Earthworms moving in soil

Lumbricidae

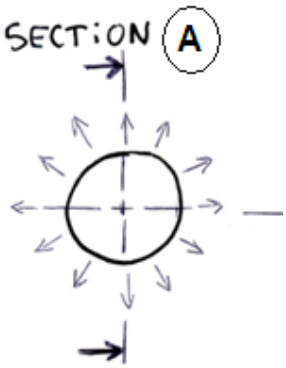
Nature phenomena:
The earthworms are hardworking diggers which has great impact on the soil-ecology. They can manage to move in different types of soil as they sometimes dig as deep as to the groundwater. In loose soil they press forward, in harder soil they eat and swallow the soil unloading it on top or in cavities.

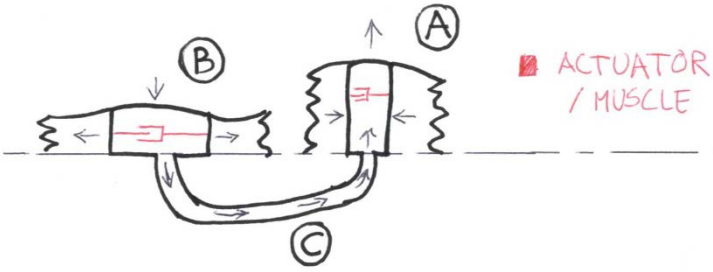
Their outer morphology is cylindrical and the body consist of several segments. They are grown from a belt on their middle and have good self-repairing abilities because the belt can grow new segments if some are damaged or lost. Their soft appearance is not a disadvantage for this important digger.

The south african earthworm is the largest known earthworm sized approximately 6 feet.

Biological mechanism:
The worm pushes through the soil while holding a circular pressure against the tunnel. The front is stretched to press into the soil. The earthworm has no spine and works with hydrostatic low pressure. The wall of the earthworm consists of fibers with constant length swept helically to the right and left. This pattern is able to change shape according to length and volume. The cavities of each segment are filled with liquid giving the earthworm its hydrostatic skeleton.

Functional principle:
The peristaltic movement is generated by circular segmental pressure to hold the position(A), and depressurizing to stretch forward(B). The needed pressure is made by an actuator between (A) and (B). (C) shows the connection between the fluid filled cavities.





Source
Danmarks natur 6, Böcher Tyge W., 1980, Politikens Forlag, Danmark.
Functional anatomy of invertebrates, Fretter Vera, Graham Alistair, 1976.
Comparative Biomechanics – Life's Physical World, Steven Vogel, 2003, Princeton University Press.