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Dear Editors,

This paper, title *Lung Inspired Deep Water Sampling Module*, is submitted for possible publication in the Focused Section on Bio-Inspired Mechatronics.

The deep ocean environment is always difficult to design for. A number of advanced electronic systems are used in deep sea science and exploration; however these are all completely isolated within their pressure housings. Whereas molecular microbial research requires access to the seawater and microbes present. The challenge is to controllably get an autonomous microbial instrument intimate access to the seawater, but also protect it from the crushing pressure.

We accomplished this by considering naturally occurring and biological systems that exchange with the environment but can also manipulate pressure. Lungs and the process of breathing was an obvious candidate for inspiration. This concept has been developed, designed, fabricated, and deployed into the ocean to enable new scientific research. Although developed for deep ocean microbial research, this technology could have applications for other work in extreme environments as well as isolated fluid handling.

I feel that bio-inspired mechatronics is an excellent fit for this work. The successful development of this technology hinged upon choosing a concept that naturally fit our requirements. We could collect and manipulate the seawater for analysis, without ever exposing pumps and driving hardware to the water. With ship costs exceeding \$30k per day, the capability of testing the equipment prior to deployment in the ocean was highly desired. At the concept stage we could demonstrate the lung inspired process enabled full pressure testing on shore.

Thank you for the consideration and review of this work. We look forward to your comments.

Sincerely,

Douglas M. Pargett