

UDC 591.185.5:599.537

PHYSIOLOGY OF THE SONAR SYSTEM IN BLACK SEA DOLPHINS

[Article by E. Sh. Ayrapet'yants, V. A. Voronov, Yu. V. Ivanenko, M. P. Ivanov, D. L. Ordovskiy, B. F. Sergeev, and V. I. Chilingiris; Leningrad, Zhurnal Evolyutsionnoy Biokhimi i Fiziologii, Russian, No 4, 1973, submitted 31 January 1973, pp 416-422]

Black Sea dolphins (Tursiops truncatus and Phocaena phocaena) were found to be capable of detecting metal spheres 5 to 150 mm in diameter and cylinders of the same diameter and height from a distance of over 24 m. The spheres and cylinders could be differentiated from 17.0 and 18.5 m, respectively. The dolphin's echolocator adapted in the course of location, i.e., the locating signals adjusted to the parameters of the objects located. The directivity of emission varied widely. The directivity pattern was scanned with no change in the position of the animal's head. The directivity pattern of reception in the horizontal and vertical planes narrowed with increasing frequency and decreasing duration of the signal. When the reception pattern is scanned by turning the head, there evidently takes place a spatial-frequency filtering that ensures the directed and coordinated reception of the echosignal.

Introduction

The nature of the propagation of sound waves in water creates favorable conditions for the use of echolocation by aquatic organisms. Echolocation has reached the highest peak of development in dolphins [1-7] whose enormous and rather highly developed brain enables them to control locating sound pulses and to make a complex analysis of echosignals. Accordingly, knowledge of the physiology of the dolphin sonar system is of value not only from the general biological standpoint but also for bionics problems.