

A DECOMPRESSION CHAMBER FOR FISHES

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In recent years, the demand for live specimens of deep-water fishes for use in both scientific studies and aquariums has increased. One problem, however, is that, regardless of the collecting technique used, most fishes should be decompressed if captured at depths greater than 30 feet.

Many marine fishes possess a gas-filled swim bladder, which expands as they are brought toward the surface. It is used by fishes to maintain a stable position in midwater and often to produce and detect sound.

Fishes are capable of absorbing excess gases from the swim bladder, as well as secreting gases into it. In most coral-reef species, the absorption of the gases is a slow process. They are absorbed by the blood in a capillary network known as the oval gland and then secreted back into the water through the gills. Only a few bottom-dwelling fishes such as hawkfishes (Cirrhitidae) and blennies (Blenniidae) do not need to be decompressed, since they lack gas-filled bladders.

An angelfish captured at a depth of 100 feet may require more than three hours to be safely brought up to the surface. If brought up too rapidly (ie. the normal ascent rate for a scuba diver), its swim bladder will probably burst. Even if the fish is brought up slowly with occasional stops to prevent exploding, its swim bladder may still expand enough to damage nearby vital organs such as the kidney, which lies directly above the swim bladder. In either case, the fish will slowly die, perhaps lingering as long as a week or two. A fish whose swim bladder is overexpanded is termed hyperbuoyant; the fish needs to be equalized in order to remain stable in the water column.

UN-IDEAL COLLECTING METHODS

Unfortunately, most divers merely talk about fishes requiring decompression time. There are, however, several adequate methods for bringing them to the surface in slow stages. Commonly, it is most practical to take a few hours and relax in the boat while periodically raising the fishes in a holder attached to a line. The disadvantages of this method are that it may be time consuming and, if the seas are rough, extremely unpleasant. It also takes considerable experience to learn the proper rates at which to raise the different species.

While ascending with the fishes, a diver can watch to see when their abdomens swell. At this point, they are unable to maintain a steady position in the water. They should be raised just enough so that they are slightly hyperbuoyant but still able to swim down. If done properly, the fishes will maintain a head-down posture but will not appear to be overly distressed. They should be kept at this depth until they are swimming normally again. Then they can be raised a little more.

One method used by some collectors is to bring a fish near the surface and insert a hypodermic needle (about 23 gauge) carefully under the scales and directly into the swollen swim bladder. Then, with slight pressure on the fish, the collector can bleed out the excess gases. This method is useful but requires a certain amount of experience in learning the exact location of the swim bladder in various species.

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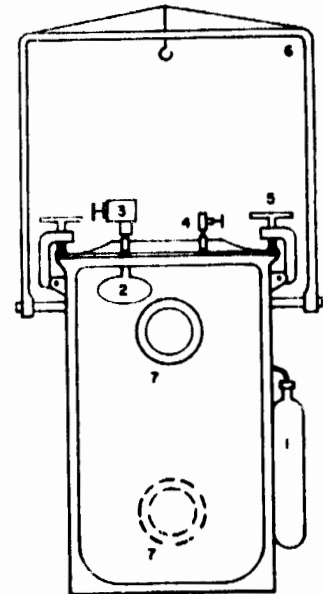
The disadvantages of this method are two-fold. If not properly inserted, the needle may cause considerable damage to other organs.

Also, by allowing the swim bladder to become overexpanded, a rupture in the swim bladder may occur due to the excess pressure on nearby organs. This may partially be avoided by inserting the needle in the fishes at the depth at which they are caught. The fishes also should be treated with antibiotics in order to prevent infection of the wound.

THE DREAM MACHINE

A few years ago a group of scientists and divers began discussing the ideal situation in which some sort of container could be used to maintain pressure on fishes as they are brought to the surface. Thus, once they were there, the pressure could be slowly decreased.

After some testing, Edwin Baughman has made this dream machine available. Known as the "decom tank" the little decompression chamber is made from a high-pressure cylinder and is modified with valves, viewing ports, and filters. It is epoxy coated and holds approximately 18 gallons of seawater. It is lowered from the boat to the desired depth on a 1/8-inch stainless-steel cable.



After capture, fishes are placed in a "keep", which is then placed inside the decom tank. The lid is fastened by six cover clamps, and air is admitted at ambient pressure from a pony bottle via a regulator into a purge control valve. The air is contained in a rubber bladder inside the chamber. All valves are then closed. The decom tank is winched up to the boat, and a reverse pressure regulator is attached. The pressure inside the decom tank is then equal to the pressure at the depth at which the fishes were placed in it. Once on the surface, the pressure can also be increased, equilibrating pressure to a deeper depth if needed. The fishes can now be slowly decompressed and carefully watched through the viewing ports.

UNNECESSARY DEATHS PREVENTED

Originally, the decom tank was rigged so that fresh air could be continually pumped through the water that was under pressure. It was found, however, that since the fishes were then breathing compressed air, they were subject to decompression sickness, or the bends. It is physically impossible to provide air at 1 atmosphere of pressure and still keep the animals in water at the pressure at which they were captured. The lack of oxygen does not affect the fishes as long as they are not crowded.

The decom tank has enabled Hawaiian researchers to collect many rare fishes from deep water. Usually, only one dive to depths between 150 and 200 feet is now necessary to collect fishes such as tinker's butterflyfish *Chaetodon tinkeri*, bandit angelfish, *Molacanthus arcuatus*, and the fancy bass, *Pseudanthias thompsoni*.

In our resource-conscious world, the decom tank should become generally used by collectors of deep-water fishes, since it saves many rare and beautiful species from unnecessary death.