The state of biohydrodynamic investigations in Russia (survey).

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Some scientists tried to reveal the mechanism which could explain Gray's paradox in dolphins and fishes: The morphological investigations has shown that the skin structure in Cetacea is highly peculiar and could serve as prototype for damping artificial covers. The skin is characteristic for fishes the existence of mucus which is able to decrease the hydrodynamic drag. Great attention has been paid to the study of chemical and hydrodynamic properties of mucus. The structure of a boundary layer, the streamline character, the tangent tension in the boundary layer of the body of a free-swimming dolphin, the kinematics of the tail fins in dolphins and fishes have been studied experimentally in detail. The improvement of specially designed gauges have made it possible to find the variable character of the phase velocity of locomotor wave, as well as the dynamic pressure gradient within the animal's body of actively swimming dolphin. Using the method of the towing the drag of a dead dolphin has been measured and the investigation of the boundary layer was carried out on the model of dolphin. Much attention is given to the study of swimming bioenergetics in fishes and in dolphins. Mathematical models of the formation of hydrodynamic forces by the body, as well as of hydrodynamic pressure distribution on the body of actively swimming dolphin were elaborated. About 600 studies of Soviet and Russian authors are dedicated.