

A Large Hyperbaric Trap-Respirometer for the Capture and Maintenance of Live Deep-Sea Organisms

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Abstract - The capture and maintenance of live deep-sea fishes is difficult due to the rapid decompression and expansion of the gas-filled bladders of some species upon ascent to the surface, and potentially to the intolerance of many species to surface pressure (1 atm). Overcoming these problems would enable an enormous diversity of studies concerning the biology and physiology of deep-sea animals. We have constructed a pressurized trap-respirometer to capture fishes and other large organisms at depths to 4000 meters and bring them to the surface under pressure. The system consists of a 90 liter stainless steel pressure cylinder (1.2 m long, 30 cm ID) that is deployed as a free vehicle. After the organism is captured at depth a pressure-retaining door is sealed and the trap is brought to the surface. Upon recovery and transfer of the system to the laboratory, high-pressure pumps maintain a flow of seawater and a pressure accumulator and regulator system controls pressure within the trap. Internal instrumentation includes a circulating pump, oxygen optode, and low light camera. Experiments are planned to investigate metabolic rates and the pressure tolerances of the captured animals.