Death-defying disease

A gigantic virus contains compounds that could be used in anti-ageing and cancer-inhibiting therapies, says Willie Wilson.

Last summer, my colleagues and I unravelled the genetic code of the largest algal virus ever analysed, and unearthed a cluster of genes responsible for producing a key component of anti-wrinkle and anti-ageing creams.

The virus's genetic code (or genome) proved to be a real challenge to decode, because it was remarkably different to other viruses. Our genetic map provides a tantalising glimpse of the potential benefits locked within, but many of the gene secrets of this mysterious giant are still to be revealed.

Rather than just providing the virus's genetic sequence, our microarray analyses provided information on which genes are 'switched on' during the infection process. (For an explanation of microarrays, see *Planet Earth*, winter 2004, p18.) The virus appears to infect only the tiny, floating, chalk-covered marine algal species (*Emiliania huxleyi*) that forms beautiful 'blooms' on the surface of the sea. *Emiliania huxleyi* is part of our climate system—when it blooms it soaks up billions of tonnes of carbon dioxide from the atmosphere. Incredibly, the virus also helps regulate climate. When the infected algae die, they release a gas called dimethyl sulphide that helps clouds to form.

The genes we found code for ceramide, a chemical that can control a 'death mechanism' (called apoptosis) that prolongs the life of a cell and then kills it at will. These genes have never before been found in a virus. They are more commonly seen in animal and plant cells. For example, the mechanism they control is what makes a tadpole's tail disappear as it develops into a frog.

For an invading virus, the ability to control when your host will die and ensure your own survival is quite incredible. Essentially, the virus hijacks the cell and slows down the ageing process by keeping it healthy for as long as possible. It uses the cell as a kind of factory to replicate itself, but eventually takes over completely, killing off the cell.

Understanding the genes that control cell death could help us develop ways to hold back the onslaught of life-threatening disease or the process of ageing. Scientists looking for new compounds to use in fields from medicines to cosmetics will be interested in the newly discovered viral ceramide.

But the research is far from over. This virus really is a giant. Most viruses only have a few genes. HIV, for example, has only nine, while this algal virus has 472 genes. We've only just scratched the surface. Much more work is needed to understand what function most of the genes actually perform.

Want to know more?
This research was reported in the journal *Science* in August (vol. 309, p1090-1092).

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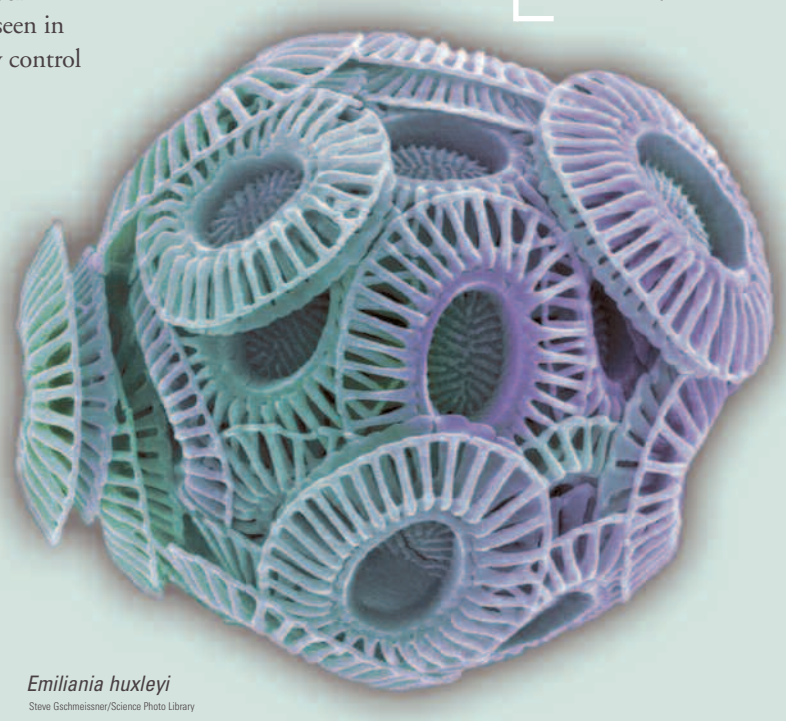

Emiliania huxleyi
Steve Gschmeissner/Science Photo Library

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