

Fins of fish, their designation, structure and function

Objective: To examine the structure and function of fish fins, explore the caudal fin shape,  
.learn to write formulas of fins

Materials and equipment: A set of fixed fish – 10–20 species. Table: "The types of tail fins"  
"Location of pelvic fins", "Modifications of fins". Tools: tweezers, dissecting needles,  
.cuvettes

Basic theoretical information

Fins help fish to balance the body and are involved in the movements. The size, shape,  
number, position and function of them are various. Fins are divided into paired, which  
.correspond to higher vertebrates' limbs and unpaired

The paired are: pectoral P (pinna pectoralis), abdominal V (pinna ventralis). The unpaired  
include: dorsal D (pinna dorsalis) and anal A (pinna analis), tail C (pinna caudalis). Catfish,  
salmon, characids, bagridae have fat fin behind the dorsal fin (pinna adiposa), which does  
.[not have fin rays [6

The pectoral fins are typical for most fish and are absent in Moray eels and Cyclostomes [7].  
Rays have significantly increased pectoral fins and they are the main body of the movement.  
Flying fish have highly developed pectoral fins, allowing them to hover in the air. Pelvic fins  
occupy various positions due to the displacement of the center of gravity caused by the  
decline in the abdomen and concentration of internal organs in front of the body (Fig. 3).

Abdominal position – pelvic fins are in the middle of the belly (sharks, Clupeiformes,  
Cypriniformes). Thoracic position – pelvic fins are shifted to the front of the body  
(Perciformes). Jugular position – pelvic fins are ahead of the thoracic and on the throat  
..(cod

.Figure 3. Positions of pelvic fins: 1 – abdominal; 2 – thoracic; 3 – jugular

Pelvic fins of some species have turned into thorns (three-spined stickleback), some other's – into a suction cup (pinohor). Rear beams of pelvic fins of males of sharks and rays have turned into copulative organs claspers. Pelvic fins are absent in eels and cyclostomes. Dorsal fins may be three (Gadiformes), two (Perciformes) or one (Cypriniformes, Clupeiformes). The position of the dorsal fin can be varied: pike's is shifted back Clupeiformes and Cypriniformes have it in the middle of the body, the fish with a massive front of the body one of the fins is located near the head (perch, cod). Anal fin acts as keel usually there is one anal fin but codfish has two. Flounder, eel and catfish have well developed in length anal fin and it is used as movement body by fish. Caudal fin has variety of different buildings. Depending on the size of the upper and lower blades it is distinguished: Isocercal type – the upper and lower blades of fin are identical (mackerel, tuna, carp); Heterocercal type – elongated lower blade of fin (flying fish); Epicercal type – elongated upper lobe of the caudal fin (shark Acipenseriformes). Several types are distinguished by the shape and location relatively to the end of the spine: Protocercal – as a fin fringe (lamprey larvae of some fish) (Fig. 4, 1); Heterocercal – asymmetric tail fin with considerably elongated upper blade, which comes to the end of the spine (cartilage, sturgeon) (Fig. 4, 2); Homocercal – externally fin has vane structure, but modified last body of vertebra (urostyl) comes to the top of the blade (bony fish) (Fig. 4, 3); Diphyrcercal – tail fin merges with the dorsal and anal (Lungfish) (Fig. 4, 4).

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Figure 4. Types of caudal fins off ish: 1 – protocercal; 2 – heterocercal; 3 – homocercal; 4 – .diphyrcercal

The bony fish have the following types of tail fins: forcipate (herring), sinuate (salmon), truncated (codfish), round (gobies, burbot), semilunar (tuna, mackerel), sharp (eelpout). The

fastest swimmers are fish with forcipate, sinuate and semilunar tail fin. The complete .(absence of caudal fin is rather rare phenomenon, for example, seahorse (Fig. 5

.Figure 5. Seahorses body

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The support of fins is fin rays. There are branched and unbranched rays. The latest can be segmented and able to bend or unsegmented and tough (prickly), which in turn can be smooth or jagged. Solid (tough) and unbranched rays are always at the beginning of fin and branched soft rays are always at the end of the fin. The shape and the number of rays in the fins, especially dorsal and anal are specific signs and expressed through the formula of fin. Every fin in this formula is signed by the first letter of the Latin name of the fin (see above). The number of unbranched (prickly) rays is indicated by Roman letters, and soft (branched) by Arab. For example, the formula of dorsal fin (pinna dorsalis) of zander looks like D XIII–XV, I–III 19–23 – this means that the fish has two dorsal fins, the first of which has 13–15 prickly .rays, and the second has 1–3 prickly rays and 19–23 branched

Progress of work

All species need to be examined and sketched: paired and unpaired fins; branched and .1 unbranched and also segmented and unsegmented fin rays; position of thoracic and abdominal fins. 2. Find fish that: do not have paired fins; have modified fins; with one, two and three dorsal fins. 3. Determine all types and forms of the tail fin. 4. To make the formula .of spinal and anal fins for species listed by teacher

Questions for individual work

What fins are attributed to paired and unpaired? What Latin letters are they designated .1 by? 2. Which fish fatty fin is characteristic for? 3. What types of fin rays can be identified? How do they differ? 4. Where are the pelvic fins? What determines their position? 5. Give examples of modifications of fins. 6. What functions do fish fins perform? 7. What types of ?tail fins are characteristic for fish

