

## **How the alligator is able to "hold its breath" underwater for long periods of time and survive has been described in a report of research conducted at UCSD**

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How the alligator is able to "hold its breath" underwater for long periods of time and survive-- even though it is equipped with respiratory and circulatory organs similar to those of creatures of the land-- has been described in a report of research conducted at the University of California's Scripps Institution of Oceanography.

The animal can submerge for about two hours because it employs certain physiological mechanisms which ration the supply of oxygen to important organs and tissues, experimental studies have shown.

Research performed by Dr. Harald T. Andersen, a physiologist at the University of Oslo, Norway, has also indicated that:

(1) The alligator's heart, which slows to just two or three beats a minute, may be the only muscle which receives oxygen during the period of submersion.

(2) As much as one-half of the animal's oxygen supply is consumed during the first 20 minutes of a two-hour dive.

(3) The alligator remains conscious until his oxygen is almost depleted, then returns unharmed to the surface.

Working with Dr. Per F. Scholander, Professor of Physiology, Dr. Andersen performed a series of physiological tests on 14 alligators acquired from the San Diego Zoo. His findings constitute a valuable addition to the understanding of respiratory mechanisms in diving birds and mammals. Until the study, knowledge of poikilothermic, or "cold-blooded," divers-- of which the alligator is one-- was scarce.

"It has turned out that certain respiratory actions in animals, fish, and man are similar," says Dr. Scholander, "the alligator experiments fit in with other physiological studies of diving animals-- with respiratory systems of man as the focus."

Dr. Andersen found evidence that certain circulatory adjustments in the submerged alligator shut off the blood supply to some organs and tissues not critically dependent upon a continuous supply of oxygen.

For instance, he observed that lactic acid which formed in the muscles during diving did not appear in the animal's blood until after it emerged from the water. This suggests that the flow of blood through the muscles is greatly reduced, or even shut off, while the alligator dives. The reduced muscular circulation is an important adjustment enabling the alligator to make limited oxygen last for a long underwater period.

One conspicuous adjustment in diving animals is universal, physiologists have learned, and, apparently, the alligator is no exception. This is a "bradycardia," or slow action of the heart during the period of submersion. Slowing to just two or three beats a minute, the heart may be the alligator's only oxygen-receiving muscle during submersion, Dr. Andersen believes.

Experiments were conducted with the American alligator, *mississippiensis*, one of only two known species of the animal.

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