and releases the compression of stomodeal cells, which results in a lack of *Twist* induction. This finding confirms that *Twist* expression is mechanically induced by stomodeal-cell compression as a result of germ-band extension.

Farge concludes that although the mechanism that triggers nuclear localization of Armadillo is not known, the fact that its homologue β-catenin translocates into the nuclei at the dorsal pole of early frog and fish embryos indicates that "...mechanical compression may reactivate a conserved and ancient pathway for dorsal-ventral axis formation" in the *Drosophila* embryo.

Arianne Heinrichs,
Nature Reviews Molecular Cell Biology

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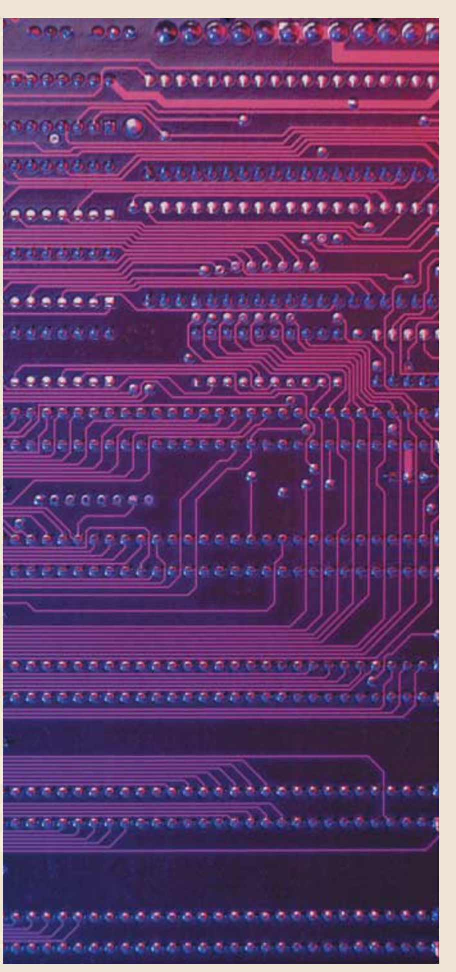

GENOMICS

Ocean bacteria surf the genome wave

If you have ever spent time during your summer vacation staring at the ocean, wondering "how do photosynthetic picoplanktonic marine cyanobacteria make a living out there", wonder no more! A flood of recent papers in *Nature* and the *Proceedings of the National Academy of Sciences* provide some answers.

Although the cyanobacteria *Prochlorococcus* and *Synechococcus* might look small, together they account for about one-half of the photosynthesis that occurs in our oceans. Groups from California, the Massachusetts Institute of Technology and France used genome sequencing to investigate their lifestyle. For example, although *Synechococcus* can swim, Palenik *et al.* found that it does not have the standard genes that allow bacterial swimming. The bacterium also seems to be able to use organic sources of nitrogen and phosphorus from the sea, which breaks the stereotype that cyanobacteria only use inorganic forms that might be limiting.

Three different isolates of *Prochlorococcus* were sequenced simultaneously: two by Rocap *et al.* and one by Dufresne *et al.* These bacteria are specialists that adapt to niches in the ocean environment, so these analyses allow comparisons of low light-adapted to high light-adapted ecotypes. Some bacteria cast off many genes to conserve energy when they specialize in this way, but the process is not consistent, as only one of the low light-adapted ecotypes had a genome as small as its high light-adapted cousin. In fact, the genes that remain are not common among the ecotypes, with notable amounts from horizontal gene transfer or duplication events separating the cousins. A related paper by Bibby *et al.* specifically examines specialization of the antennae of low light-adapted *Prochlorococcus* to optimally photosynthesize in various conditions.

As if surviving in the vast ocean is not hard enough, these bacteria must also fend off predators. Two further papers in the same issue of *Nature* describe oceanic viruses and cyanophages, and their ability to infect *Prochlorococcus* and *Synechococcus* specifically. Although this process is often fatal to the bacterium, it can lead to the transfer of valuable genetic material between the two participants, which creates the diversity that is seen in the genome sequences.

Armed with these fun facts, every leisurely swim in the ocean can now be a creative research endeavour. In fact, one-third of the genes in each genome are characterized as having unidentified function, so now there are more reasons than ever to move the laboratory to the Caribbean and switch to oceanographic genomics.

Chris Gunter,
Nature

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FURTHER READING Fuhrman, J. Genome sequences from the sea. *Nature* **424**, 1001–1002 (2003)

WEB SITES
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http://www.jgi.doe.gov/JGI_microbial/html
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