UNESCO *Supplement to ims Newsletter, No. 63* 1992

HARMFUL ALGAE NEWS

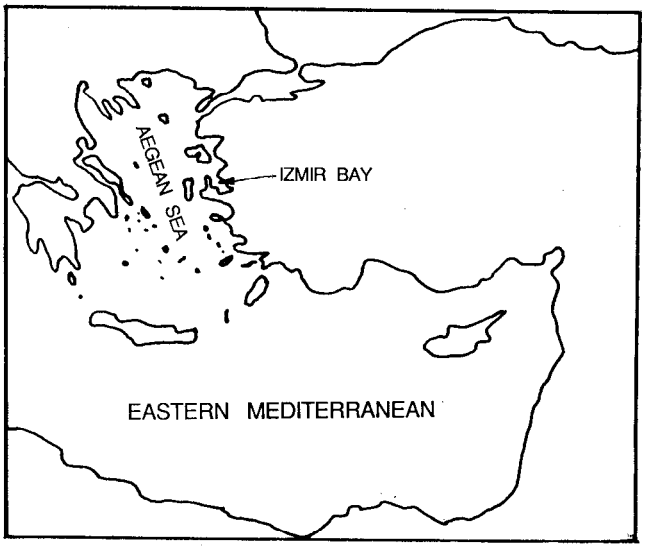
An IOC Newsletter on toxic algae and algal blooms *No. 2*

Noxious Blooms in the Bay of Izmir, Aegean Sea

Fish mortalities associated with red-tides were first reported in the Bay of Izmir in 1955. Since then, red-tides and other noxious algal blooms thought to be due to progressive eutrophication have been observed almost every year by reporters and Turkish scientists.

In January 1990, Ege University and FAO launched the first extensive research programme on these problems in Izmir Bay under the leadership of Dr. T. Koray. Information from this programme is now being applied to questions posed by abnormal fish mortalities during spring.

The most common species causing red-tides in this bay since 1980 are *Prorocentrum micans*, *Alexandrium minutum*, *Gymnodinium simplex*, *Noctiluca scintillans*, *Scrippsiella trochoidea*, *Mesodinium rubrum*, *Gonyaulax polyedra* and *Ceratium furca*. Among these, only *A. minutum* is known to be toxic and to be associated with bivalve and fish mortality. So far there is no clear evidence of PSP in the Bay of Izmir. Death of fishes due to this species is characterized by yellowish colouration of the bodies and gills. Levels of *A. minutum* exceed 6-10 million cells per litre when mortalities occur. During blooms in the Bay of Izmir, demersal and pelagic fishes also exhibit symptoms of anoxia. These symptoms are often seen during non-toxic blooms of the diatoms *Thalassiosira anguste-lineata* and *T. allenii* and the euglenoid *Eutreptiella gymnastica* at night. Thousands of the crab *Carcinus mediterraneus* migrate onto land at night when oxygen deficiency occurs. On the other hand, air bubbles are formed by the high rates of photosynthesis during the day in the blooms, and appear at the surface.



Although the impact of algal blooms on some fishes (mullets, sardines, anchovies, gobiids) is frequently

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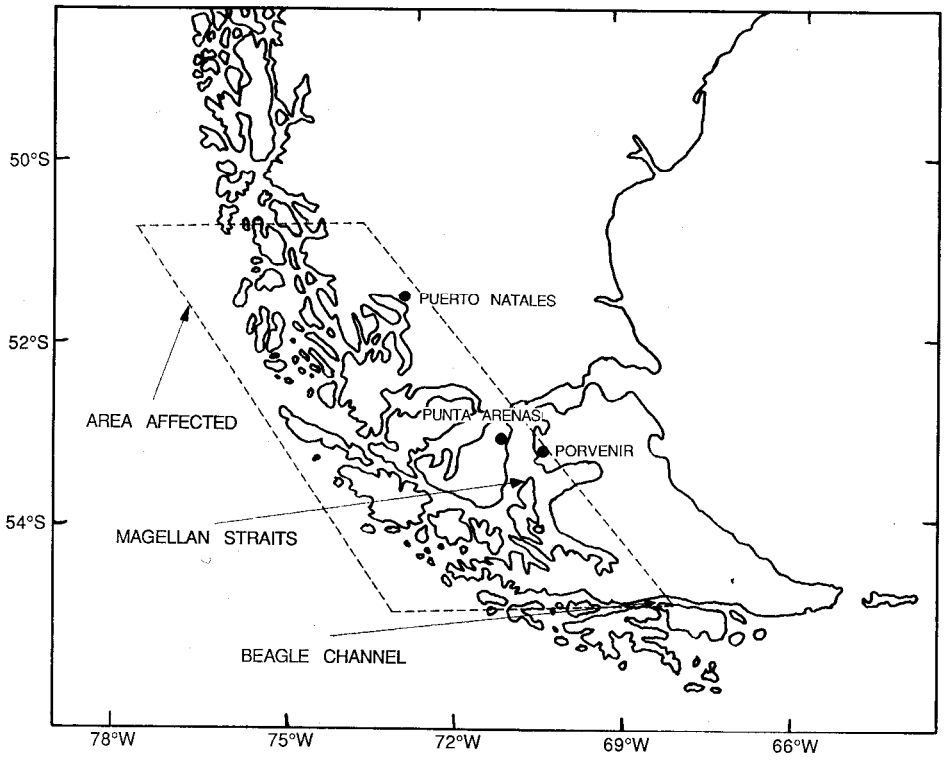
Major PSP Outbreak in Chile, 1991-1992



Red tides and the accompanying threat of PSP have been a constant worry to the shellfish industry in southern Chile for at least twenty years. The mussels *Mytilus chilensis* (chorito), *Choromytilus chorus* (choro) and *Aulacomya magellanica* (cholga) and the clam *Chlamys patagonicus* (ostión) are the main risk species.

Paralytic toxins were detected in southern Chilean waters during routine monitoring in October 1991. Corresponding emergency measures were taken immediately. These include a ban on harvesting and an extension of the monitoring area. The phenomenon extended from approximately 50°45'S to the Beagle Channel in about 54°55'S latitude (see map) and was detected for the first time in the Straits of Magellan, close to the town of Punta Arenas, and in the eastern mouth of the Strait (e.g. Faro Felix).

Despite the warnings, and due

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(Cont'd from p. 1, 'Noxious blooms')

observed, little is known about which factors are responsible for the mortalities. The adjacent simple speculative model synthesizes the results of our work and offers a coherent explanation of the mixed effects of anoxia - hyperoxia - *A. minutum* and possibly PSP in the Bay of Izmir. The model illustrates how strong stratification and cell accumulation in sub-surface waters affect fish. Both anoxic and hyperoxic layers are formed respectively by the decay of sedimented cells and high photosynthetic rates and are unfavourable environments for many pelagic organisms. Consequently, they are forced to migrate into the narrow layer in which *A. minutum* dominates. Although toxins are produced in amounts too low to cause PSP, fish are stunned by exotoxins and may also feed on zooplankton which has itself concentrated the toxins (the cells stick on gills) in this narrow layer during the day. Mortality of these paralysed fish is caused by maximum oxygen deficiency at dawn.

Harvesting of mussels has been forbidden in the eutrophic inner Bay of Izmir since 1980.

Tufan Koray, Ege University, PK 24, 35102 Izmir, Turkey.

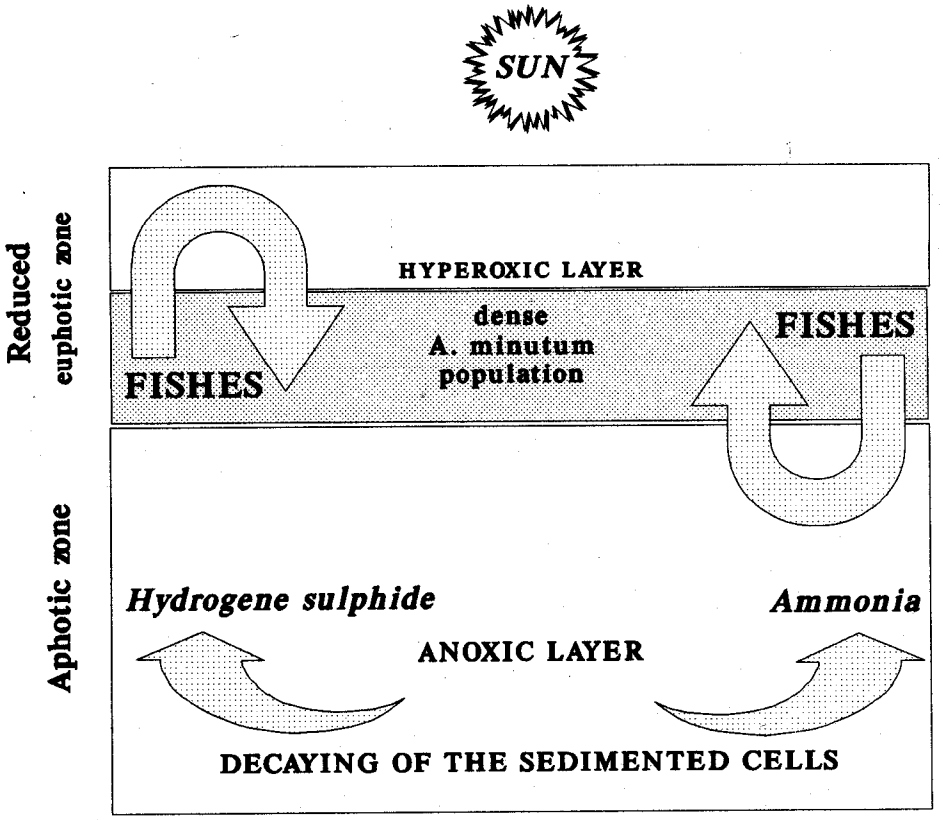

Fig. 1: A speculative model for A. minutum *fish mortality in the bay of Izmir.*

A new *Chrysochromulina* outbreak and fish kills in Danish coastal waters

Several species of the flagellate *Chrysochromulina* (Prymnesiophyceae) are now (April 1992) blooming in Danish coastal waters. The first observations were made mid April in connection with fish kills in fish farms in the south-western Little Belt. *Chrysochromulina* spp. were found in concentrations between 10 and 15 million cells per litre.

In the routine monitoring carried out 24-27 April, *Chrysochromulina* spp. were found in concentrations between 5 and 15 million cells per litre at all sampling sites in the coastal waters of Funen Island, and at several localities along the east coast of Jutland.

Several tons of young Rainbow Trout (*Salmo gairdneri*) have died in aquaculture sites, and fishermen have reported dead fish in their nets. So far, no damage to benthic fauna or vegetation has been reported.

At most of the sampling sites, the vertical distribution of the cells is uniform. Temperature in the affected areas has been 6-8°C, and salinity between 14-20 ‰. Where a halocline has built up, *Chrysochromulina* spp. was only found in low concentrations in the bottom water.

The *Chrysochromulina* community is composed of at least five species: *Chrysochromulina hirta, C. spinifera, C. brevifilum, C. ericina* and a species not yet described (det. Ø. Moestrup, Univ. of Copenhagen). No single species is dominant and the relative dominance varies in time.

Frode Knipschildt, Funen County, Department of Technology and Environment, Ørbækvej 100, DK 4000 Odense SØ, Denmark

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probably to the unusual duration and extension to new areas, numerous cases of intoxication have occurred (about 300) and eleven people have died. The first cases were reported in November 1991. High levels of toxicity have been detected, of the order of 10,000 microgr/100 g and more (J.C. Uribe), higher than any values previously detected in Chile. Species like the carnivorous gatropod known as 'loco' (*Concholepas concholepas*) gave values of 400 to 500 microgr/100 g in the foot muscle. The muscle of the 'ostión' (*Chlamys patagonicus*) also gave high values.

The Chilean Undersecretary of Fisheries, Andrés Couve, has initiated an educational campaign amongst the local communities, and also relaxed some restrictions on other fisheries to encourage the fishermen to diversify.

We hope to be able to provide further information on this outbreak in *Harmful Algae News* no. 3.

Georgina Lembeye, Laboratório de Microalgas, Freire 385, Casilla 221, Castro, Chile.

ETI - a computer approach to taxonomy and identification of organisms

Taxonomy and systematics are the sciences concerned with the identification, description and classification of organisms. Exact organism identifications are of the utmost importance, not only in building knowledge of the (history of) biodiversity and to preserve wildlife, but also for monitoring changes in the biological environment, identifying causes of pests, diseases, and toxic algal blooms in fisheries, agriculture and mariculture management, etc.

When environmental problems arise, or pests or diseases occur, quick answers are required, but identifying organisms is a time-consuming job requiring expert knowledge. Though taxonomy and systematics form the actual basis for all biological sciences, taxonomy is on the wane and skilled taxonomists are rapidly decreasing in number, leading to serious questions in the scientific community concerning the preservation of this knowledge (*Nature*, August 1990). In developing countries there is a need for directly accessible taxonomic information and expertise, for example, to tackle agricultural problems (pests, diseases) or for management purposes (wildlife, aquaculture, fisheries).

The Expert-center for Taxonomic Identification

The Expert-center for Taxonomic Identification (ETI) will concentrate, preserve and promote taxonomic knowledge and provide the possibilities to answer taxonomic, biogeographic, and ecological questions quickly and efficiently. Present-day computer equipment offers the possibility to modernize taxonomy as it allows efficient handling of very large multimedia databases. ETI is developing a database system that stores taxonomic descriptions, drawings, photographs, video and sounds, as well as species-related information such as distribution maps, ecological characteristics, information on pests, diseases etc. The system makes fast retrieval of the data possible on a 'need-to-know' basis. Identification will be guided by an 'expert system', using both text and images as tools, thereby allowing efficient use by experts as well as laymen. This system makes use of multiple entry keys. This is a great advantage to the traditional dichotomous keys, as the (inexperienced) user can start with any character available on the specimen, instead of being forced to use characters that may be difficult to interpret or may be damaged. Moreover, the system will offer help at every step in the identification process, and therefore provides a maximum of taxonomic expertise to the user.

The ETI taxonomic databases will be stored in the main frame computer of the University of Amsterdam, while Topic Oriented Subsections (TOS) will be made available on CD-ROM or other media which can be run any time any place on a simple microcomputer (Macintosh and IBM compatibles). A TOS may cover various taxonomic groups, areas, or applications of taxonomy. In future, on-line connection to the ETI databases will be possible.

ETI will be developed in three phases: (i) a pilot phase during which the system will be designed and tested using two relatively small marine groups – namely pteropods and chaetognaths, and a larger group – birds; (ii) a building phase during which more data on various groups will be entered into the system and teaching programmes will be developed; and (iii) a consolidation phase during which the database will be expanded further and expertise made available to users. From the start the ETI organization will set up an international network of taxonomic experts, which will serve as the supplier of taxonomic data and can make free use of the ETI system.

With UNESCO support, an international 'protist network' started in December 1991, aiming for an ETI programme covering all protists.

Government funding allows us to bring in necessary expertise and equipment to expand and cover more taxonomic groups as well as related information. It is the intention of ETI to cooperate with other data centers in the field of taxonomy by promoting an exchange of know-how and databases.

In order to build up taxonomic databases we call upon experts all over the world. We intend to have a data input programme available mid-1992 and invite all taxonomists to input data of their specific groups. Inputted data will be accompanied by a full reference to the author. Optimization and organization of the data will be done by the ETI staff. Contributors to ETI will receive a free copy (on CD-ROM) of their taxonomic group in return for their much appreciated services. Also, they will receive a reduction in price on other ETI taxonomic programmes. ETI taxonomic programmes will be made available to users for the nominal fee of the costs of production.

Location and organizational structure

ETI is based at the Institute of Taxonomic Zoology of the University of Amsterdam (The Netherlands). It is financially supported by the Dutch Government (Ministry for Science and Education, Science Policy Department), the University of Amsterdam and UNESCO, through its Promotion of the Marine Sciences Programme (PROMAR).

ETI is a non-profit organization committed to the preservation, concentration and distribution of taxonomic knowledge.

We hope that taxonomists will be interested in helping to build up an ETI programme on their precious groups! Please write to us for a questionnaire.

Further information can be obtained from an article appearing in *BINARY 3/92* entitled 'Computer Aided Taxonomy'.

Peter H. Schalk, ETI, PO Box 4766, N–1009 AT Amsterdam, The Netherlands

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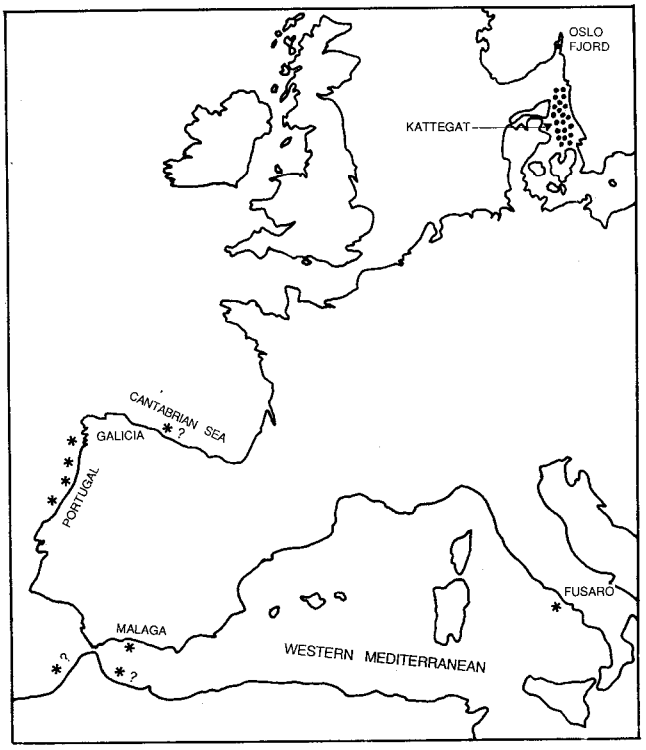
Gymnodinium catenatum in Europe

by Tim Wyatt

Early cases of mussel poisoning in Europe, going back to 1689 AD, were reviewed by Chevalier and Duchesne[1] in 1851. This may be the earliest publication in which a causal link between mussel toxicity and algal blooms was proposed. In some of the cases summarized there, it is reasonably clear that the patients suffered the kind of paraesthesia characteristic of paralytic shellfish poisoning (PSP). The only phytoplankton species in northern European waters today which produce paralytic toxins are members of the *Alexandrium* group (*tamarensis* and *minutum*). But there is at least a possibility that PSP in this region prior to 1700 AD was due to *Gymnodinium catenatum*. This suggestion stems from the fact that *G. catenatum* resting cysts were deposited in large numbers in Kattegat sediments (between Denmark and Sweden), over an area of about 20,000 km^2, from about 2000 until about 300 years ago[2], indicating that the species was then a regular, even prominent component of the phytoplankton there. Apart from a record in the Oslo Fjord, the further distribution of *G. catenatum* in that time interval is unknown.

The present range of *G. catenatum* in European waters extends only as far as northern Spain, where it was first recorded in 1976. Its cysts were not found in sediment cores covering the last 9000 years in Galicia by Margalef[3]. The species has been known in Portugal (between Espinho and Obidos) since 1986[4], but was not detected in Obidos between 1958 and 1962[5]. There are two published Mediterranean records. It has been present in Fusaro Lagoon in Southern Italy since 1985 when sampling began there[6] and has been reported once from Málaga waters in Southern Spain[7]. There are unconfirmed reports that it occurs in the Cantabrian Sea, and in Moroccan inshore waters too.

G. catenatum was first described in 1943 from material collected in the Gulf of California (western Mexico), and has since been found on both sides of the Pacific and Atlantic Oceans and in both hemispheres[8]. As pointed out in *Harmful Algae News* no. 1, the case for its introduction into Tasmanian waters is strong. But Gaines[9] has argued that the distribution pattern is natural. He suggests that 'synergism between ecological variables' has permitted the species to bloom, with the implication that it is autochthonous to all these regions but was formerly very rare.



Outline of Western Europe and Maghreb coast showing:

* *Distribution of Gymnodinium catenatum*

*? *Unconfirmed reports*

Distribution of subfossil cysts in sediments

Nordberg's study[2] provides some indications which may help to resolve the issue. Sediments deposited in the Kattegat since the *G. catenatum* extinction there are coarser than before, and the mean grain size now exceeds that of *G. catenatum* cysts. Its sudden decrease and disappearance about 300 years ago might therefore have been due to the cyst being transported elsewhere (and deposited in the Norwegian Deep or beyond) by a change in mixing and transport patterns. Hydrographic conditions in the Kattegat are still seasonally suitable for *G. catenatum*, but deprived of an inoculum or seed bed, the species cannot appear there. Nor, if the sedimentation regime

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Graduate and postdoctoral course

by Stefano Guerzoni

This course, entitled 'The impact of algal growth on coastal waters and lagoons', will be held at the Centro Marino Internazionale, Lungomare Eleonora D'Arborea 22, 09072 Torregrande, Oristano, Italy, from 29 June to 19 July 1992. The course Director is Professor Jean Michel Robert (Marine Biology Laboratory, University of Nantes, France).

Briefly, S. Giusta is a lagoon in the western part of Sardinia Island, where recently (in the past 2-3 years) several episodes of anoxia with massive fish-kills were experienced. Very few (if any) studies were done up to now, so there is no information about the causes. Lagoonal fish-production was reduced drastically recently and, even if no harmful algal blooms were recorded up to now, we are interested in following the future development of the summer blooms. The S. Siusta area will be used as an 'open laboratory' during the course for practical and field work.

For further information, contact: Rosalba Murgia, Istituto di Geologia Marina, Via Zamboni 65, 40127 Bologna, Italy. Tel: (39-783) 22032; fax: (39-783) 22002. The registration fee is 150,000 liras (US$ 120) for school and 500,000 liras (US$ 400) for food and lodging (full board for 20 days).

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continues to prevent local accumulation of its cyst, would its accidental reintroduction be likely to succeed. Thus the absence of *G. catenatum* cysts in Spanish and Tasmanian sediments until very recently suggests the species was introduced in both cases.

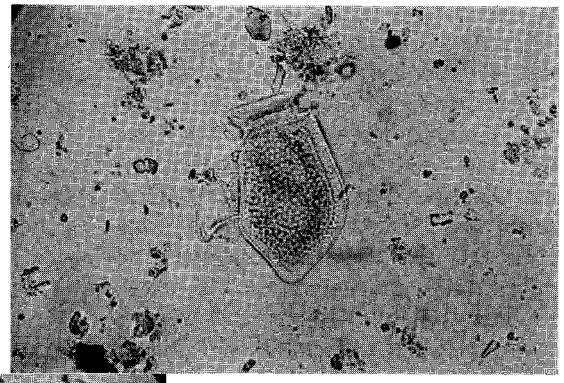
The issue is not exactly between introduction and autochthony, but between 'hierarchical' (long distance) and 'neighbourhood' or local diffusion. A species range can normally be viewed as the balance between local extinctions and recolonizations from local populations. If we accept that available evidence indicates no European source of recolonization for *G. catenatum* has existed for three centuries, then its appearance in Europe in 1976 might be attributable to transoceanic transport, possibly from the western Atlantic. A potential vector would have been the Spanish distant water fishing fleet, based in Galicia, which began operating in Argentinian waters precisely in 1976. *G. catenatum* was first recorded in Mar de Plata in 1962[10].

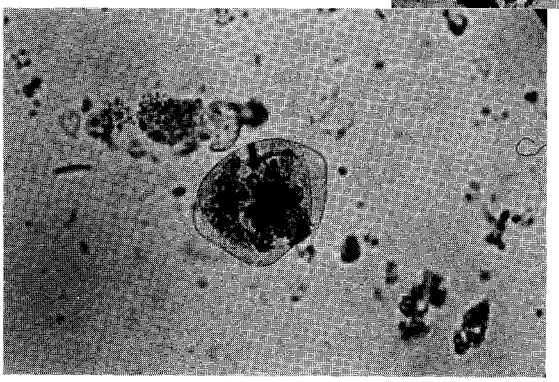
But another possibility exists. A recent attempt to find *G. catenatum* only a few kilometres from the Galician coast was unsuccessful[11]. Most phytoplankton sampling in the Moroccan sector of the Atlantic has been some distance from the coast, and close inshore waters remain unexplored. If Moroccan inshore waters have provided a refuge for *G. catenatum* since its extinction in the Kattegat, it is not necessary to postulate trans-Atlantic transport. A search for cysts in suitable sedimentary horizons might support a more parsimonious hypothesis.

(1) *Ann. d'Hyg. Publ. et de Méd. Lég.*, 45, Paris (1851).
(2) *Geol. Inst. Publ.*, A65, Göteborg (1989).
(3) *Invest. Pesq.*, 5 (1956).
(4) Franca and Almeida, in: Okaichi et al., *Red tides. Biology, environmental science, and toxicology*, Elsevier (1989).
(5) *Notas e Estudos Inst. Biol. Mar.*, 34, Lisboa (1968).
(6) *Rapp. Comm. Int. Mer Médit.*, 31 (1988).
(7) Bravo et al. in: Granéli et al., *Toxic marine phytoplankton*, Elsevier (1990).
(8) *J. Plankton Res.*, 10 (1988).
(9) *J. Shellfish Res.*, 8 (1990).
(10) *Rev. Mus. Arg. C. Nat. "B. Rivadavia" C. Zool.*, 7 (1962).
(11) Fraga et al, *Rhode Island Conf.* (1991), in press.

Update from Uruguay

At the time of the Rhode Island Conference, the entire coast of Uruguay was closed to shellfish harvesting. The ban was lifted in November 1991. Since then, both DSP and PSP have been detected. The former occurred in January 1992 and was associated with *Dinophysis acuminata* concentrations up to 6000 cells l^{-1} in some zones like La Paloma (about 200 km east of Montevideo). An outbreak of PSP occurred in February 1992, associated with *Alexandrium catenella* and *Gymnodinium catenatum*, with maximum concentrations respectively of 40 x 10^3 and 90 x 10^3 cells l^{-1}. This is the first time these two species have been recorded in Uruguayan waters, though both are well known in adjacent Argentinian waters. The DSP threat led to a partial ban, and the PSP threat to a total ban on shellfish harvesting.





Top: Dinophysis acuta, *vegetative cell.*
Bottom: Dinophysis acuta, *cyst. Photos: Y. Pazos.*

Silvia Méndez, Instituto Nacional de Pesca, Constituyente 1497-89, Montevideo 11200, Uruguay.

PSP in Morocco

Algal blooms commonly cause problems in Moroccan waters, both on the Atlantic and Mediterranean coasts. Red tides are observed several times a year in various localities, and during these periods the consumption of mussels, oysters and other molluscs is forbidden. These problems may increase in the future since there is now a rapid development of aquaculture taking place involving both national and international investors.

There is a large modern aquaculture complex in Nador lagoon, and another covering 2000 hectares began in February this year in the Mouloaya estuary near Oujda.

Another is planned for Larache on the Atlantic Coast South of Tanger. In addition, there are important resources in the Wadi Bou Regreg near Rabat.

Scientific studies of the taxonomy and ecology of potentially harmful algae in Moroccan waters are therefore urgently needed.

M. Baddyr, Institut Agronomique et Vétérinaire Hassan II, CHA, B.P. 121 Aiz Melloul, Agadir, Morocco

***Note from the Editor**: Dr. Baddyr has just sent us a copy of an article by A. Tber published in* Maghreb Vétérinaire, *vol. 2, p. 15-19 (1983), which reports PSP toxicity levels in mussels sampled in 1982 at various Moroccan localities. The highest levels, up to 4880 M.U./100g, were recorded at sites near Agadir and Essaouira in samples collected in October.*

So far as we are aware, Moroccan waters are not marked positive in any chart showing the worldwide distribution of PSP toxins.

Red Tide Research Programme in China

China now experiences a broad range of harmful algal blooms including those that endanger humans (e.g. causing paralytic shellfish poisoning), others that kill farmed fish and shrimp, and still others that alter the general aesthetics of coastal waters due to the noxious character of the blooms. In the past, Chinese red tide activities have generally been restricted to monitoring and descriptive field investigations. A newly established, high priority national red tide research programme includes plans to characterize the taxonomy, physiology, ecology and toxicology of species indigenous to Chinese coastal waters.

Chinese research emphasis on red tides has grown dramatically in recent years, in parallel with the perceived expansion of the phenomenon and its impacts. Nationally coordinated projects were initiated in 1987, and again in 1988 to investigate the East and South China Seas. A significant development occured in 1990 when red tides were given 'major' project status – the highest possible research ranking obtained by only a few projects throughout all scientific disciplines. The resulting four-year project is headed by Dr. Qi Yu-zao, President of the Institute of Hydrobiology, Jinan University and collaborating investigator on the NSF of China proposal. The national red tide programme involves eight institutions and universities, and over 100 scientists. The institutions include: the Institute of Hydrobiology, Jinan University; the South China Sea Branch, State Oceanic Administration of China (SOA); East China Sea Branch, SOA; Third Institute of Oceanography, SOA; the Institute of Oceanology, Academica Sinica; the South China Sea Institute of Oceanology, Academica Sinica; the Institute of Environmental Science, Zhongsan University; and the South China Sea Institute of Fisheries of the Chinese Academy of Fisheries.

There are four research priorities in this national programme: (i) biological basis of red tides (taxonomy, cultivation, life cycles, toxicology); (ii) experimental ecology studies (physiological requirements, growth characteristics, enclosed marine ecosystem experiment); (iii) monitoring (three-year monitoring programme at two sites in the South and East China Sea, plus major coastal cruises); (iv) mathematical modelling.

Qi Yu-Zao and Hong Ying, Institute of Hydrobiology, Jinan University, Guangzhou, China; fax: (86-20) 5516941.

What the haptonema is for

by Ralph A. Lewin

M. Kawachi and colleagues (*Phycologia* 30, p. 563-573, 1991) have neatly solved (or partly solved) a problem that has worried phycologists for years: why certain chrysophytes have a haptonema.

This organelle is just visible by light microscopy. It is a filament something like a flagellum extending between the paired cilia of certain unicellular algae, but is clearly not involved in swimming.

Short haptonemata are little more than spurs: long ones may exceed the cell in length, and are normally coiled. People had postulated that a haptonema might be involved in feeding, but many of us discounted this idea because haptophytes are generally photosynthetic. Little did we suspect what dark deeds could be done by such little plants.

Kawachi *et al.* (*op. cit.*) show one prymnesiophyte (the class name now preferred) uses the haptonema to catch and eat bacteria and other little morsels. The species they looked at was *Chrysochromulina hirta*. As the cell swims, the organelle is extended straight ahead. Small particles stick to it, and are caused to slither down its surface towards a site some micrometres from the base. After a few have accumulated in a kind of bacterial bolus, apparently held together by slime, the lump is sent back up to the haptonemal tip. Seconds later, the whole filament curves, bending back on itself, and conveys its meatball to a buccal area. There it is ingested into the cell. The haptonema then straightens out again and recommences fishing.

Algae can no longer be regarded simply as primary producers, because even among the apparently vegetative components of phytoplankton pastures there are many facultative predators. Some, such as the colourless dinoflagellates (for instance the giant cells of *Noctiluca*), are obligate predators, but in the past few years we have learned that many smaller dinoflagellates, evidently with good functional photosynthetic apparatus, can also use solid food by extracellular or intracellular digestion of prey cells.

Among predatory algae we now have to include prymnestiophytes such as *Chrysochromulina* which are as small as 5 micrometres in diameter. But what happens in nature? Or does it merely constitute a source of midnight snacks or supplementary food, tiding the algae over periods when photosynthesis is precluded at night, or when the cells sink below the euphotic zone?

(The original article has been slightly shortened for this newsletter.)

ICES-IOC Study group on the dynamics of harmful algal blooms

The ICES-IOC Study Group on the Dynamics of Harmful Algal Blooms met in Vigo, Spain, 7-9 April 1992, to design and propose a programme for studying the dynamics of harmful algal blooms. This multinational, multidisciplinary research programme is intended to include modelling, experimental and field components. The research programme requires investigators from several countries to work simultaneously in the same localities, in order to have the necessary variety of expertise. As well, sequential field studies in different localities will help to resolve the worldwide variation in the population dynamics of harmful algae.

Several localities were suggested as appropriate for a comprehensive study. Among the proposed localities the following three were chosen; Iberia (Spanish-Portuguese Atlantic Coast); Gulf of Maine (USA); Skagerrak/Kattegat (Scandinavia). Furthermore the research programme includes a comparative *Heterosigma* study and mesocosms experiments. The latter will be independent as well as supportive to the field experiments.

This research programme on the dynamics of harmful algal blooms will be a major component of the "Ecology and Oceanography" element of the IOC-FAO Harmful Algal Bloom Programme, outlined in *Harmful Algae News* no. 1. The proposed research programme will be presented to the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms in June 1992 (see below), and published as an *ICES Research Report* later this year.

The development of the IOC-FAO Harmful Algal Bloom Programme continues

The objective of a planning meeting 10-11 April in Vigo, Spain, was to continue the planning process of an international programme to deal with the problems of harmful algae. The broad outline of the programme was completed at a workshop in Newport, Rhode Island, USA, 2-3 November 1991.

The main objectives were to review the broad outline of the programme, to identify staff and resource requirements of a secretariat for the programme, and to prepare recommendations for presentation to the first session of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms. Furthermore the first issue of IOC's *Harmful Algae News* was reviewed and the strategy for the development of an international society on harmful algae was discussed as mentioned elsewhere in this issue.

With respect to the present newsletter, it was decided that an editorial support group composed of contributing editors, representing different geographical regions of the world, should be formed as soon as possible, and at the latest in the fall of 1992. One of the group's tasks will be to provide the Editor with material from their region. It was suggested that each 'sub-editor' in turn could be responsible for an issue in order to give a comprehensive overview of the situation in the different regions of the world.

The first session of the Intergovernmental Panel on Harmful Algal Blooms will take place 23-25 June 1992 in Paris, and the ad hoc planning committee will present the following recommendations to the Panel: (i) to accept the programme plan outlined in the *IOC Workshop Report* No. 80; (ii) to establish a secretariat to support coordination and implementation of the programme; (iii) to provide support for continued planning and implementation of the programme; (iv) with respect to the considerations of the ICES-IOC study group to design and propose a programme for studying the dynamics of harmful algal blooms, Member States should consider the ICES-IOC study group report, review it at a national level, and provide the sustained resources to implement the activities; (v) the concerns expressed in past programme documents about long-term trends in harmful algal blooms occurrences and data sets should be brought to the attention of the IOC GOOS Support Office for inclusion in the development and implementation plans for GOOS (Global Ocean Observing System).

Those who would like to receive the outline of the Harmful Algal Bloom Programme (*IOC Workshop Report* No. 80) can send a request to IOC.

INTERNATIONAL SOCIETY

At the IOC-SCOR Workshop on Programme Development for Harmful Algal Blooms held in Newport (USA) following the Vth Conference on Toxic Marine Phytoplankton (November 1991), it was recommended that 'it would be appropriate to form an international (harmful algal bloom) society that would be independent of any one country, but attached to an international body such as the International Council of Scientific Unions (ICSU)'. This recommendation was supported at the recent IOC ad hoc planning programme meeting held in Vigo, Spain. We hereby solicit suggestions, ideas, proposals and assistance from those of you interested in helping to prepare the terms and bylaws of this society for presentation to attendees at the VIth Conference on Toxic Marine Phytoplankton (1993) to be convened in Nantes, France. Your input will help to establish the strategy and working group assignments that we will follow in developing the proposal for this society. Please send your comments etc. to:

Ted Smayda
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Early red tides

Many travellers through the centuries have left accounts of red tides from all parts of the world. Here are two extracts from a book by E. Olafsson and B. Pálsson (*'Reise igennem Island foranstaltet...* ') published in 1772.

'This phenomenon is known in other countries but is rare in Iceland. In 1712 it was observed in Reykjaströnd. The sea was blood-coloured off the coast quite far out, so that the oars of fishing boats became bloodstained, and that "blóðkifrar" (coagulated blood), to use the word of the writer of the annales, indicating his belief that it was blood, settled on the seaweed and stones on the beach. Much earlier, or in 1649, the same was observed two miles offshore in Northwest Iceland and now again in Seydisfjördur and western Alftafjördur. In the early morning that day the sea in these fjords was blood-red but the night before it had been fiery red so there must have been some kind of phosphorescence occurring. It cannot be verified whether this was caused by some marine insects or plants...' (para. 84).

'Some time in 1638 fishermen observed "blood in the sea" off the east coast of Iceland. It drifted towards the shore in wide stretches or current bands. This is only mentioned here in reference to what has previously been reported (on para. 84). It is however possible that when whales get into a fight in the sea, especially when killer whales by the thousands attack the huge toothless (sei) whales and tear them to pieces, that the sea will become bloodstained for miles. This might even be one other way to explain the red colour of the sea' (para. 846).

It was common amongst seamen at that time to attribute red water to the menstrua of whales. This is the only account I know in which a fight between whales is suggested.

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Future events

JUNE 92

The IOC-FAO Ad hoc Intergovernmental Panel on Harmful Algal Blooms, 1st Session, 23-25 June, UNESCO, Paris, France.

AUGUST 92

Environmental Assessment in Developing Countries, 19-22 August, World Bank HQ, Washington DC, USA. *Contact*: M. Voland, Box 70, Belhaven, NC 27810, USA.

12th International Diatom Symposium, 30 August - 5 September, Renesse, Netherlands. Monitoring, eutrophication, acidification and ecotoxicology are expected to be among the issues discussed. *Contact*: AquaSense, PO Box 41125, 1009 EC Amsterdam, The Netherlands. Tel.: (31-20) 592 2244; fax: (31-20) 592 2249.

SEPTEMBER 92

40th Annual Congress of the Society for Medicinal Plant Research, 1-5 September, Trieste, Italy. This congress will include a one-day session devoted to algal toxins. *Contact*: The Congress Secretariat, Via S. Nicolò 14, 34121 Trieste, Italy. Tel.: (39-40) 368343; fax: (39-40) 368808.

Nutrient regeneration and primary production - closing the loop (Society of General Microbiology), 2-4 September, Trinity College, Dublin, Ireland. *Contact*: M. A. Lock, School of Biological Sciences, University of Wales, Bangor, Gwynedd LL57 2UW, UK.

Workshop on red tides and mortality of marine organisms in the Caribbean, 17-19 September, Instituto Oceanográfico de Venezuela, Universidad de Oriente, Cumaná, Venezuela. *Contact:* Elvira Ferraz-Reyes, President of the Organizing Committee, CONCIT, Apartado 70617, Los Ruices, Caracas, Venezuela. Tel.: (58–2) 2390433; fax: (58-2) 2398677.

OCTOBER 92

International Workshop on Marine Environmental Protection and Coastal Living Resources, 29 September - 3 October, Bremen Maritime Training Center, Bremerhaven, Germany. Main topics: eutrophication in semi-enclosed seas, and harmful algal blooms. *Contact*: Polarmar GmbH, Burger 20, 2850 Bremerhaven, Germany. Tel.: (49-471) 973 2191; fax: (49-471) 973 2215.

NOVEMBER 92

8th International IUPAC Symposium on Mycotoxins and Phycotoxins, 8-12 November, Stouffer Presidente Hotel, Mexico City, Mexico. *Contact*: Symposium Secretariat, VIII International IUPAC, Insurgentes Sur 3700 - C, Apartado Postal 101-63, 04530 Mexico DF, Mexico. Tel: (525) 550 58 83; fax: (525) 548 82 07.

LATE 93

VIth International Conference on Toxic Marine Phytoplankton, 18-22 October, Nantes, France. *Contact:* Cité des Congrès, 5 rue Valmy, 44041 Nantes Cedex 10, France. Tel: (33) 40 37 41 30; fax: (33) 40 37 40 73.

HARMFUL ALGAE NEWS

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ISSN 0020-7918