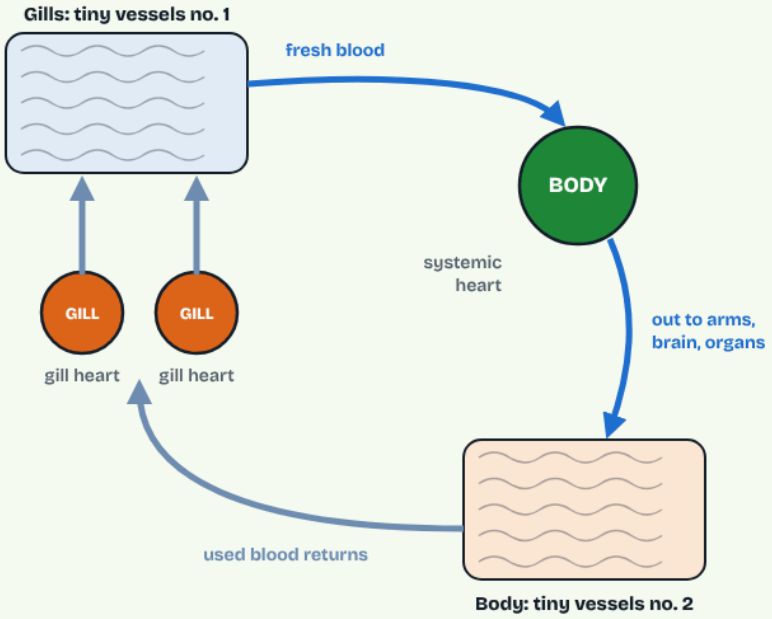
That is why

Why do octopuses have three hearts?

Blue blood must cross two sets of tiny vessels, so two gill hearts boost it before one heart feeds the body.

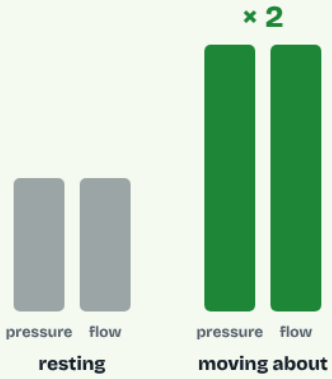
A One loop, three pumps



2 gill hearts + 1 body heart = 3 hearts.
Blood squeezes through two mazes of tiny vessels in a row, so it gets a fresh push from the gill hearts in between.
It is blue because its oxygen carrier, hemocyanin, uses copper.

B Moving about

Sensors on the main artery leaving the heart:



Squeeze harder, not faster

Pressure and flow roughly double when the octopus moves about, but the heart rate barely changes. Each beat pushes more blood.

C Jetting: the big heart stops

1 Mantle squeeze

A hard jet raises the pressure around the hearts.

2 No blood returns

Veins can't push blood back against that pressure, so the gill hearts run dry.

3 Body heart pauses

It beats only when filled, so the pulse stops: cardiac arrest while jetting.

Oxygen debt limit: about 22 mL per kg, so jets last only a few meters. Octopuses prefer to crawl.

Two relay pumps and one finishing pump.

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