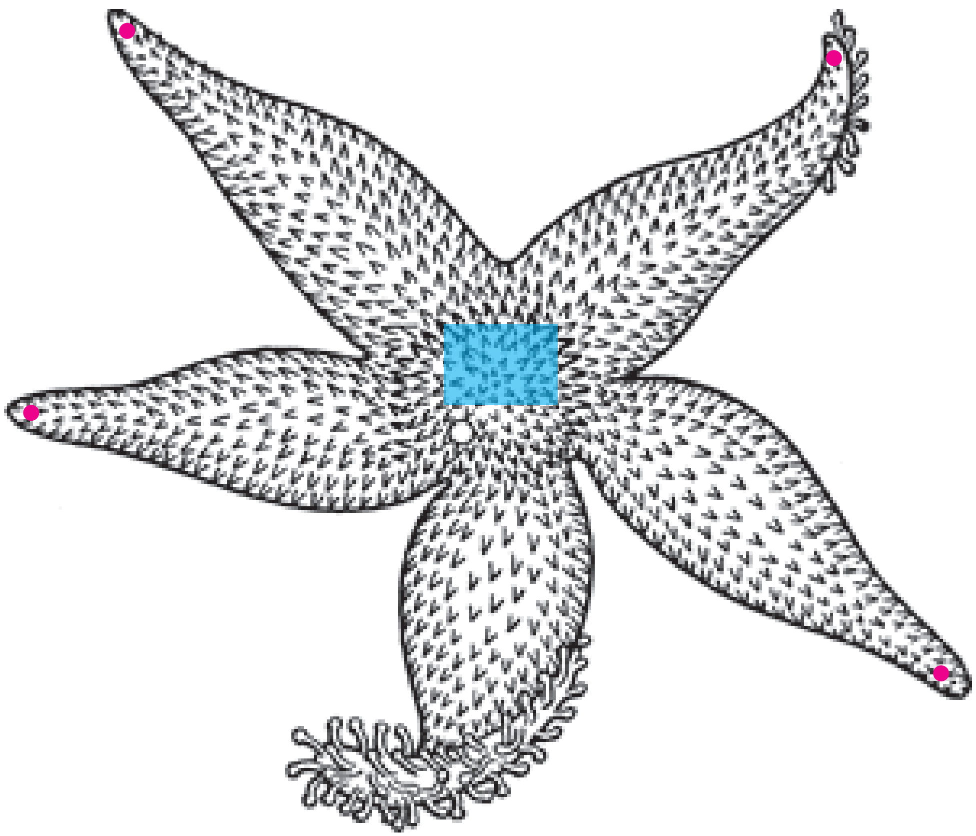
STARFISH SOFT ROBOT



Use solar to drive hydraulic pressure to tube feet. Use photo sensors to choose the direction of travel so that more solar energy can be harvested.

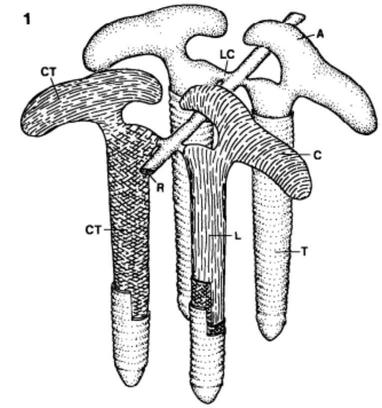
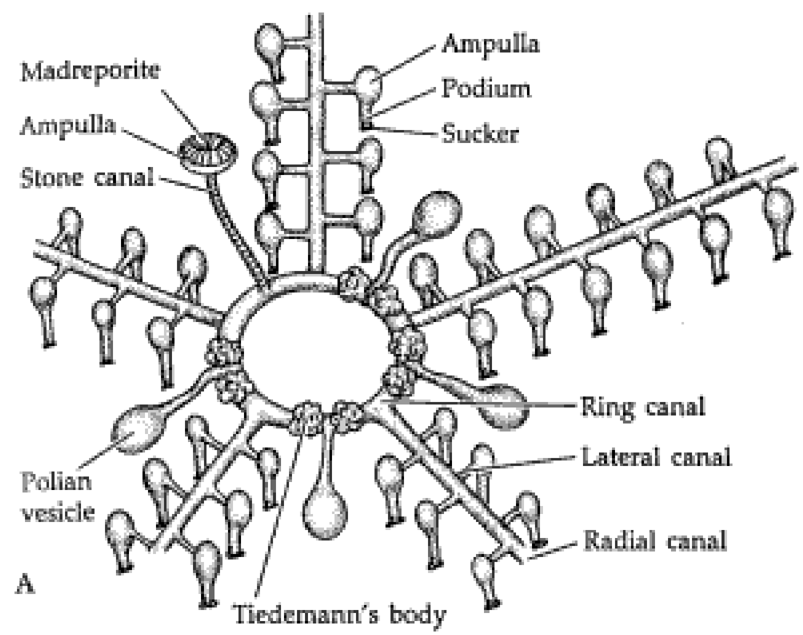


Figure 1. Schematic cutaway drawing of the arrangement of the tube feet (T), ampullae (A), and the lateral (LC) and radial canals (R), showing the trajectories of the connective tissue fibers (CT), longitudinal muscle (L) of the tube feet, and circular muscle (C) of the ampullae.

The walls of these organs have, like nematodes, longitudinal muscles and connective tissue fibers in crossed-helical arrays, as in figure 20.4. Their fiber angles are high--about 67 degrees for fully extended feet--so tube feet also lie on the left side of the curve of figure 20.2. Contraction of muscle tries to shorten a foot and increase that angle still further, pushing it downward on the curve. The high fiber angle minimizes fattening of the tube foot, so contraction should produce little actual shortening and considerable pressure rise. That is, unless the system can expel fluid.

"But the system does expel fluid, so things get more complex than in nematodes. Above each tube foot is a bulbous chamber, the ampulla, equipped with circular muscles and reinforcing fibers at right angles to that muscle. So contraction of foot muscle forces fluid into the ampulla, extending its muscle. That couples the muscle of foot and ampulla in a hydraulically linked antagonism (McCurley and Kier 1995) much like muscles on opposite sides of a bending nematode…The whole thing hooks onto the water-vascular system of pipes, so its overall volume can vary. At the same time, a one-way flap valve prevents contraction of either foot or ampullary muscle from simply forcing water back into those pipes (Maerkel and Roeser 1992)." (Vogel 2003:414)



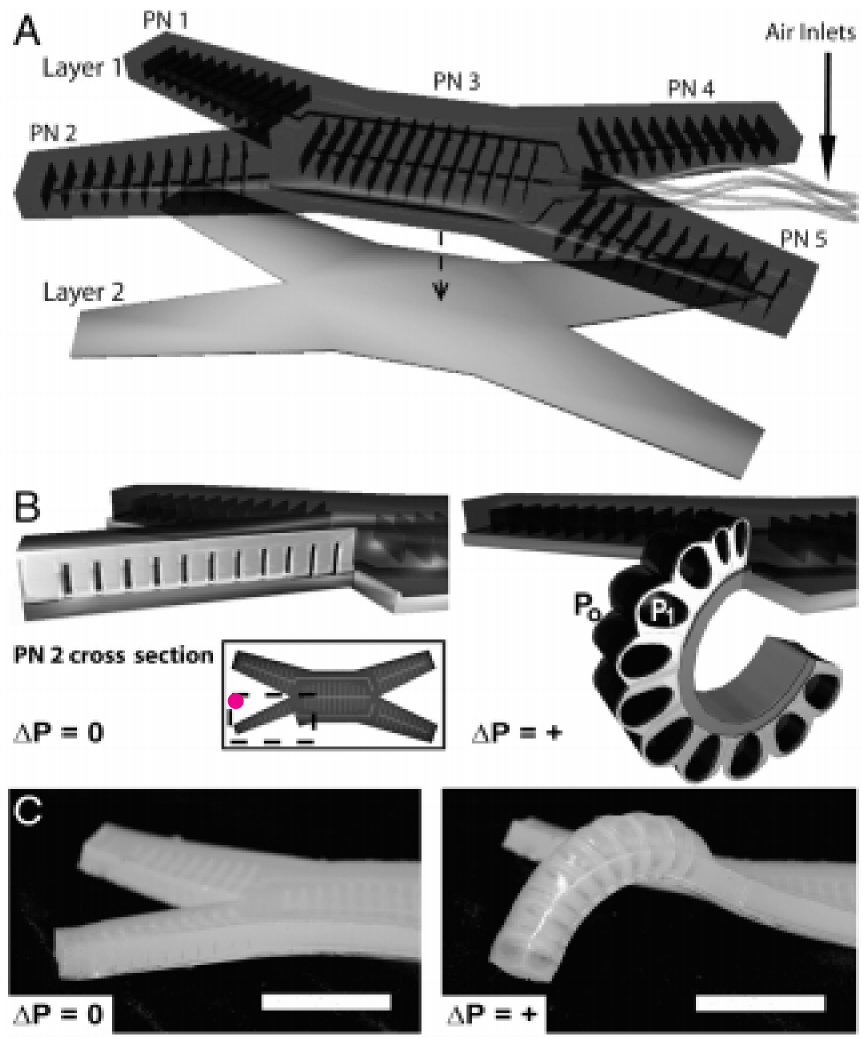
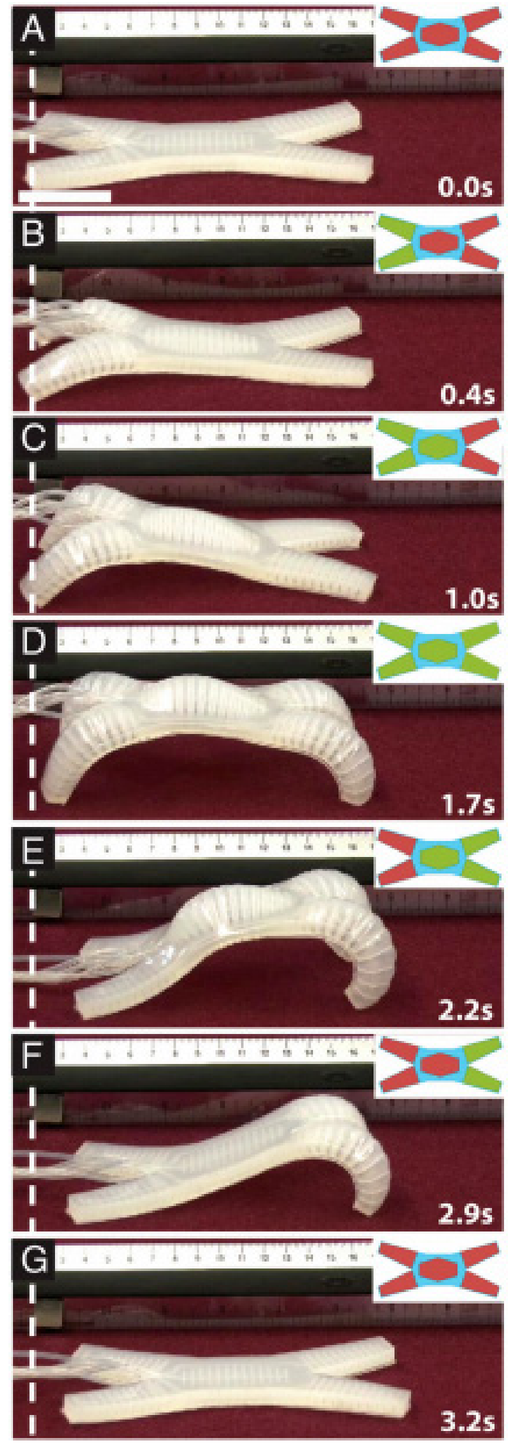


Fig. 1. (*A*) Schematic representation of the soft PN channels, formed by bonding an elastomeric layer (layer 1) to the strain-limiting layer (layer 2). The independent PNs are labeled PN 1, 2, 3, 4, and 5; black arrows indicate the location at which we insert tubing, and the dashed arrow indicates the bonding of layer 2 to layer 1. (*B*) A cross section of a portion of PN 2 is schematically illustrated at atmospheric pressure (P_0; *Left*) and actuated at PN pressure ($P_1 > P_0$; *Right*). (*Inset*, *Left*) Top view of the robot and the section removed from PN 2. (*C*) An optical micrograph with PN 2 at atmospheric pressure (*Left*) and at 7.0 psi (0.5 atm; *Right*). The rest states (*Left*) of PNs 1 and 2 are curved away from the surface. The scale bar is 3 cm.



How to mobile inflation/ deflation......?

GAS INFLATOR
The gas inflator that inflates the airbag is placed in a holder in the collar on the bicyclist's back. Hövding's gas inflator is a cold gas inflator that uses helium and it's one of the smallest gas inflators on the market. A similar inflator is used in a motorcycle helmet with airbag system.

...Can't put it back.

PRESSURE DRIVEN....
Squeeze tubes that reinflate themselves.... due to their shape. Mechanically squeeze using maybe...
-motor?
-muscle wire?