Illuminating Fish and Squid

Fish and squid share illuminating microbe.

By David Alderton

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Bobtail squid, courtesy William Ormerod/Margaret McFall-Ngai/University of Wisconsin-Madison.Besides the obvious link that both the diminutive bobtail squid and the pinecone fish occur in the Pacific Ocean, research by scientists at the University of Wisconsin-Madison has shown they both have the same species of bacterium in their bodies.

The microbe in question, known as Vibrio fischeri, is luminescent. It effectively powers the squid's light organ. It is used by the squid to mimic moonlight, which confuses potential predators when it is swimming near the surface in search of food at night. In addition, these bacteria are also to be found in the pinecone fish, colonizing its jaws and allowing this species to locate food on the reef under cover of darkness. The resulting light may even attract the zooplankton on which it feeds.

The research, carried out by Mark Mandel and Ned Ruby, has revealed that the bacteria first colonized the pinecone fish, and then moved into the squid within the last 30 million years. The scientists have discovered this transfer to the cephalopod was made possible by a genetic modification in the bacterium involving a regulatory gene. This type of gene can switch on groups of other genes, which otherwise lie dormant in the bacteria.

It used to be thought that in order for bacteria to undergo significant changes in infectivity, they had to acquire a whole range of new genes. Now however, thanks to the study of the pinecone fish and the squid, it has been shown that a single gene can dramatically alter bacteria and the way in which they become infective.

This is potentially a very exciting breakthrough as far as medicine is concerned, according to the University of Wisconsin-Madison team, because it would be much easier to target a single regulatory gene using a drug for example, rather than a whole host of different genes. By this means, it should then be possible in the future to prevent harmful bacteria spreading from animals to people.