

# BACK BOX

## Oil from blooming algae?

For some time, Dr Lance Hillen of the Aircraft Research Laboratories in Melbourne has been looking into the nature of a most unusual scum.

Twenty-two years ago, to the surprise of people who saw it, the scum drifted ashore from a shallow fresh-water lake near the Coorong, South Australia. It had an oily look and, when scientists distilled it, up to 70% of the product turned out to be a hydrocarbon liquid closely resembling crude oil.

The scum was dead algae. A sudden population explosion had occurred in the normally sparse algal species *Botryococcus braunii*. Records exist of similar 'blooms' of *Botryococcus* elsewhere, but they are rare. Lake Titicaca, high in the Andes on the Peru-Bolivia border, and a brackish lake in Soviet Kazakhstan are two places where blooms have occurred.

Normally *Botryococcus* reproduces extremely slowly; it exists all around the world as minute green dots suspended in the water of lakes and dams. But if it could be induced to bloom often and over large areas, the dead algae drifting ashore may be able to make a useful contribution to the world's liquid fuel supplies.

Its oil-like composition is unique among algae. Scientists have noticed a close resemblance in chemical composition between *Botryococcus* and some oil shales, and have speculated that ancient blooms might



A little bit of the algal scum.



Oil distilled from the scum.

The Coorong inlet, S.A.



have fossilized to form the shale. If this is so, perhaps the algae erupted into activity much more often millions of years ago than they do now.

At the CSIRO Division of Chemical Technology in Melbourne, Dr Bailey Carrodus is trying to find out what causes the algae to bloom. If the answer turns out to be some nutrient in the water, and if the algae always respond dramatically to this chemical, one can envisage large-scale production of

*Botryococcus* as an oil substitute. Perhaps artificial lakes could be built on unproductive land, and the algae could multiply in waste water pumped to them.

But this is all speculation at the moment; no firm clues to the cause of the blooms have emerged. One of the problems Dr Carrodus faces is getting hold of enough of the algae for experiments in the laboratory. The populations in lakes and dams around Australia are

scattered and very small, and reproduction occurs as slowly in the test-tube as it usually does in nature.

His experiments so far indicate that the blooms are not associated with changes in quantities of the major nutrients in water. Observations of lakes where the algae occur suggest that the species may prefer recently flooded areas to established water bodies. But more positive clues remain elusive.

In the hope of observing changes in water that encourage the algae to greater activity, Dr Carrodus has begun a program of sampling lakes and dams around Melbourne. He is keeping a close watch on a pair of very similar dams, only one of which contains *Botryococcus*. Differences he detects in the water may prove significant, even though no sign of blooming has appeared in the dam with the algae.

Other stretches of water are being monitored less frequently. Dr Carrodus plans to concentrate his attention on those where increases and decreases in the algae's numbers show up.

Hopefully, a bloom will occur in one of them. The information gathered beforehand would be very valuable in sorting out the cause. But even if this doesn't happen, which seems more likely, observations of the factors associated with rising and falling populations may point to a solution to the tantalizing mystery of the *Botryococcus* blooms.