That is why

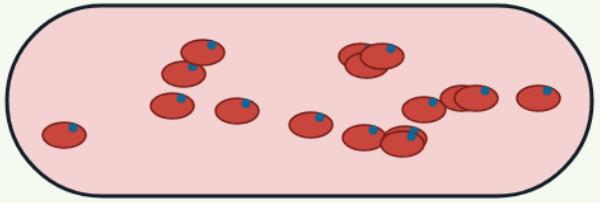
Why do Antarctic icefish have clear blood?

They lost hemoglobin by genetic accident. Oxygen dissolves straight into their thin blood, which only works in icy, oxygen-rich water.

A Red blood vs clear blood

Most fish: red blood

● = oxygen



Red blood cells packed with hemoglobin carry most of the oxygen.

Icefish: clear blood



No red blood cells, no hemoglobin. Oxygen is simply dissolved in the plasma.

Carries less than 10% as much oxygen

B Why it can work there

1 Ice-cold water holds more oxygen

Antarctic waters stay between about -1.8 °C and 1.5 °C, and cold water dissolves more oxygen than warm.

2 Thin blood flows easily

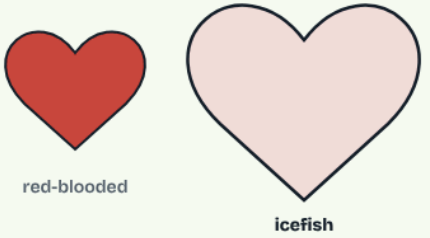
Without cells, the blood is runny even in the cold, so it is easier to push through vessels.

3 Antifreeze keeps it liquid

Like many Antarctic fish, icefish make antifreeze proteins that stop ice crystals from growing.

C How they make up for it

Bigger heart, more blood



Icefish hearts are much larger and pump far more blood. Some organs get extra blood vessels too.

The cost

Icefish spend about 22% of their energy on their heart, against 5% or less in temperate fish. Their blood volume is up to 4 times larger.

An accident it survives only in the coldest sea on Earth.

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