

COMPARATIVE BIOMORPHOLOGY OF PAIRED FINS OF FISH

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Summary

The article presents a review of the main scientific theories of the origin of the paired fins of fish and their biomorphological features in different currently existing species of marine fish. It was established that the paired fins of fish serve not only for maintenance of body-balance and for turning sharply, but also may have some structural features that enables the “flight” of fish. These features also help fish to scare predators or to hunt, to walk on the seabed or land. In addition paired fins can be the organs of taste and touch.

Key words: pectoral fins, pelvic fins, paired fins, fish.

Introduction

Fish are the first representatives of the fauna of our planet that possess paired as well as unpaired limbs (fins). The pectoral fins of fish are homologues of the front limbs, while the pelvic fins are homologues of the hind limbs of tetrapods. In most cases, the paired fins act as stabilizers during swimming. The pectoral fins help to create a dynamic lifting force that allows fish to maintain its depth. The pelvic fins help fish to move up and down, turn sharply and stop quickly [2, 6].

The origin of the paired fins

Fossils do not give a clear answer about when and how the paired fins appeared. However, there are several theories that explain the origin of the paired fins. According to the Gegenbaur’s theory, the pectoral fins developed from a modified gill septum and from a series of gill-rays. Kerr agreed with this theory as

to the primitive nature of the archipterigium, but also suggested that the pectoral fins derived not from the gill septum, but from the external gills. According to the Balfour's theory of the lateral fold, the paired fins are the remnants of continuous skin folds that had its internal skeleton. Romer supposed, that the paired fins derived from the dermal spines (ichthyodorulites) which located on the ventral side of the body. Further ichthyodorulites were provided with muscles that helped in their locomotion [1, 2, 3, 5, 6].

Modifications of the paired fins

Such fishes as the tripod fish (*Bathypterois grallator*), handfishes (family Brachionichthyidae), frogfishes (family Antennariidae) and fishes that belong to the family Ogcocephalidae can propel themselves by walking on the sea floor.

The pectoral fins of flying gurnards (family Dactylopteridae) consist from two parts: the upper part enables fish to "fly" in the water and to scare predators due to its color; the lower finger-shaped part – to walk on the bottom and also serves as an organ of sensation.

Flying fish (family Exocoetidae) are well known for their ability to perform short flights with a help of pectoral or pectoral and pelvic fins (depend from specie) under threat of predator's attack.

Manta rays (*Manta alfredi* and *Manta birostris*) posses horn-shaped cephalic fins that are derivatives of the anterior pectoral fins. The primary function of these fins is to help channel planktonic food into the mouth during feeding.

The pelvic fins of gobies (family Gobiidae) are fused and form a sucker that helps fish to adhere to stones. Within this family mudskippers are known as amphibious fish and can use their pectoral fins to walk on land [4, 7, 8, 9, 10].

Conclusions

It may be said that the theory of the lateral fold origin of the paired fins is the most reasonable, because it does not contradict the facts revealed by paleontology, embryology and comparative anatomy.

Different modifications of the paired fins of currently existing marine fish can serve for walking, flying, adhering to objects, feeding, scaring predators. They can also be the organs of sensation.

Further study of the paired fins of fish will help to find out their role in the life of individual species and will help to answer the question of the origin of vertebrate limbs.

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