

Scientists Discover How Fish Evolved To Float At Different Sea Depths

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Scientists at the University of Liverpool have discovered how fish have evolved over the last 400 million years to stay motionless at different water depths.

A research team led by Dr Michael Berenbrink, a Comparative Physiologist at the School of Biological Sciences, has revealed how modern fish, such as pike and cod, have developed a way of floating at certain water levels using a gas-filled swimbladder.

Dr Berenbrink investigated the mechanism that allows fishes to keep the swimbladder inflated with gas even at great water pressure in the depths of the sea. The mechanism comprises of a complex system of arteries and veins, called the rete mirabile, and special blood proteins, which can release oxygen even at high oxygen concentrations.

These systems drive oxygen from the blood into the swimbladder allowing the fish to float at different levels in the sea without coming to the surface of the water for air. A similar system is also present in the eye of the fish, which provides oxygen to the retina.

Dr Berenbrink explains: "I am interested in how the mechanisms in the swimbladder and eye could have evolved. Some fish have no swimbladder and others fill it by swallowing air at the surface of the water. Another group of fishes has a closed swimbladder that is inflated through gas secretion even when they are in high water pressures. My aim was to find out how these systems came into place and how this allowed for the great variety of fishes we have in our oceans today."

The study revealed that the special blood proteins, which are essential for oxygen secretion, were present in the eye system 250 million years ago. This predated the swimbladder system by 100 million years. The special blood proteins induced development of the swimbladder system.

Dr Berenbrink continued: “Many researchers believe that the swimbladder evolved from a primitive lung, which can be traced back 400 million years. These findings will help us to understand the diversity and success of modern fishes in their environment.”

Dr Berenbrink’s research will be published in Science magazine on Friday, 18 March 2005.

Source: University of Liverpool

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