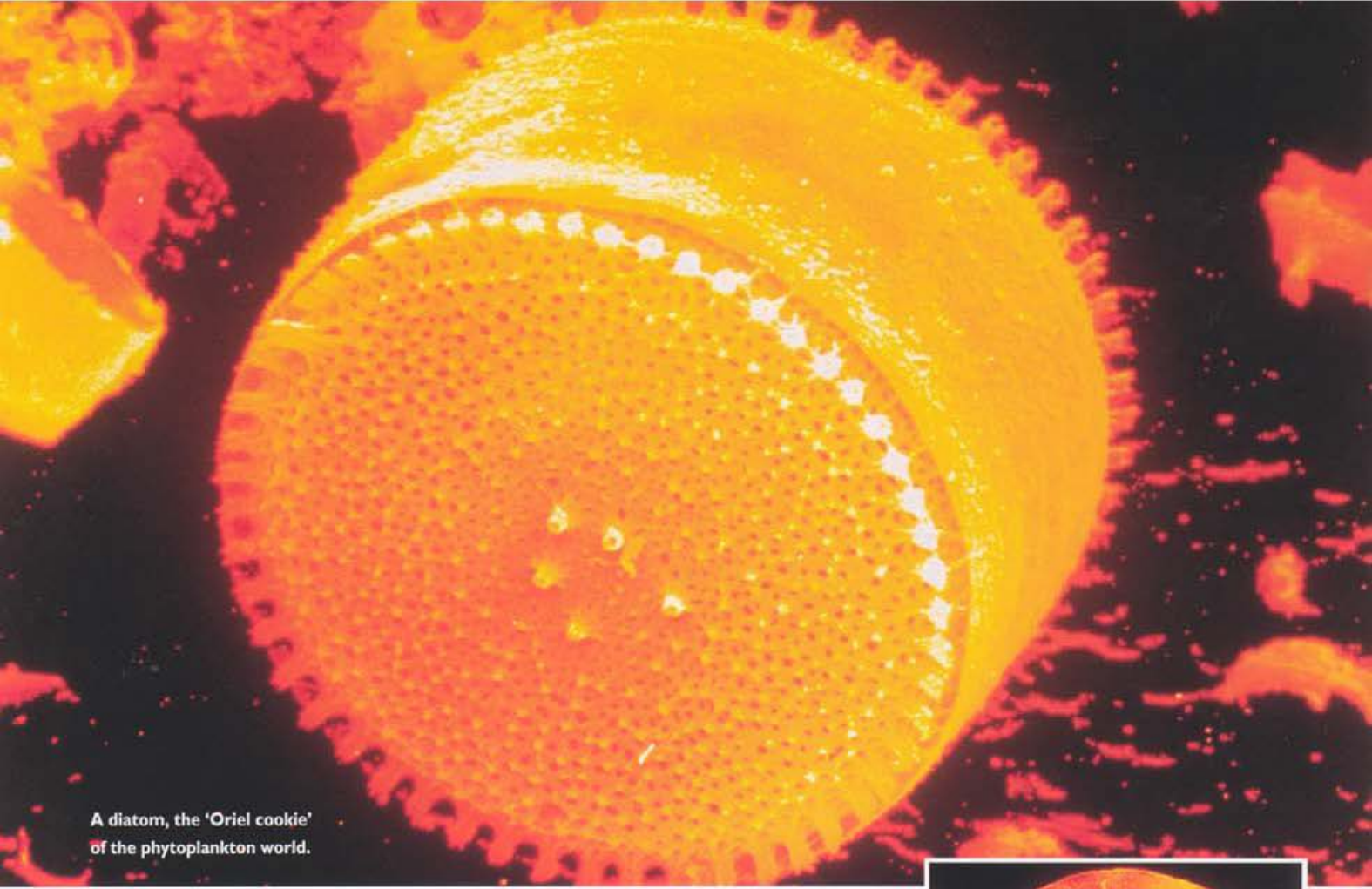


A diatom, the 'Oriel cookie' of the phytoplankton world.

Speaking for the silent majority

DR Peter Thompson has vivid memories of how his interest in phytoplankton became a passion. It happened on a field trip near his home town of Vancouver in 1976, while studying at the University of British Columbia.

Thompson was the only one of 35 students to turn up. For a whole day he had the undivided attention of two impassioned lecturers as they splashed about in a local estuary. 'Their enthusiasm convinced me that the microscopic world of the phytoplankton was where I wanted to be,' Thompson says.

Dr Peter Thompson at work on the Swan River. To understand phytoplankton you have to think like them, he says.

With a Masters, Phd and Post-doctoral Fellowship behind him, Thompson is now blazing trails as a phytoplankton ecologist with CSIRO's Division of Fisheries at Perth, spending about half of his time studying the Swan River.

In 1993, he described an algal bloom in the river as the worst he had seen in his 15 years of phytoplankton research. His assessment coincided with the establishment of the Swan River Trust's multi-million dollar assault on the river's problems.

Thompson relishes every opportunity to become immersed in his research. 'I love mucking around on small boats: that way you're right in the aquatic environment,' he says. On big boats you tend to be on the deck looking down on it.'

And in studying microscopic phytoplankton you can never get close enough. 'To understand the phytoplankton you have to think like them,' Thompson says. 'You're a plant and usually you have got just 24 hours!

Dinophysis fortii.

'To be successful, you have to get plenty of food, light and warmth. If in your day on earth you get all three, and avoid being eaten by predators (zooplankton), then you get the chance to reproduce.'

The phytoplankton's love of light accounts for their presence towards the water's surface, thus capturing the media spotlight as algal blooms.The attention is justified, because some algal blooms – dinoglagellates

and blue-greens in particular – can be lethal to animals and fish, and cleaning up after the blooms can be costly.

These realities drive the Swan River research program. The river is the focus of the State capital and drawcard for both tourists and locals. Western Australia can't afford to have its showpiece aquatic playground go bad, just as New South Wales, Victoria and South Australia can't afford to have the Murray River clog with blooms. Phytoplankton are definitely a national issue!

Thompson says that despite the havoc caused by algal blooms, eliminating phytoplankton is not the answer. He sees them as symptoms of a problem, not the cause, and respects and admires them.

'Phytoplankton are uniquely beautiful; gorgeous! There is a fascinating symmetry to their shapes, and a great deal of the earth's biology is influenced by them,' he says. 'They are the quiet achievers in global ecology.

'They play a vital role in the aquatic food chain. Without them there would be no Australian fishing industry, currently valued at $1.5 billion a year.

'They are also a crucial food source for all the filter feeders including mussels and oysters, and the predatory zooplankton, the diet of some birds.

'And then there's their role in our daily breath. They are a major source of atmospheric oxygen, and without phytoplankton absorbing CO2, the carbon cycle would be a badly buckled wheel.'

Thompson laments that people don't give due regard to the role of his microscopic friends . 'A blue whale is admired by everyone because of its large size, but without phytoplankton there would be no blue whales, or fish of any kind,' he says.

'Thompson laments that people don't give due regard to the role of his microscopic friends'

Nutrient ratios

The biggest issue in algal-bloom management is how to control the rise in nutrient levels in our lakes and rivers. Thompson's work concentrates on these nutrient levels, searching for ways to reduce the extremes of phytoplankton behaviour.

His conclusions are breaking with some established views. For example, phosphorus is often painted as the 'bogeyman' in the nutrient-algae equation. In WA's phosphate-poor farmlands, this is particularly so. Phosphatic fertilisers have been poured onto WA farms, and leached away almost as quickly into groundwater, rivers and estuaries.

It is surprising, therefore, that Thompson says river managers would be far better off concentrating on reducing levels of nitrogen, not phosphorus. How can this be?

His explanation is simple. Like all living creatures, phytoplankton need nitrogen and phosphorus in a ratio of about 15:1. Reducing the levels nitrogen - the nutrient needed in greatest quantities - will therefore have the greater effect on phytoplankton survival.

Slowly but surely this lead shown by Thompson and some others is being followed. 'It's been very satisfying to have helped move the debate along on this issue,' he says.

Silica levels significant

From his studies of the Swan, Thompson has also identified a possible means of reducing levels of toxic algaes in estuaries and rivers elsewhere. He has found that the Swan's relatively low levels of toxic algae are traceable to the river's high silica content, a consequence of its sandy catchment.

Highly dependent on silica are a diatoms, phytoplankton that generally are non-toxic. Thompson call diatoms the 'Oriel cookie of the phytoplankton world': a reference to a popular brand of biscuits in his native Canada.

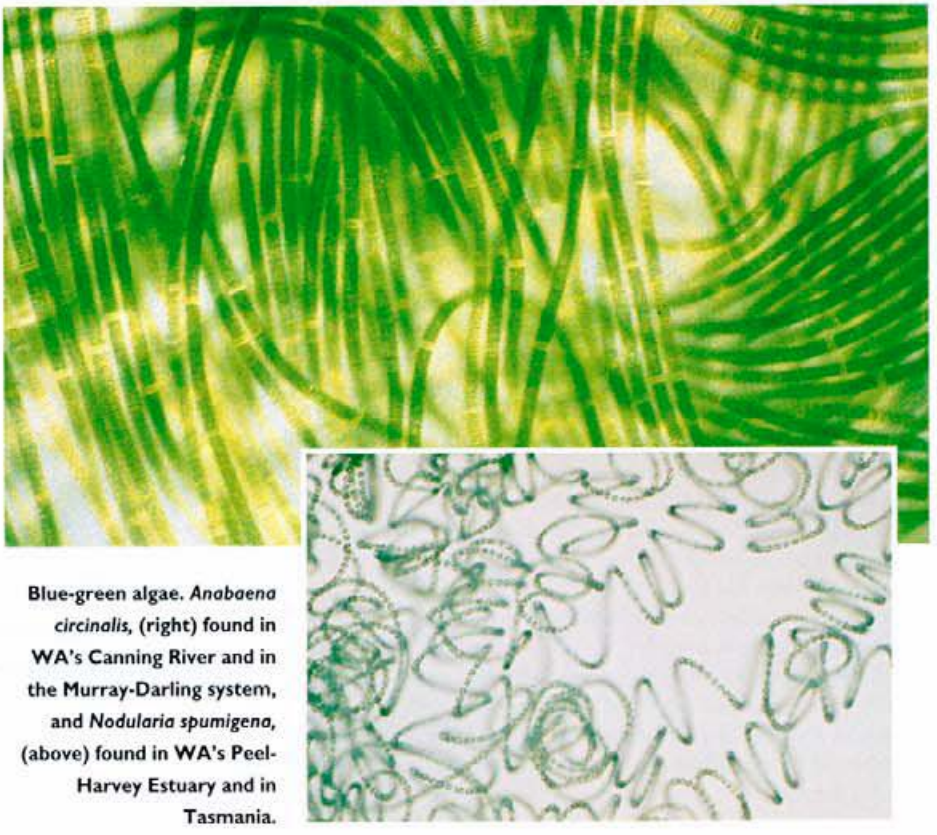
Again the nutrient ratio aspect is important. If silica levels are kept high, diatom species will tend to dominate, squeezing out the toxic undesirables in the process. High silica levels would also encourage the growth of zooplankton, the predator of algae that Thompson says 'loves eating diatoms'. Higher zooplankton levels would in turn reduce the numbers of all phytoplankton, including the smelly and sometimes toxic blue-green algae.

Thompson's research is unravelling many of Australia's algae mysteries. He may even identify areas where algal blooms should actually be encouraged in order to enhance primary production.

For example, Canada's $300 million salmon industry invests $25 million a year in a Salmon Enhancement Program. Some of the money is spent hiring water bomber aircraft to dump fertiliser into mountain lakes to increase algal levels.

Despite different international interpretations of their usefulness, Thompson insists that the core issues in the life of the phytoplankton are the same the world over: light, food and warmth. 'Phytoplankton are citizens of the world,' he says. So too are phytoplankton ecologists!

David Berry



Blue-green algae. *Anabaena circinalis*, (right) found in WA's Canning River and in the Murray-Darling system, and *Nodularia spumigena*, (above) found in WA's Peel-Harvey Estuary and in Tasmania.