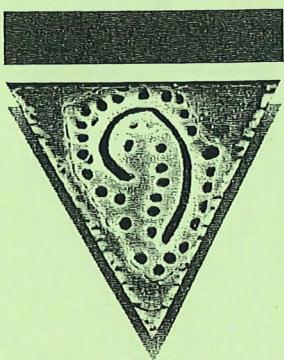


Hosting of 9th International Conference on Harmful Algal Blooms

A/Prof. G.M.Hallegraeff

Harmful
A L G A L
BLOOMS



Ninth Conference
TASMANIA

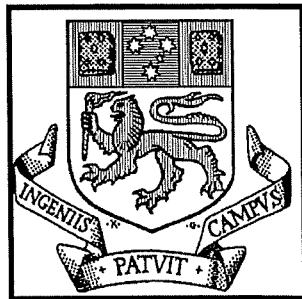
2000



**F I S H E R I E S
R E S E A R C H &
D E V E L O P M E N T
C O R P O R A T I O N**

Project No. 1998 / 343

Hosting of 9th International Conference on Harmful Algal Blooms



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School of Plant Science, University of Tasmania,
Hobart, Tas. 7001, Australia

September 2001

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1998/2001 Hosting of 9th International Conference on Harmful Algal Blooms

PRINCIPAL INVESTIGATOR:

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OBJECTIVES

To host a successful international conference dealing with: (1) Ecology and oceanography of harmful algae events; (2) Taxonomy of the causative organisms; (3) Chemistry of the toxins involved; (4) Management of toxic and harmful events; and (5) Pharmacological and epidemiological aspects. The conference will comprise: Keynote lectures, Oral and poster presentations, Round table discussions; Workshops; as well as a Social Programme including excursions to key Tasmanian aquaculture operations. A conference web site on the internet will also be created.

NON TECHNICAL SUMMARY:

OUTCOMES ACHIEVED

The FRDC sponsored 9th International Conference on Harmful Algal Blooms held in Hobart, Tasmania, from 7-11 February 2000, was a resounding success. It was the largest conference on this topic (526 participants from 47 countries) ever held anywhere in the world. A total of 130 talks and 308 poster presentations were given. The conference broke important new ground by dedicating a special session to Algal Bloom Monitoring, Management & Mitigation. Special sessions were also dedicated to Impacts on Shellfish Aquaculture and Impacts on Finfish Aquaculture. Two FRDC representatives (Peter Lee and Alex Wells) attended, and as a special service to the Tasmanian finfish aquaculture industry US expert Dr Jack Rensel gave a keynote conference address, a special satellite seminar for fishfarmers and government staff, as well as met with 4 fish farming companies on site. US experts Prof. Sandra Shumway and Dr Monica Bricelj visited several shellfish aquaculture operations. A public forum on "Harmful Algal Blooms: Impacts on Health, Environment & Economy" was scheduled in association with the conference. The publication outputs from this meeting include a 518 pages Conference Proceedings Volume (to be published through the Intergovernmental Oceanographic Commission of UNESCO) and a special issue of the international journal Phycologia (vol. 40(3)) both to appear in 2001.

KEYWORDS: Harmful Algal Blooms; Shellfish Biotoxins; Aquaculture Finfish Kills

Harmful
ALGAL
BLOOMS



Ninth Conference
TASMANIA

2000

CONVENOR

Gustaaf HALLEGRAEFF

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Fisheries Research and Development Corporation (FRDC)
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Australian Quarantine and Inspection Service (AQIS)
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International Society for the Study of Harmful Algae (ISSHA)
US-EPA (Environmental Protection Agency)
Scientific Committee Ocean Research (SCOR)
UNEP-MAP (Mediterranean Action Plan)
University of Tasmania
IOC-WESTPAC

ACKNOWLEDGEMENTS

In addition to FRDC, this conference was sponsored by the Land Water Resources Research Development Corporation (LWRRDC), Australian Quarantine and Inspection Service (AQIS), and Tasmanian Oyster Research Council (TORC). Thanks to the financial support of the Intergovernmental Oceanographic Commission of UNESCO, IOC-WESTPAC, the Scientific Commission for Oceanographic Research (SCOR), the US Environmental Protection Agency, the Mediterranean Action Plan of UNEP, the Organisation for the Prohibition of Chemical Weapons (OPCW), and the International Society for the Study of Harmful Algae (ISSHA), some 35 graduate students and scientists from developing countries were able to participate in this conference.

The logistics of organising this meeting were facilitated by the staff of Conference Design, of which Penny Archer and Ben Thiessen deserve special mention. We thank Judi Marshall and other student helpers at the University of Tasmania for organisational help, and Jeannie-Marie LeRoi and Jane Quon and co-workers for greatly enriching the conference with their theatre and art events, respectively. Steve Eastwood took the HAB2000 group picture and Jane Bailey, Valerie Dragar and Miquel de Salas provided expert help in producing the final typescript of the Conference Proceedings .

BACKGROUND

The principal investigator accepted an offer to host the 9th International Conference on Harmful Algal Blooms in Hobart in February 2000. Previous conferences in this prestigious international series have always been held at Northern Hemisphere sites in North America (Miami 1978, Newport 1991), Canada (New Brunswick 1985), Japan (Takamatsu 1987, Sendai 1995) and Europe (Sweden 1989, France 1993, Spain 1997). The initiative to break with this tradition has been triggered by significant research progress made in Australia on quarantine issues related to transfer of harmful algal species via ship's ballast water and translocation of aquaculture products, the occurrence of the largest known toxic cyanobacterial bloom in Australian freshwaters, a devastating outbreak of neurotoxic shellfish poisoning (NSP) in New Zealand (180 human poisonings), as well as increasing incidences of paralytic shellfish poisoning (PSP) in neighbouring countries in the tropical Indo-West Pacific (notably the Philippines; hundreds of human fatalities).

NEED

Starting in the mid 1980s, Australia has experienced an increased public awareness of harmful algal blooms, especially their suspected involvement in causing fish kills and feared public health risks following consumption of contaminated seafood products and drinking water supplies. If not adequately monitored and managed, the economic impacts on Australia's developing aquaculture industry and on both domestic and export markets could be devastating. An example of the first problem is the 1989 bloom event by the golden-brown flagellate *Heterosigma akashiwo* in Big Glory Bay, New Zealand, which killed NZ\$ 12 million worth of cage-reared chinook salmon. An example of the second problem is the 1993 New Zealand outbreak of neurotoxic shellfish poisoning by the dinoflagellate *Gymnodinium* cf. *breve* (NSP; 180 illnesses, no deaths) which led to export losses of NZ \$ 4.5 million in the first quarter of 1993 and a 25% decrease in domestic shellfish demand. Similarly, positive test results are now available from Australian shellfish products for paralytic shellfish poisons (NSW, TAS, VIC, NSW), diarrhetic shellfish poisons (TAS, NSW, SA), amnesic shellfish poisons (VIC, TAS), neurotoxic shellfish poisons (VIC) and cyanobacterial peptide toxins (WA). While algal biotoxins only in extreme cases lead to human fatalities, it is the so-called "halo"-effect of bad publicity resulting from a few human poisonings that can devastate aquaculture industries. Compared to our neighbour New Zealand, which spends \$3.2 M per year in biotoxin monitoring efforts (most comes from the Ministry of Health, with industry providing \$750,000 per year via an industry levy), Australian efforts in this area of quality assurance and environmental protection of aquaculture operations are unsatisfactory.

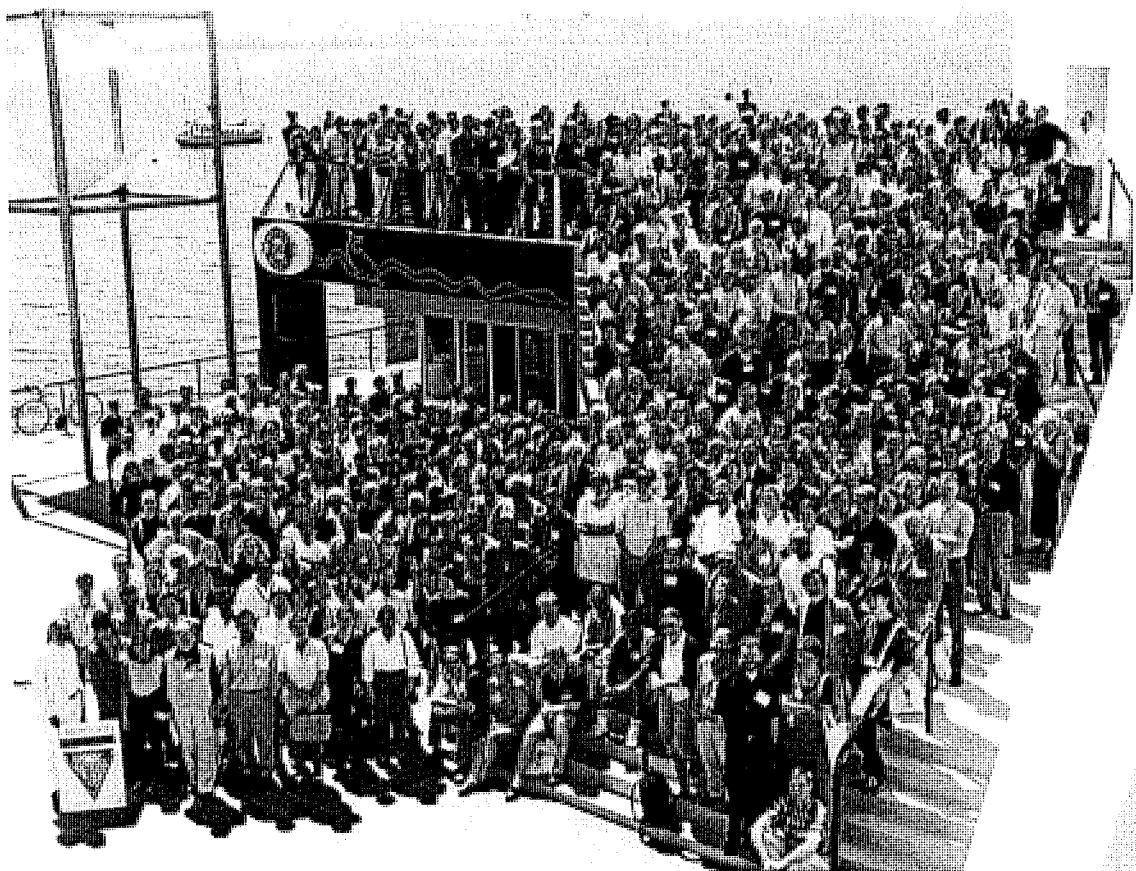
OBJECTIVES

To host a successful international conference dealing with: (1) Ecology and oceanography of harmful algae events; (2) Taxonomy of the causative organisms; (3) Chemistry of the toxins involved; (4) Management of toxic and harmful events; and (5) Pharmacological and epidemiological aspects. The conference will comprise: Keynote lectures, Oral and poster presentations, Round table discussions; Workshops; as well as a Social Programme including excursions to key Tasmanian aquaculture operations. A conference web site on the internet will also be created.

RESULTS & DISCUSSION

The 9th International Conference on Harmful Algal Blooms (HAB2000) was held in Hobart (Tasmania, Australia) from 7 to 11 February 2000. The conference venue was the Wrest Point Convention Centre located on the magnificent foreshores of the Derwent River estuary. HAB2000 brought together a record number of 526 participants (473 full and 43 day registrations, including 87 students) from 47 countries. This was the first time this prestigious

conference series was scheduled in the Southern Hemisphere, but this appeared not to have deterred strong participation from Europe (122), USA (77) and South East Asia (84).



A total of 130 talks and 308 posters were presented, and where parallel sessions were scheduled the plenary introductory session featured reviews covering the full range of topics. A total of 472 abstracts, organised as a searchable database, were made available via internet during the months preceding the meeting and for registered conference participants this complete conference abstract record is also included in CD-ROM format with this Proceedings volume. The scientific programme of HAB2000 focused on new algal bloom species and new toxic phenomena, new regional bloom events, ecophysiology and bloom dynamics, cysts and sediments, eutrophication, novel toxins, ecophysiology of toxin production, exotoxins, foodchain effects, population genetics, molecular probes, immunological methods, role of bacteria, and impacts on finfish and shellfish aquaculture operations. Being held in Australia, this was the first conference in this series which prominently featured problems caused by freshwater cyanobacterial blooms, including impacts of cyanotoxins on human health and aquatic foodwebs, and aspects of drinking water treatment. A special session on international algal bloom programmes and future conferences, as well as a dedicated session on algal bloom control and management were also scheduled. The opening address was presented by Dr Meryl Williams, director-general of the International Commission of Living Aquatic Resources

Management (ICLARM), while the closing address was given by Prof. Max Taylor , to whose life-time pioneering achievements this conference was dedicated. Summaries of some of the conference sessions were published in *Harmful Algae News* (Intergovernmental Oceanographic Commission) no. 20, May 2000.

Considerable debate occurred both before and during the conference on the pros and cons of various conference publication options. While the local conference organisers proposed to raise the quality and visibility of the conference publication by seeking to publish them as a special issue(s) of the international journal *Phycologia*, the international organising committee of this and previous meetings in this conference series expressed strong views to continue the tradition of 4 page conference papers, among others to create a publication outlet for preliminary student reports and submissions from scientists in developing countries who may have difficulty to publish in the primary literature. Accordingly, it was resolved to revert for the bulk of the conference manuscripts to the traditional 4 page IOC Proceedings format. An editorial team consisting of Gustaaf Hallegraeff, Susan Blackburn, Christopher Bolch, Richard Lewis made a selection out of some 145 manuscript submissions.

To satisfy the wishes of authors who still preferred publication in the primary literature 17 full conference manuscripts have also been published as a special volume of the journal *Phycologia* (volume 40, part 3, 2001), edited by S. Blackburn and G. Hallegraeff as guest editors, and D.Mann as overseeing journal editor. Unfortunately, we did not have sufficient finances available to provide reprints of these *Phycologia* volumes to all HAB2000 conference participants.

At the 8th International Conference in Vigo, the offer by Karen Steidinger to host the 10th Conference in this series in St Petersburg, Florida (USA) was accepted by consensus, and this offer was confirmed during HAB2000 for scheduling in October 2002. Conference participants voted in favour of an offer by Grant Pitcher to host the 11th conference in South Africa in 2005.

BENEFITS

The hosting of this prestigious conference in Australia will be of benefit to the entire bivalve shellfish and finfish aquaculture industry and will also be of interest to government agencies responsible for environmental and water quality monitoring. Through education, the lessons learned from this conference hopefully will minimise impacts of algal blooms on domestic markets, and could provide Australian aquaculture producers a strategic advantage in future export markets by protecting the "clean environment" image.

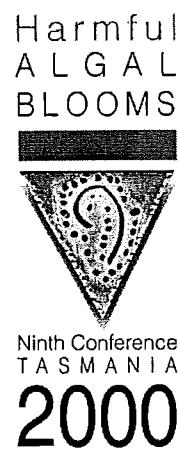
FURTHER DEVELOPMENT

A separate FRDC sponsored consultancy project hopefully should form the basis for an Australian National Marine Shellfish Biotoxins Strategy. Similarly, the Finfish Aquaculture CRC includes a programme examining the impact of finfish aquaculture on the environment.

INTELLECTUAL PROPERTY

FRDC contribution will be duly acknowledged in all brochures, conference proceedings etc.

CONFERENCE PROGRAMME (TALKS)



DAY 1 MONDAY 7 FEBRUARY		DAY 2 TUESDAY 8 FEBRUARY		DAY 3 WEDNESDAY 9 FEBRUARY		DAY 4 THURSDAY 10 FEBRUARY		DAY 5 FRIDAY 11 FEBRUARY	
SESSION 1		SESSION 5				SESSION 9		SESSION 13	
New HAB Species/ New Toxic Phenomena		Ecophysiology/ Bloom Dynamics		FREE DAY EXCURSIONS MEETINGS WORKSHOPS		Novel Toxins	Finfish Aquaculture	Control & Management	Population Genetics & Phylogeny
M O R N I N G T E A									
SESSION 2		SESSION 6		FREE DAY EXCURSIONS MEETINGS WORKSHOPS		SESSION 10		SESSION 14	
Regional Australian Events		Marine Ecology; Population Dynamics	Freshwater Ecology; Cyano- toxicity			Ecophysiology of Toxin Production	Shellfish Aquaculture	Role of Bacteria	Molecular Probes
L U N C H									
SESSION 3		SESSION 7		FREE DAY EXCURSIONS MEETINGS WORKSHOPS		SESSION 11		SESSION 15	
Regional Marine Events	Regional Events (Cyanobacteria)	Marine Ecology; Population Dynamics	Freshwater Ecology; Cyano- toxicity			Ciguatoxins & Brevetoxins	Shellfish Aquaculture	Bloom Control	Immunological Methods
A F T E R N O O N T E A									
SESSION 4		SESSION 8		FREE DAY EXCURSIONS MEETINGS WORKSHOPS		SESSION 12		SESSION 16	
New HAB Species	Drinking Water Treatment	Cysts & Sediment	Eutrophication			Poster Session		CONFERENCE SUMMARY	
		HAB Programs & Conferences				Exotoxins	Food Chain Effects	CONFERENCE THEATRE	
FREE EVENING		ICE BREAKER ANTARCTIC ADVENTURE		PUBLIC FORUM		FREE EVENING		CONFERENCE DINNER	

Conference Programme – Day 1: Monday 7 February 2000

SESSION 1 – PLENARY HALL

0900 – 0905	WELCOME Gustaaf Hallegraeff , University of Tasmania – Conference Convenor
0905 – 0920	OPENING ADDRESS Meryl Williams – Director-General ICLARM
	NEW HAB SPECIES / NEW TOXIC PHENOMENA – Chair: R. Lewis
0920 – 1000	KEYNOTE JoAnn Burkholder <i>The toxic <i>Pfiesteria</i> complex</i>
1000 – 1030	C.A. Scholin , R. Marin III, P.E. Miller, G.J. Doucette, F.M. Van Dolah, C.L. Powell, M. Busman, P.D.R. Moeller, F.Gulland, M. Haulena, L.J. Lowenstine, P. Silvagni, M. Silver, K. Lefebvre & V. Trainer <i>Mortality of sea lions along the central Californian coast linked to a toxic diatom bloom</i>
1030 – 1050	M.D. Dickman <i>Hong Kong's worst fish kill from a red tide: March-April 1998</i>
1050 – 1110	K.J. James , A. Furey, M. Satake & T. Yasumoto <i>Azaspiracid Poisoning (AZP): A new shellfish toxic syndrome in Europe</i>
1110 – 1120	GROUP PHOTO
1120 – 1140	MORNING TEA

SESSION 2 - PLENARY HALL

	REGIONAL AUSTRALASIAN EVENTS – Chair : Y. Fukuyo
1140 – 1210	KEYNOTE Ian R. Falconer <i>Toxic cyanobacterial bloom problems in Australian waters: Risks and impacts on human and animal health</i>
1210 – 1240	R.V. Azanza & F.J.R. Taylor <i>Are Pyrodinium blooms in the southeast Asian region recurring and spreading? A view at the end of the millennium.</i>
1240 – 1300	S.I. Blackburn , N. Parker, J. Parslow, P. Bonham, L. Clementson, J. Volkman, J. Hunter, P. Morgan & E. Butler <i>The Huon Estuary, south east Tasmania: an integrated approach to <i>Gymnodinium catenatum</i> bloom dynamics</i>
1300 – 1400	LUNCH

Conference Programme – Day 1: Monday 7 February 2000

SESSION 3 – PLENARY HALL

REGIONAL EVENTS (MARINE) – Chair: S.Blackburn

- 1400 – 1420 **J. Turquet**, J.P. Quod, L. Ten-Hage, Y. Dahalani & B. Wendling
Example of a Gambierdiscus toxicus flare-up following the 1998 coral bleaching event in Mayotte island (Comoros, South-West Indian Ocean).
- 1420 – 1440 **A.A. Ismael** & Y. Halim
Occurrence and succession of potentially harmful phytoplankton species in the Eastern Harbour of Alexandria
- 1440 – 1500 **S. Gallacher**, P.A. Gillibrand, M.R. Heath, P. Hess, F.G. Howard, M.C. Kelly, E.M. Macdonald & W.R. Turrell
The occurrence of Amnesic Shellfish Poisons in Scottish waters
- 1500 – 1520 P. Backe-Hansen, **E. Dahl** & D.S. Danielssen
On a bloom of Chattonella in the North Sea/Skagerrak in April-May 1998.
- 1520 – 1540 **F.H. Chang** & M. Uddstrom
Occurrence and distribution of a newly described Gymnodinium brevisulcatum sp. nov. during the 1998 summer toxic outbreaks on the central east coast of New Zealand
- 1540 – 1600 **G.A. Wagy**, P.J. Harrison & F.J.R. Taylor
Ecophysiology of some dinoflagellates from Ambon Bay, Indonesia
- 1600-1630 **AFTERNOON TEA**

SESSION 4 – PLENARY HALL

NEW HAB SPECIES – Chair : J. Burkholder

- 1630-1650 **H. Glasgow**, J. Burkholder, S. Morton & J. Springer
A new species of toxic Pfiesteria
- 1650-1710 **A.J. Haywood**, K.A. Steidinger, E.W. Truby, G. Kirkpatrick, T. Suzuki, I. Garthwaite and L. Mackenzie
Evidence for a new genus within the Gymnodiniales from different datasets
- 1710-1730 **Y. Kotaki, N. Lundholm**, K. Koike, K. Kobayashi, M. Yoshida, C. Van Thuoc, N.T.M. Huyen, N.C. Hoi, Y. Fukuyo, Ø. Moestrup & M. Kodama
Production of domoic acid and morphology of the diatom Nitzschia navis-varingica sp. nov., isolated from a shrimp culture pond in Do Son, Vietnam
- 1730-1750 **B. Reguera** & S. Gonzalez-Gil
Small cell formation in Dinophysis spp

Conference Programme – Day 1: Monday 7 February 2000

SESSION 3 – TASMAN ROOM

REGIONAL EVENTS (CYANOBACTERIA) – Chair: G. Jones

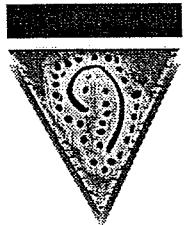
- 1400-1420 **J.M. O'Neil**, G.R. Shaw & W.C. Dennison
Blooms of the toxic cyanobacteria Lyngbya majuscula in coastal Queensland waters
- 1420-1440 **W. Hosja**, S. Grigo, J. Latchford, J. Cosgrove & M. Cousins
The effect of the Dawsville Channel on cyanobacterial blooms and associated phytoplankton in the eutrophic Peel-Harvey estuary and its associated waterways, Mandurah, Western Australia
- 1440-1500 **H.T. Kankaanpää**, V.O. Sipiä, J.S. Kuparinens, J.L. Chizmar & W.W. Carmichael
Growth and toxicity of Nodularia bloom in the western Gulf of Finland in August 1999
- 1500-1520 **G. McGregor** & L. Fabbro
Dominance of Cylindrospermopsis raciborskii in Queensland tropical and subtropical reservoirs: Implications for monitoring and management
- 1520-1540 **G. Shaw**, A. Seawright, M. Shahin, P. Senogles, J. Mueller & M. Moore
The cyanobacterial toxin, cylindrospermopsin: Human health risk assessment
- 1540-1600 **C. Garnett**, G. Shaw, P. Florian & B. Chiswell
Preliminary assessment of the effects of climate change on risks from cyanobacterial blooms
- 1600-1630 **AFTERNOON TEA**

SESSION 4 – TASMAN ROOM

DRINKING WATER TREATMENT – Chair: G. Shaw

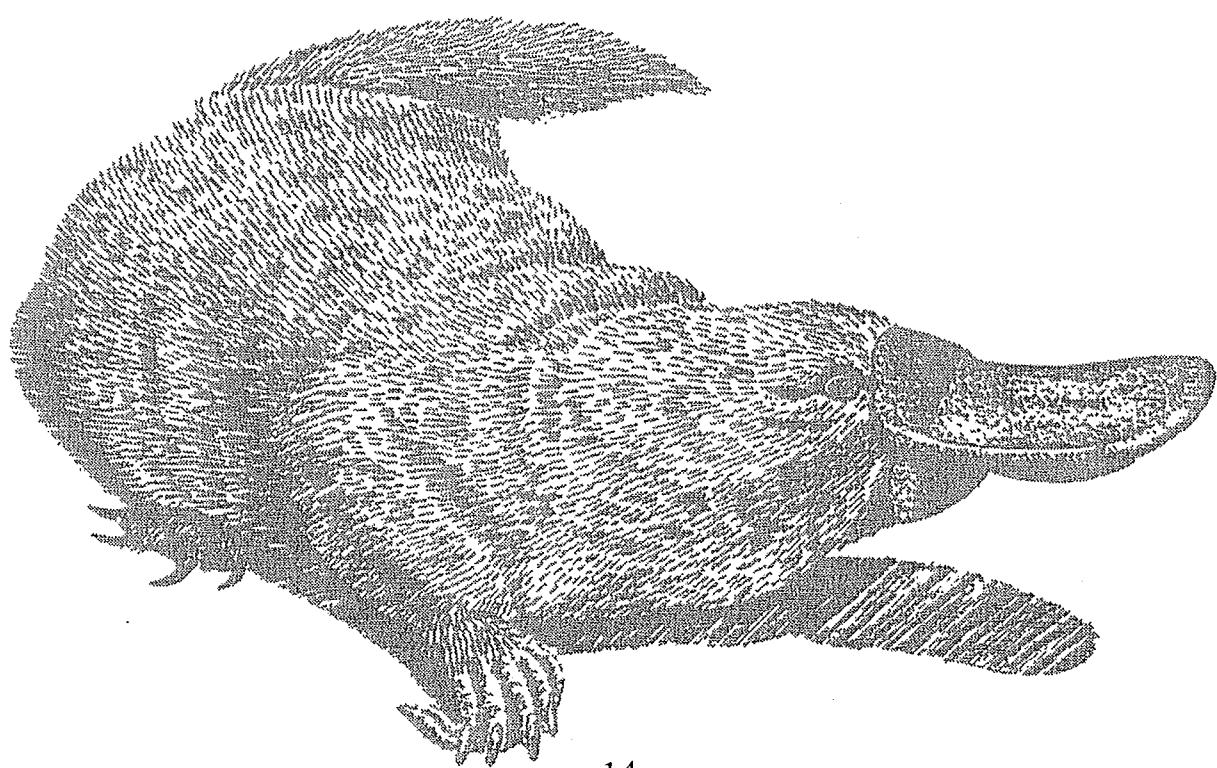
- 1630-1650 **S.J. Höger, D.R. Dietrich & B.C. Hitzfeld**
Effect of ozonation in drinking water treatment on the removal of cyanobacterial toxins and toxicity of by-products after ozonation of microcystin-LR
- 1650-1710 **J.F. Müller**, P. Senogles, N. Holling & G.R. Shaw
Formation of chlorophenols during treatment of water contaminated with cyanobacteria.
- 1710-1730 **P.J. Senogles**, G. Shaw, A. Scott, R. Sadler & B. Chiswell
Degradation of the cyanobacterial toxin cylindrospermopsin using various treatment methods
- 1730-1750 **M. Smith**, G. Jones, G. Eaglesham, G. Shaw & M. Moore
Biodegradation of the cyanotoxin cylindrospermopsin

Harmful
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TASMANIA

2000



Conference Programme – Day 2: Tuesday 8 February 2000

SESSION 5 – PLENARY HALL

ECOPHYSIOLOGY / BLOOM DYNAMICS – Chair: E. Graneli

0830 – 0910

KEYNOTE

D.M. Anderson

*The ecology and oceanography of toxic Alexandrium blooms in the Gulf of Maine:
results from the ECOHAB-GOM program*

0910 – 0940

G.J. Jones

Cyanobacterial bloom ecology and management. The Australian experience

0940 – 1000

J.J. Walsh & K.A. Steidinger

Saharan dust and Florida red tides: The cyanophyte connection

1000 – 1020

T.J. Smayda

Watermass stratification and harmful algal blooms: An alternative view

1020 – 1040

B. Dale & A. Amorim

Dinoflagellate resting cysts as seed beds for harmful algal blooms

1040 – 1120

MORNING TEA & POSTER SESSION

Conference Programme – Day 2: Tuesday 8 February 2000

SESSION 6 – PLENARY HALL

MARINE ECOLOGY: NUTRIENTS – Chair: K. Steidinger

1120-1140	S.S. Bates , C.Leger, M.F. Satchwell & G.L. Boyer <i>Effects of iron on domoic acid production by Pseudo-nitzschia multiseries</i>
1140-1200	E. Rue , M. Maldonado & K. Bruland <i>Domoic acid binds iron: A possible role for the toxin?</i>
1200-1220	M. Doblin , C. Legrand, P. Carlsson, C. Hummert, E. Graneli & G. Hallegraft <i>Uptake of humic substances by the toxic dinoflagellate Alexandrium catenella</i>
1220-1240	J.E.B. Rines , J.M. Sullivan, P.L. Donaghay & M.M. Dekshenieks <i>Where are the harmful algae? Thin layers of phytoplankton, and their implications for understanding the dynamics of harful algal blooms</i>
1240-1300	S. O'Boyle , G. Nolan & R. Raine <i>Harmful phytoplankton events caused by variability in the Irish coastal current along the West of Ireland.</i>
1300-1400	LUNCH

SESSION 7 – PLENARY HALL

MARINE ECOLOGY: POPULATION DYNAMICS – Chair: T. Smayda

1400-1420	K. Yin , V.W.Y. Tang & P-Y Qian <i>Spatial and temporal distribution of HABs in Hong Kong during 1983-1998</i>
1420-1440	T.A. Villareal , M.A. Brainyard & L.W. McEachron <i>Gymnodinium breve in the Western Gulf of Mexico: Resident versus advected populations as seed stocks for blooms</i>
1440-1500	T. Yamamoto , T. Seike, T. Hashimoto, K. Tarutani, T. Sugiyama & N. Hiraga <i>Modelling the population dynamics of the toxic dinoflagellate <i>Alexandrium tamarense</i> in the estuary of Hiroshima Bay, Japan</i>
1500-1520	G. Nishitani , H. Sugioka & I Imai <i>Population dynamics of the toxic dinoflagellates <i>Dinophysis</i> spp. in Maizura Bay, Japan, with special reference to autofluorescence characteristics and attachment of picophytoplankton</i>
1520- 1550	AFTERNOON TEA

Conference Programme – Day 2: Tuesday 8 February 2000

SESSION 6 – TASMAN ROOM

FRESHWATER ECOLOGY: CYANOTOXICITY – Chair: I. Falconer

- 1120-1140 **P.T. Orr**, G.J. Jones, R.A. Hunter, K.T. Berger, C.L.A. Orr & D.A. de Paoli
*Ingestion of toxic *Microcystis aeruginosa* by dairy cattle and the implications for microcystin contamination of milk*
- 1140-1200 **J.H. Best**, S. Pflugmacher, C. Wiegand, F.B. Eddy & G.A. Codd
The effect of lipopolysaccharide and microcystin-LR on glutathione S-transferase activities in fish
- 1200-1220 **K.M. Ross**, I. Garthwaite, C.O. Miles, W. Fischer, D. Dietrich, A.R. Chamberlin, J.B. Aggen & N.R. Towers
An ELISA with broad specificity for microcystin hepatotoxins
- 1220-1240 **B.A. Neilan**, M.C. Moffitt, D.Tillett, T.Boerner & D.L. Parker
Cyanobacterial phylogeny and the evolution of cyanotoxicity
- 1240-1300 E. Dittmann, D. Tillett, M. Kaebernick, B.A. Neilan, M. Erhard, H. von Dohren, T. Rohrlack, J.G. Kohl & **T. Borner**
Microcystin biosynthesis: Genes, enzymes, regulation, function
- 1300-1400 **LUNCH**

SESSION 7 – TASMAN ROOM

FRESHWATER ECOLOGY: IMPACT OF CYANOTOXINS – Chair: G. Codd

- 1400-1420 **S. Pflugmacher**, C. Wiegand, K.A. Beattie, G.A. Codd & C.E.W. Steinberg
Uptake, effects and metabolism of the cyanobacterial toxin microcystin-LR on the emergent reed plant Phragmites australis (Cav.) Trin. ex Steud
- 1420-1440 L. Xu, B. Zhou, **P.S. Lam**, J. Chen, G. Chen, Y. Zhang & K. Harada
Study of intoxication mechanism of microcystins on fish
- 1440-1500 **B. Hitzfeld**, W. Fischer, J. Eriksson, A. Mikhailov & D. Dietrich
*Immunochemical localization of microcystin-LR and associated pathological changes in rainbow trout (*Oncorhynchus mykiss*)*
- 1500-1520 **C. Wiegand**, G.A. Codd & S. Pflugmacher
Detoxication of the cyanobacterial toxin microcystin-LR by aquatic organisms from different trophic levels
- 1520- 1550 **AFTERNOON TEA**

Conference Programme – Day 2: Tuesday 8 February 2000

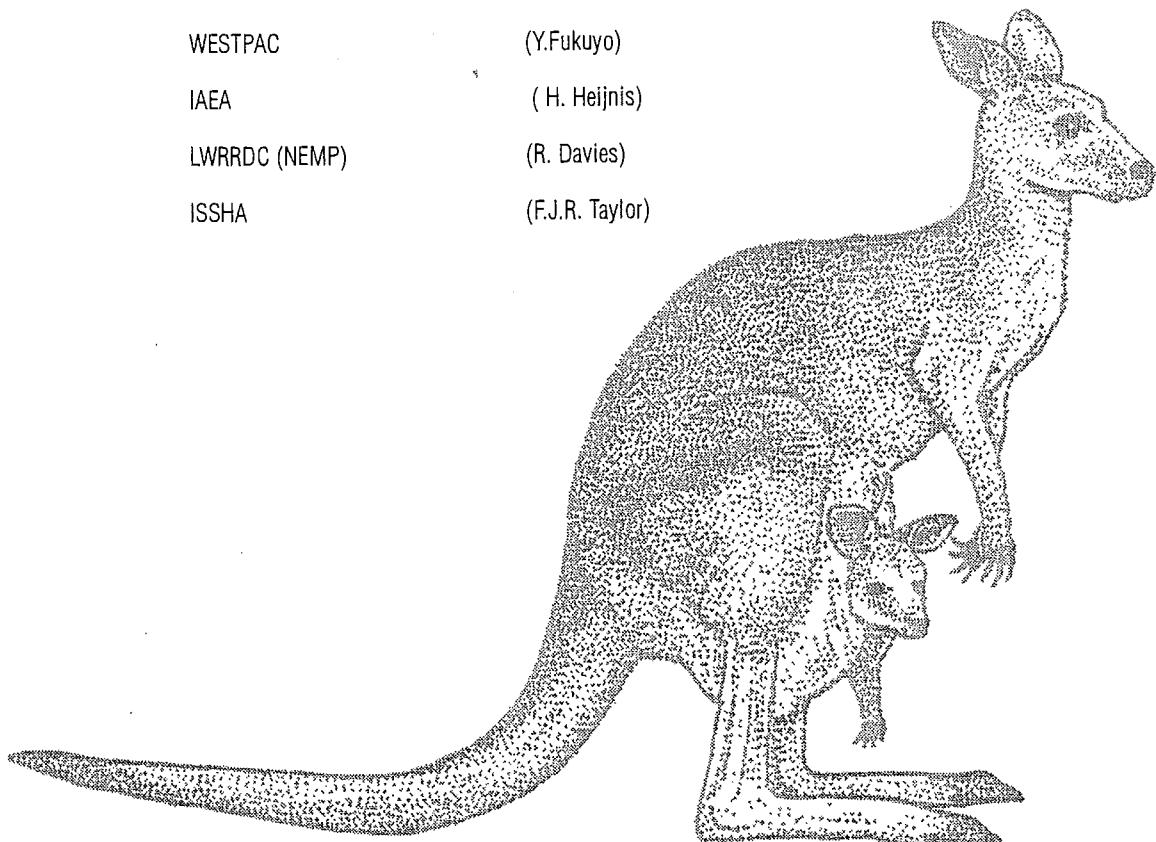
SESSION 8 – PLENARY HALL

CYSTS AND SEDIMENTS – Chair: B. Dale

- 1550 – 1610 **A. McMinn**, G. Hallegraeff, J. Smith, A. Lovell, A. Jenkinson & H. Heijnis
Recent appearance of Gymnodinium catenatum at Port Lincoln, South Australia?
- 1610 – 1630 **K. Matsuoka**, Y. Saito, H. Katayama, Y. Kanai, C. Jianfang & Z. Huaiyang
Harmful dinoflagellate cysts found in surface sediments and a core sample collected from Chanjean River, China
- 1630 – 1650 **S. Itakura & M Yamaguchi**
Germination characteristics of natural occurring cysts of Alexandrium tamarensis in Hiroshima Bay, Inland Sea of Japan
- 1650 – 1710 **M. Adachi**, T. Kanno, T. Matsubara, S. Itakura, M. Yamaguchi & T. Nishijima
Promotion of cyst formation in the toxic dinoflagellate Alexandrium (Dinophyceae) by natural bacterial assemblages

PLENARY HALL

- 1720-1830 HAB Programs & Conferences – Chair: H. Enevoldsen
- | | |
|-------------------|-----------------|
| HAB 10 conference | (K. Steidinger) |
| GEOHAB | (P. Gentien) |
| IOC-HAB | (H. Enevoldsen) |
| WESTPAC | (Y. Fukuyo) |
| IAEA | (H. Heijnis) |
| LWRRDC (NEMP) | (R. Davies) |
| ISSHA | (F.J.R. Taylor) |



Conference Programme – Day 2: Tuesday 8 February 2000

SESSION 8 – TASMAN ROOM

EUTROPHICATION – Chair: P. Thompson

1550 – 1610

J. Dela-Cruz, P. Ajani, R. Lee & I. Suthers

Noctiluca scintillans – An indicator of coastal eutrophication?

1610 – 1630

M.L. Parsons, & Q. Dortch

Sedimentological evidence of an increase in Pseudo-nitzschia (Bacillariophyceae) abundance in response to coastal eutrophication

1630 – 1650

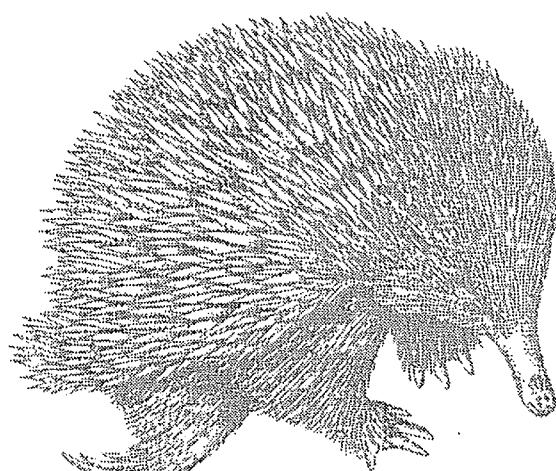
S. Moncheva

On the long-term response of harmful algal blooms to the evolution of eutrophication off the Bulgarian Black sea coast: Are the recent changes a sign of recovery of the ecosystem? – The uncertainties

1650 – 1710

A. Vershinin & A. Kamnev

Cladophora macroalgal blooms at Anapa (NE Black Sea) interfere with recreation and tourism



Conference Programme – Day 4: Thursday 10 February 2000

SESSION 9 – PLENARY HALL

NOVEL TOXINS – Chair: T. Yasumoto

0830 – 0910

KEYNOTE

R. Lewis

The changing face of ciguatera: an Australian perspective

0910 – 0930

M. Satake, K. Ofuji, T. McMahon, J. Silke, K.J. James, A. Furey, H. Naoki, Y. Oshima & T. Yasumoto

Structures and LC/MS determination of azaspiracids, causative toxins of azaspiracid poisoning

0930 – 0950

A. Alfonso, L.A. de La Rosa, M.R. Vieytes & **L.M. Botana**

Yessotoxin: A powerful new tool for the study of signal transduction

0950 – 1010

H. Goto, T. Igarashi, M. Watai, T. Yasumoto, O.V. Gomez, G.L. Valdivia, F. Noren, L.A. Gisselson & E. Graneli

Worldwide occurrence of pectenotoxins and yessotoxins in shellfish and phytoplankton

1010 – 1030

E.K. Silbergeld, A.E. Eldefrawi, J.B. Sass, A.El Nabawi, J. Choich, S. Sathyanarayana, V. Brewer, S. Conrad,

P. Eilers, A.Kane, D. Oldach, S. Hall & J.G. Morris

Pfiesteria piscicida: Identifying toxins associated with a novel human neurotoxic syndrome

1030 – 1100

MORNING TEA



Conference Programme – Day 4: Thursday 10 February 2000

SESSION 9 – TASMAN ROOM

FINFISH AQUACULTURE – Chair: S. Shumway

0830 – 0910

KEYNOTE

J. Rensel

Mitigation of harmful algal blooms in fish mariculture

0910 – 0930

I.R. Jenkinson & G. Arzul

Potentially cheap mitigation of rheotoxicity, cytotoxicity and fish mortality caused by the dinoflagellates,

Gymnodinium mikimotoi and G. cf. maguelonnense

0930 – 0950

J.N.C. Whyte, N. Haigh, N.G. Ginther & L.J. Keddy

First record of blooms of Cochlodinium sp. causing mortality of net-pen reared salmon on the west coast of Canada

0950 – 1010

J.L. Martin

Does salmonoid aquaculture impact blooms of Alexandrium, Pseudo-nitzschia and Dinophysis?

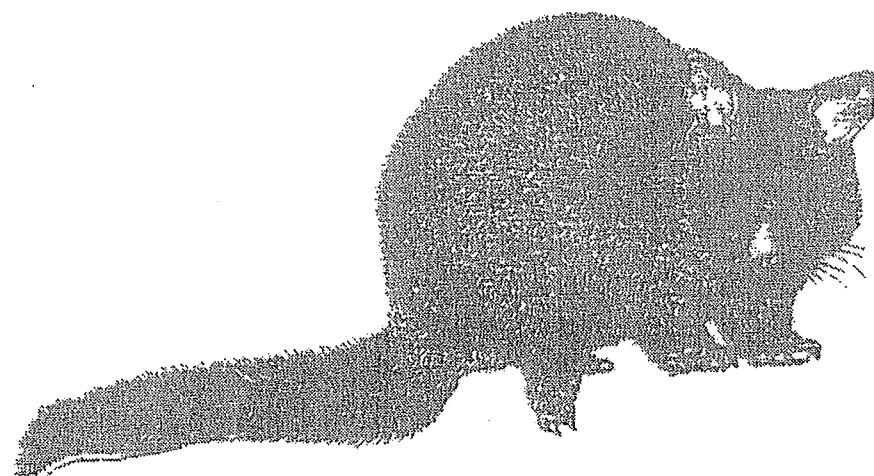
1010 – 1030

L. Songhui, Q.Yuzao & I.J. Hodgkiss

Similar blooms but different results-a mitigation experience

1030 – 1100

MORNING TEA



Conference Programme – Day 4: Thursday 10 February 2000

SESSION 10 – PLENARY HALL

ECOPHYSIOLOGY OF TOXIN PRODUCTION – Chair: M. Quilliam

1100-1140	KEYNOTE
	A.D. Cembella
	<i>Environmental and genetic factors regulating production of polyether toxins in marine dinoflagellates</i>
1140-1200	S. Khan , M. Haruyama, S. Iwashita, K. Ono & Y. Onoue
	<i>Environmental factors affecting the neurotoxin production of Chattonella antiqua (Raphidophyceae)</i>
1200-1220	M.J. Twiner & C.G. Trick
	<i>Hydrogen peroxide induced effects toward cultured cell lines: Does Heterosigma produce toxic concentrations?</i>
1220-1240	J.A. Marshall , B. Munday, S. Newman, Y. Yoshizawa & G.M. Hallegraeff
	<i>Effect of high irradiance on Chattonella marina (Raphidophyceae) from South Australia and Japan with implications for ichthyotoxicity</i>
1240-1300	R.M.A. Velzeboer , P.D. Baker & J. Rositano
	<i>Levels of saxitoxins associated with growth of the cyanobacterium Anabaena circinalis under varying sources and concentrations of nitrogen</i>
1300-1400	LUNCH

SESSION 11 – PLENARY HALL

CIGUATOXINS & BREVETOXINS – Chair: J.Ramsdell

1400-1430	T. Yasumoto , T. Igarashi, A-M Legrand, P.Cruchet, T. Bracchi, M. Chinain, T. Fujita & H. Naoki
	Structural elucidation of twenty ciguatoxin congeners
1430-1450	Anne-Marie Legrand , Philippe Cruchet, Taina Bracchi, Mireille Chinain
	<i>Isolation and LC/MS analysis of ciguatoxins from fish and microalgae to elucidate the biodiversity along the trophic chain of ciguatera</i>
1450-1510	S. Pauillac , P. Branaa, M. Chinain & J. Naar
	<i>The reversed micellar medium as a universal tool for the development of antibody-based assays to marine phycotoxins using small amount of material</i>
1510-1530	T. Sano, J. Shen & Y. Shimizu
	<i>Confirmation of dual mechanism of methyl introduction in brevetoxin biosynthesis: Comprehensive interpretation of dinoflagellate polyketide biosynthesis.</i>
1530 – 1620	AFTERNOON TEA & POSTER SESSION

Conference Programme – Day 4: Thursday 10 February 2000

SESSION 10 – TASMAN ROOM

SHELLFISH AQUACULTURE – Chair: M. Bricelj

1100 – 1140	L. Mackenzie <i>Harmful algal bloom research and monitoring in New Zealand: an overview of the 1990s</i>
1140 – 1200	J.F. Jellett , M.V. Laycock, P. Bishop, M. Quilliam, R.E. Barrett, C.G. Allison, C.R. Bentz, S.L. Plummer <i>Comparison trial of a rapid test for paralytic shellfish poisoning (PSP) and the AOAC mouse bioassay</i>
1200 – 1220	S. Svensson <i>Depuration of Diarrhetic Shellfish Toxins (DST) from mussels, Mytilus edulis: No evidence that food increases the rate of depuration</i>
1220 – 1240	P.V. Azanza , R.V. Azanza & A.I. Gedaria <i>Depuration of PSP toxins from green mussels, Penna viridis</i>
1240 – 1300	E.A. Smith , F. Milne and S. Gallagher <i>Utilisation of paralytic shellfish toxins (PST) by molluscan bacteria</i>
1300 – 1400	LUNCH

SESSION 11 – TASMAN ROOM

SHELLFISH AQUACULTURE – Chair: P. Busby

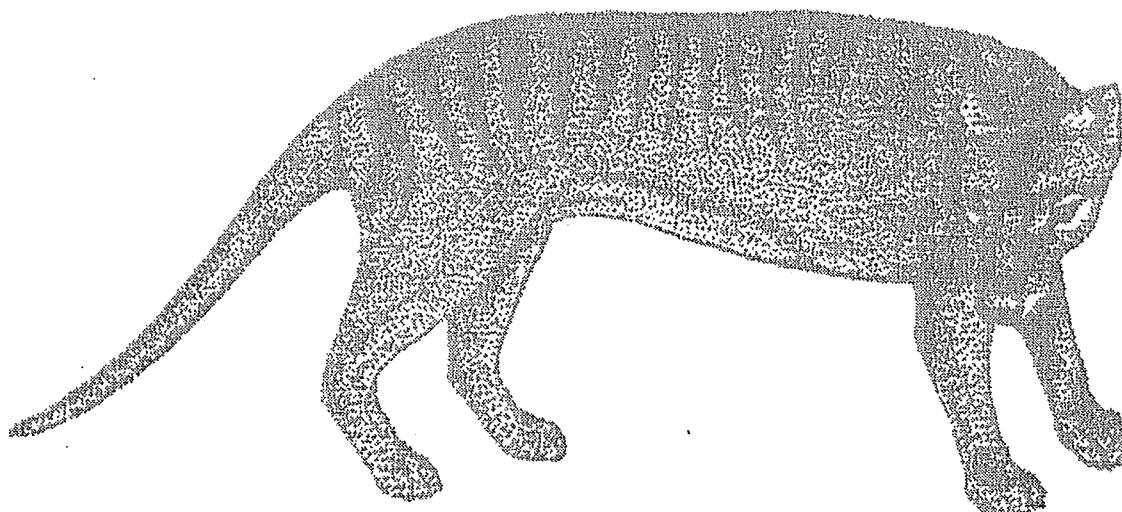
1400 – 1430	V.M. Bricelj , S. MacQuarrie & B.M. Twarog <i>Differential sensitivity and uptake of PSP toxins within and between softshell clam (<i>Mya arenaria</i>) populations from Atlantic Canada</i>
1430 – 1450	H. Ramstad & T. Aune <i>Comparison of yessotoxin concentration in blue mussels (<i>Mytilus edulis</i>) between coastal and fjord locations in Norway</i>
1450 – 1510	M. Quilliam , G. Eaglesham, G. Hallegraeff, J. Quaine, J. Curtis, D. Richard & P. Nunez <i>Detection and identification of toxins associated with a shellfish poisoning incident in New South Wales, Australia</i>
1510 – 1530	G.C. Pitcher & J.M. Franco <i>Paralytic shellfish poisoning in the abalone <i>Haliotis midae</i> on the west coast of South Africa</i>
1530 – 1620	AFTERNOON TEA & POSTER SESSION

Conference Programme – Day 4: Thursday 10 February 2000

SESSION 12 – PLENARY HALL

EXOTOXINS – Chair: D. Baden

- 1620 – 1640 **N. Johansson & E. Graneli**
Increase in the production of allelopathic substances by Prymnesium parvum cells grown under N or P deficient conditions
- 1640 – 1700 **C. Legrand**, G. Johnsen, E. Graneli & E Sakshaug
On growth and toxicity of Chrysochromulina leadbeateri and Prymnesium parvum (Haptophytes)
- 1700 – 1720 **R. Pierce**, M. Henry, P. Blum & S. Payne
Gymnodinium breve toxins without cells: extra-cellular and intra-cellular toxins.
- 1720 – 1740 **D.P.H. Hsieh**, S. Huxtable & G.H. Chang
Total production of C1 /C2 by Alexandrium tamarensense
- 1740 – 1800 **I. Garthwaite**, K.M. Ross, C.O. Miles, N. Towers & A. Haywood
Detection of NSP (brevetoxins) in algal cultures and seawater by ELISA



Conference Programme – Day 4: Thursday 10 February 2000

SESSION 12 – TASMAN ROOM

FOOD CHAIN EFFECTS – Chair: A. Cembella

1620 – 1640 **P.A. Tester**, D. Shea, G.J. Doucette, Y. Pan & C.A. Scholin

Algal toxins in marine food webs

1640 – 1700 **S. Bargu**, B. Marinovic & M. Silver

Feeding response of krill to the toxin producing diatom Pseudo-nitzschia

1700 – 1720 **K.A. Lefebvre**, M.E. Steele, H.C. Marshall, S. Dovel & M.W. Silver

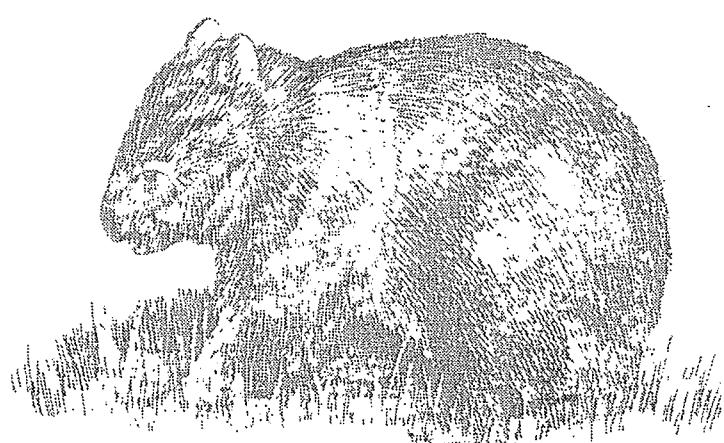
*Outward excitotoxic effects and tissue distribution of domoic acid in a prominent vector species, the Northern anchovy (*Engraulis mordax*)*

1720 – 1740 E. Fairey, N. Shuart, M. Busman, K. Kimm-Brinson, P. Moeller & **J. Ramsdell**

Biomonitoring brevetoxin exposure in mammals using blood spot cards

1740 – 1800 **D.K. Stoecker**, K. Stevens & D.E. Gustafson

*Potential predation on *Pfiesteria piscicida**

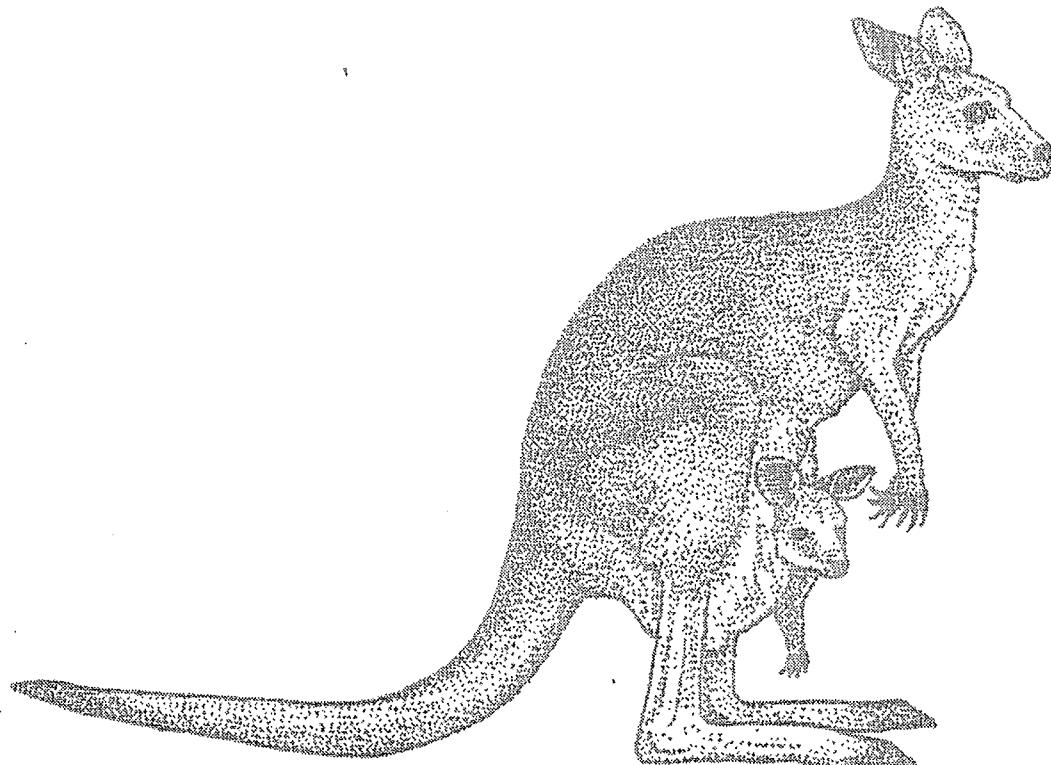


Conference Programme – Day 5: Friday 11 February 2000

SESSION 13 – PLENARY HALL

CONTROL & MANAGEMENT – Chair: J. Rensel

0830 – 0910	D.Paterson <i>An agenda to minimise the spread of harmful algal blooms by shipping</i>
0910 – 0930	M.C. Villac , G. Persich, L. Fernandes, R. Paranhos, S. Bonecker, V. Garcia, C. Odebrecht, D. Tenenbaum, M.L. Tristao, S. de Andrade & A. Fadel <i>Ballast water exchange: Testing the dilution method (Petrobras, Brazil)</i>
0930 – 0950	J.P. Harmer, I.A.N. Lucas & T.A. McCollin <i>The potential for the introduction of dinoflagellate cysts into the ports of England and Wales</i>
0950 – 1010	H.F.A.Thomas & J.L.Gerritsen <i>The most effective and environmentally friendly way of killing algae</i>
1010 – 1030	E.C.D. Todd & W. Ross <i>A bacterial risk assessment as a model for assessing risks of algal blooms</i>
1030 – 1100	MORNING TEA

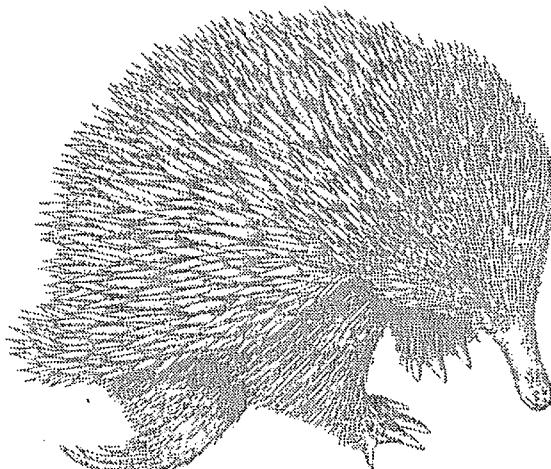


Conference Programme – Day 5: Friday 11 February 2000

SESSION 13 – TASMAN ROOM

POPULATION GENETICS & PHYLOGENY – Chair: C. Scholin

- 0830 – 0910 **C.J. Bolch**
Evolution and biogeography of the Gymnodinium catenatum species complex: a multidisciplinary approach
- 0910 – 0930 L.K. Medlin, M. Lange, **U. John**, U. Wellbrock, J. Brenner, G. Donner, M. Elbrächter, C. Hummert & B. Luckas
*Toxic Alexandrium tamarensis isolates (Dinophyceae) from the Orkney Islands, Scotland,
are related to North American stocks*
- 0930 – 0950 M. Elbraechter, **L. Medlin**, M. Lange, G. Donner & M. Schweikert
*On identification and classification of Prorocentrum species (Prorocentrales, Dinophyceae) with special
emphasis on toxic species*
- 0950 – 1010 **B. Edvardsen**, K. Schalchian-Tabrizi, S. Brubak, E. Dahl, K.S. Jakobsen & E. Paasche
Genetic analyses of Dinophysis species isolated from Norwegian waters
- 1010 – 1030 **C.P. Saint**, K.M. Wilson, M.A. Schembri, S.J. Baker & B.A. Neilan
The use of molecular techniques to characterise toxic cyanobacteria.
- 1030 – 1100 **MORNING TEA**

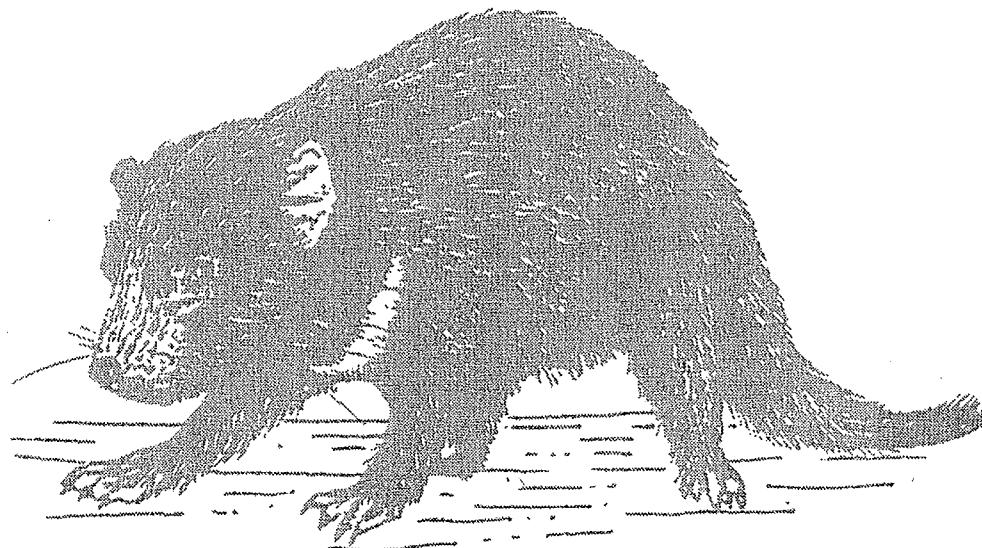


Conference Programme – Day 5: Friday 11 February 2000

SESSION 14 – PLENARY HALL

ROLE OF BACTERIA – Chair: S. Gallacher

- 1100 – 1120 X. Mayali, Y. Pan, P.D.R. Moeller & **G.J. Doucette**
Algicidal bacteria active against Gymnodinium breve
- 1120 – 1140 **H. Kitaguchi**, N. Hiragushi, A. Mitsutani, M. Yamaguchi & Y. Ishida
Killing of a harmful dinoflagellate Heterocapsa circularisquama, which causes damages to bivalves such as oysters, by a marine bacterium EHK-1
- 1140 – 1200 **I. Imai**, T. Sunahara, T. Nishikawa & Y. Hori
Relationship between the population dynamics of Chattonella spp. (Raphidophyceae) and the algicidal bacterium Cytophaga sp. in the Seto Inland Sea, Japan
- 1200 – 1220 **J.H. Skerratt**, J.P. Bowman, P.D. Nichols, G.M. Hallegraeff & T.A. McMeekin
Estuarine algicidal bacteria: Their detection and effect on harmful algal species
- 1220 – 1240 **M. Kirchner**, A. Wichels & A. Seibold
Intracellular bacteria in the bloom-forming dinoflagellate Noctiluca scintillans
- 1240 – 1300 **S. Gallacher**, J. MacRae, C. Ferguson, E. Smith, P. Hess, M. Johnstone, L.A. Glover, S.S. Bates & I Garthwaite
Identity of bacteria isolated from the domoic-acid-producing diatom Pseudo-nitzschia multiseries and investigations into mechanisms by which they influence toxin production
- 1300 – 1400 **LUNCH**

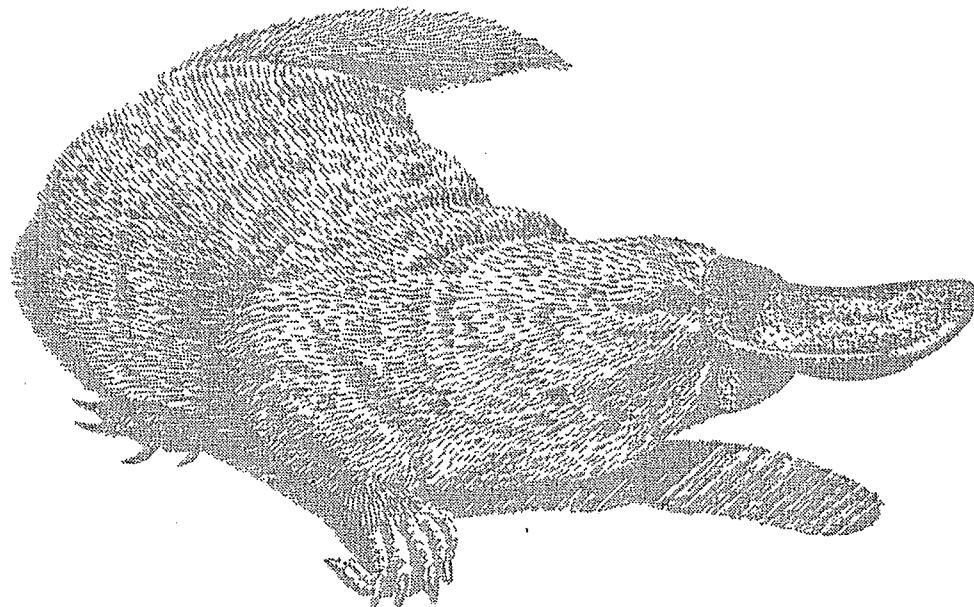


Conference Programme – Day 5: Friday 11 February 2000

SESSION 14 – TASMAN ROOM

MOLECULAR PROBES – Chair: C. Bolch

1100 – 1120	D. Oldach , P. Rublee, C. Delwiche, H. Glasgow, K. Jakobsen, T. Tengs, H. Bowers, E. Brown, J. Kempton & J. Burkholder <i>Development of molecular detection methods for <i>Pfiesteria piscicida</i> and other estuarine toxin-producing dinoflagellates guided by Heteroduplex mobility assay assisted sequence discovery</i>
1120 – 1140	J.A.F. Robledo, K. Saito, D.W. Coats, K.A. Steidinger & G.R. Vasta <i>PCR-based detection assay for the heterotrophic dinoflagellate <i>Pfiesteria piscicida</i></i>
1140 – 1200	W. Litaker , R. Sundseth, M. Wojciechowski, C. Bonaventura, R. Henkens & P. Tester <i>Electrochemical detection of <i>Pfiesteria piscicida</i> and <i>Pfiesteria-like</i> species</i>
1200 – 1220	L. Connell • <i>Rapid identification of marine algae (Raphidophyceae) using three-primer PCR amplification of nuclear internal transcribed spacer (ITS) regions</i>
1220 – 1240	J.V. Tyrrell , P.R. Berquist, P.L. Berquist & C.A. Scholin <i>Detection and enumeration of raphidophytes using rRNA-targeted oligonucleotide probes</i>
1240 – 1300	L.L. Rhodes , C. Scholin, J. Tyrell, J. Adamson & K. Todd <i>The integration of DNA probes into New Zealand's routine phytoplankton monitoring programmes</i>
1300 – 1400	LUNCH



Conference Programme – Day 5: Friday 11 February 2000

SESSION 15 – PLENARY HALL

BLOOM CONTROL – Chair: D.M. Anderson

- 1400 – 1420 **B. Kimer**
*From the history of toxic algal blooms in Israel. The case of *Prymnesium parvum* and its control*
- 1420 – 1440 **F. Noren, Ø. Moestrup & A-S. Rehnstam-Holm**
Parvilucifera infectans (Noren and Moestrup 1999): a parasitic flagellate capable of killing toxic microalgae
- 1440 – 1500 **E. Erard-Le Denn, M.J. Chretiennot-Dinet & I. Probert**
*A parasite of *Alexandrium minutum* in French coastal waters*
- 1500 – 1520 **M.R. Sengco, A. Lil & D.M. Anderson**
The control of harmful algal blooms using clay minerals
- 1520-1540 **Y.Zhiming, Z.Jingzhong & S.Xiaoxia**
Progress of red tide control with clays
- 1540-1600 **H.R.Kim, K.II Kim, K.S.Park, T.H.Hong & H.J.Jeong.**
Developing a method of controlling the outbreak and maintenance of red tides using NaOCl produced by electrolysis of natural seawater
- 1600-1630 **AFTERNOON TEA (EXHIBITION FOYER)**



Conference Programme – Day 5: Friday 11 February 2000

SESSION 15 – TASMAN ROOM

IMMUNOLOGICAL METHODS – Chair: I.Garthwaite

1400 – 1420

L.E. Lewellyn & J Doyle

The novel saxitoxin binding protein, saxiphilin: Its physiological role and applications

1420 – 1440

S. Dyhrman & B. Palenik

A single-cell immunoassay for phosphate stress in Prorocentrum minimum

1440 – 1500

M. Kodama, S. Sato & M. Sato

Antibody against PSP toxins raised by newly designed antigen

1500 – 1520

M. Schweikert, C. Burk, R. Dietrich, P. Hanke, C. Hummert & F. Brümmer

Localisation of PSP toxins in dinoflagellates of the genus Alexandrium

1520 – 1540

G. Gerds, C. Hummert, G. Donner, B. Lucas & C. Schütt

A fast fluorimetric assay (FFA) for the detection of saxitoxin in natural phytoplankton samples.

1540 – 1600

L. Peperzak, B. Sandee, C. Scholin, P. Miller & L. Van Nieuwerburgh

Flow cytometric application of monoclonal antibody and rRNA probes on cultured Gymnodinium mikimotoi

1600 – 1630

AFTERNOON TEA (EXHIBITION FOYER)

SESSION 16 – TASMAN ROOM

1630 – 1700

CONFERENCE SUMMARY

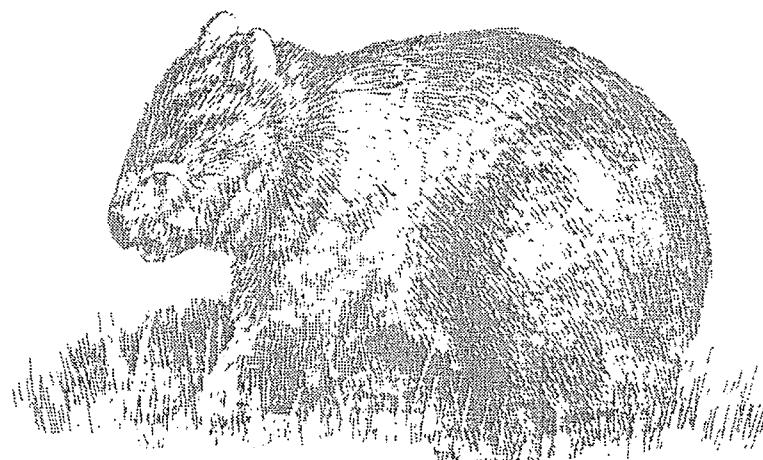
F.J.R. (Max) Taylor

1700 – 1730

CONFERENCE THEATRE

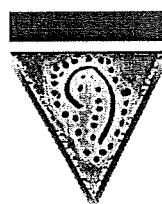
"The Deadly Dinoflagellate"

J.M. LeRoi & Double Helix Drama



CONFERENCE POSTERS

Harmful
A L G A L
BLOOMS



Ninth Conference

TASMANIA

2000

Poster Presentations

MARINE ECOLOGY

1. IS THE ATTACHMENT OF *GAMBIERDISCUS TOXICUS* TO ALGAE IN REEFS IN MONSOON AREAS BIOLOGICALLY OR PHYSICALLY DRIVEN?
Zenaida Abuso, Arnulfo N. Marasigan and Armando Tamse
2. PHYTOPLANKTON DYNAMICS AT A LONG-TERM COASTAL STATION OFF SYDNEY, AUSTRALIA
Penelope Ajani, Randall Lee, Tim Pritchard and Martin Krogh
3. A COMPARISON OF ZOOPLANKTON COMMUNITY STRUCTURE WITHIN AND OUTSIDE THE FIRST RECORDED TOXIC ALGAL BLOOM IN KUWAIT WATERS
Hussain Al-Mutairi, Sulaiman Al-Matar, Faiza Al-Yamani and Aws Al-Ghunaim
4. POTENTIALLY HARMFUL PHYTOPLANKTON SPECIES FROM QATARI WATERS
A.R.Al-Muftah
5. DID ALGAL BLOOMS CAUSE FISH KILLS OFF KUWAIT, ARABIAN GULF?
Faiza Al-Yamani, D.V. Subba Rao, Wafa Ismail, Kholood Al-Rifaie, Hussain Al-Mutairi, Aws Al-Ghunaim, Alan Lennox, C.V. Nageswara Rao, M.N.V. Subrahmanyam and Jassim M. Al-Hassan
6. HARMFUL ALGAL BLOOMS IN MALAYSIA: REVISITING KIMANIS BAY
Ann Anton, Johan Alexander & Abentin Estim
7. THE RELATIONSHIP BETWEEN PSP TOXIN PRODUCED BY *PYRODINIUM BAHAMENSE VAR COMPRESSUM* IN SHELLFISH AND THE PLANKTON IN SABAH, MALAYSIA
Ann Anton, Johan Alexander, Takehiko Ogata & Yasuwo Fukuyo
8. ENVIRONMENTAL CONDITIONS DURING THE *CHATTONELLA* BLOOM IN THE NORTH SEA AND SKAGERRAK IN MAY 1998
Jan Aure, Didrik Danielssen, Morten Skogen, Einar Svendsen & Henrik Søiland
9. EFFECTS OF INCREASED NUTRIENTS ON CIGUATERA ASSOCIATED DINOFLAGELLATES OF THE GREAT BARRIER REEF
Paul Bird, I Hewson, A Watkinson, W Dennison
10. PHYSICAL AND BIOLOGICAL FACTORS ASSOCIATED WITH TEMPORAL AND SPATIAL DISTRIBUTION OF *PFIESTERIA PISCICIDA* IN THE CHESAPEAKE BAY
H. Bowers, T. Tengs, J. Burkholder, P. Rublee, R. Magnien, D. Goshorn, D. Oldach1
11. COMPARATIVE RESPONSE TO FISH, ALGAL PREY, AND NUTRIENTS BY TOXIC, NONTOXIC, AND NEVER-TOXIC *PFIESTERIA PISCICIDA*
JoAnn Burkholder, Howard Glasgow, Nora Deamer-Melia, Jeffrey Springer & Alan Lewitus
12. ZOOPLANKTON GRAZING IMPACTS ON *ALEXANDRIUM* SP. IN THE GULF OF MAINE
Robert G. Campbell, Gregory J. Teegarden,, Allan D. Cembella, Edward G. Durbin
13. DEVELOPMENT OF A POTENTIAL HARMFUL ALGAL BLOOM IN A MESOCOSM EXPERIMENT MONITORED THROUGH PIGMENT ANALYSIS AND BIO-OPTICAL MEASUREMENTS
Matilde Skogen Chautón, Geir Johnsen, Catherine Legrand, Edna Granéli & Egil Sakshaug
14. HARMFUL ALGAL BLOOM AND PRIMARY PRODUCTION IN ARTIFICIAL LAKE SHIHWA
Joong Ki Choi, Eun Hee Lee, Jae Hoon Noh and Yong Chul Park
15. TROPHIC EFFECTS OF ESTUARINE BLOOM SPECIES ON BENTHIC AND PLANKTONIC GRAZERS
H.G. Dam , G.B. McManus, S.E. Shumway, R. Smolowitz, and G. Wikfors
16. ALGAL BLOOMS IN FRENCH POLYNESIAN ATOLLS, TOXIC OR ANOXIC?
Bruno Delesalle and Marie-Josephe Chretiennot-Dinet
17. TOTAL LUMINESCENCE SPECTRA OF *PYRODINIUM BAHAMENSE VAR COMPRESSUM*
Ma. Christina Z. Floresca, Susan Sta. Ana, Edgar Vallar, Maria Cecilia Galvez, and Rhodora Azanza
18. EFFECT OF UPWELLING PULSES ON EXCESS CARBOHYDRATE SYNTHESIS AS DEDUCED FROM NUTRIENT, CARBON DIOXIDE AND OXYGEN PROFILES
Fernando Fraga, Aida F. Ríos, Félix F. Pérez, Marta Estrada and Cèlia Marrasé
19. SHORT-TERM AND LONG-TERM EFFECTS OF TOXIC DINOFLAGELLATES ON THE COPEPOD *ACARTIA CLAUSI*.
M. Frangópolos, C. Guisande, M. Maneiro and J. Franco
20. DISTRIBUTION OF *PYRODINIUM BAHAMENSE VAR. COMPRESSUM* CYSTS IN THE SURFACE SEDIMENTS OF MANILA BAY, PHILIPPINES
E. F. Furio, K. Matsuoka, Y. Fukuyo and V M. Borja
21. BACTERIAL DIVERSITY IN TOXIC *ALEXANDRIUM TAMARENSE* BLOOMS OF THE ORKNEY ISLANDS AND THE FIRTH OF FORTH
G. Gerds, Wichels, A., Pahler, S., Müller, W.E.G. & C. Schütt
22. HARMFUL ALGAL BLOOMS IN THE CHESAPEAKE BAY, USA: COMPARISON OF EVENTS
Patricia M. Gilbert, Robert Magnien, Todd Kana, Michael Lomas, Jeff Alexander, Chunlei Fan, Erin Haramoto, Mark Trice
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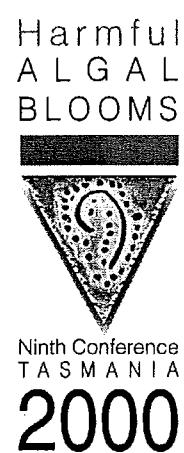
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Harmful Algal Blooms 2000

**PROCEEDINGS OF THE 9TH INTERNATIONAL CONFERENCE ON
HARMFUL ALGAL BLOOMS,
HOBART, AUSTRALIA, 7-11 FEBRUARY 2000**

Edited by

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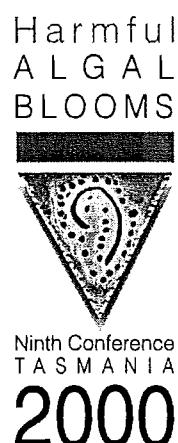
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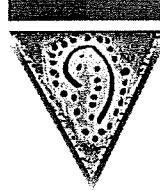
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CONFERENCE *PHYCOLOGIA* ISSUE

Harmful
ALGAL
BLOOMS



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hab special issue

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and Gustaaf Hallegraaff

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HAB Introduction

Research on Harmful Algal Blooms (HAB) first emerged as a discipline in its own right at the 1st International Conference on Toxic Dinoflagellate Blooms, which was held in Boston, Massachusetts, in November 1974. Of major concern at that time was a massive 1972 New England 'red tide' caused by the toxic dinoflagellate *Alexandrium (Gonyaulax) tamarensis*. This successful meeting was followed by two further International Conferences on Toxic Dinoflagellate Blooms, held in Miami, Florida, in 1978 and in St Andrews, Canada, in 1985. The First International Symposium on Red Tides in 1987 at Takamatsu, Japan broadened its scope to include bloom events caused by other algal groups (notably raphidophytes such as *Chattonella*), and this tradition was followed in the Fourth, Fifth, Six, Seventh and Eighth International Conferences on Toxic Marine Phytoplankton, held in Lund, Sweden (1989), Newport, USA (1991), Nantes, France (1993); Sendai, Japan (1995) and Vigo, Spain (1997). In addition to these large international meetings, an increasing number of smaller regional meetings have also been convened to address more specific issues, such as exceptional plankton blooms in European coastal waters, the impact of algal blooms on aquaculture, unusual *Aureococcus* 'brown tides' in Long Island, USA, tropical red tides of *Pyrodinium bahamense* in the Indo-West Pacific, newly recognized *Pseudo-nitzschia* toxic diatom blooms in Canadian waters and an outbreak of Neurotoxic Shellfish Poisoning in New Zealand.

The Ninth International Conference on Harmful Algal Blooms (HAB2000) was held in Hobart, Australia, from 7 to 11 February 2000 and brought together a record number of 526 participants from 47 countries. This was the first time this prestigious conference series had been held in the Southern Hemisphere, which did not deter a strong participation from Europe, USA and southeast Asia. A total of 130 talks and 308 posters were presented, with the 472 abstracts organized as a searchable database and made available via the Internet during the months preceding the meeting. The scientific programme of HAB2000 focused on new algal bloom species and new toxic phenomena, new regional bloom events, ecophysiology and bloom dynamics, cysts and sediments, eutrophication, novel toxins, the ecophysiology of toxin production, exotox-

ins, foodchain effects, population genetics, molecular probes, immunological methods, the role of bacteria and the impacts of toxic species on fin-fish and shellfish aquaculture. Given that freshwater algal blooms are such a serious issue in Australia, it was appropriate that this was the first conference in this series that prominently featured problems caused by freshwater cyanobacterial blooms, including the impacts of cyanotoxins on human health and aquatic foodwebs and aspects of drinking water treatment. A special session on algal bloom control and management was also scheduled.

This issue of *Phycologia* contains a representative selection of 16 papers presented at HAB2000. These cover fish-killing algal species such as *Pfiesteria* and *Cochlodinium*, toxic cyanobacterial problems, such as those caused by *Anabaena*, *Nodularia* and *Microcystis*, and applications of the rapidly developing field of molecular genetics to trace bloom origins and dispersal, as well as to aid the detection of raphidophyte flagellates that are difficult to recognize visually. Studies on bloom nutrient physiology, cyst germination characteristics and descriptive oceanography are included, as well as a focus on the intriguing role of bacteria-algal bloom interactions. Finally, examples are provided of applied aspects of shellfish toxicity monitoring and potential ship ballast water introductions of nonindigenous harmful microalgae.

This *Phycologia* issue is in addition to the traditional conference proceedings volume produced under the auspices of IOC-UNESCO. For HAB2000, this comprises some 140 four-page conference papers, including preliminary student reports and submissions from scientists in developing countries who may have difficulty publishing in the primary literature.

We hope you will enjoy this special selection from the rapidly growing multidisciplinary field of harmful microalgal blooms, covering a fascinating biodiversity of microalgae and cyanobacteria that had been producing powerful toxins for hundreds of millions of years before humans turned to freshwaters and the oceans for drinking water and aquaculture food production.

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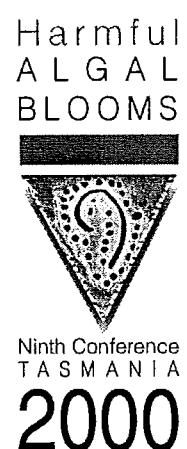
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