the development of suitable genetic probes and the use of molecular biological techniques were essential and have yet to be applied to many aspects of red algal biology. I suspect that in this field of molecular biology the text may be a little outdated, as the most recent references are from the late 1980's.

The editors are to be congratulated, this is a book on my shelves that will be referred to frequently. Although in his book, produced only seventeen years earlier, Peter Dixon concluded that "it is not generally appreciated how little is actually known about most marine and freshwater algae and the Rhodophyta is probably the worst known of any algal group", the 517 pages of this new test 'The Biology of the Red Algae' proves that considerable progress has been made towards a better understanding of these plants - the editors and twenty six authors have ensured that, and also achieved their aim of providing an excellent test summarising current knowledge of red algal biology which will fill a much needed gap as a reference source for researchers and teachers in phycology, aquatic biology and plant evolution. Perhaps with time, the biological significance of red algae will be more widely appreciated than at present, and thus the opening sentence in the introduction by Woelkerling may be changed to 'the biological significance of red algae is well known'!

In a nutshell: a mine of information, easy to use, vast diversity of topics and something of interest for all phycologists and most biologists: therefore a must for all University libraries and many phycologists.

CHRIS HAPPEY-WOOD

FORTHCOMING REVIEWS

Seaweeds of the British Isles

Volume 2 *Chlorophyta*

by E.M.Burrows, 1991. 256pp numerous figs. Price £27.00. ISBN 0 565 00981 8

Chance and Design
Reminiscences of Science in Peace and War

By Alan Hodgkin, FRS. 1992. 412pp with figures and photographs. Cambridge University Press. Price £40.00 ISBN 0 521 40099 6 (Hardback).

An excellent autobiography which the Editor has kept to himself to read over the summer! (Well there has to be some privileges!). A full review will be published in the next issue.

REVIEWERS REQUIRED

Reviewers are required for the books listed below that have recently been received. Potential reviewers should write to the Editor. Reviewers should realise that their reviews must be received by the next deadline (September 30), they should be between 500 and 1000 words and preferably sent to the editor on computer disk (see back cover for details). In return the reviewer gets to keep the book!

Books to be reviewed:

Growth and reproductive strategies of Freshwater Phytoplankton.

Ed by Craig D. Sandgren. 1992. 442pp. Numerous figures and photographs. Cambridge University Press. Price £16.95.

A catalogue of Benthic Marine Algae and Seagrasses of Venezuela.

By E.K.Ganesan. 237pp CONICIT Caracas 1989. With Maps.

SEAWEEDS OF THE BRITISH ISLES

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

All volumes are 210 x 148mm, illustrated, paperback.

Just published (review in next issue)
Volume 2 *Chlorophyta*

by E.M.Burrows, 1991. 256pp numerous figs. Price £27.00. ISBN 0 565 00981 8

Previously published

Volume 1 *Rhodophyta.*

Part 1 Introduction, *Nemaliales, Gigartinales,*
by P.S. Dixon & L.M. Irvine, 1977. xi + 252pp 90 figs Price: £15.00 ISBN 0-565-00781-5

Part 2A *Cryptonemiales* (sensu stricto), *Palmariales, Rhodymeniales,*
by L.M. Irvine, 1983. xii + 115pp 29 figs. Price: £15.00 ISBN 0-565-00871-4

Volume 3 *Fucophyceae (Phaeophyceae).*

Part 1 by R.L. Fletcher, 1987. 360pp 90 figs 15 plates Price: £30.00 ISBN 0-565-00992-3.

Volume 4 *Tribophyceae (Xanthophyceae)*

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

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

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Copies may be obtained from Publication Sales, Natural History Museum, Cromwell Road, London SW7 5BD, with payment in advance. (+ 15% postage, minimum £1.00).
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WHERE ARE YOUR OFFICERS

Another reminder that 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:

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All articles, reports, notes etc. for THE PHYCOLOGIST, can 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:
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