That is why

Why are there no insects in the ocean?

One idea: insects harden their armor with an enzyme that needs air, while crustaceans use calcium from seawater.

A Two cousins, two homes

ON LAND: insects everywhere



Flies, beetles, ants, bees: a huge share of all known animals.

IN THE SEA: crustaceans rule



Crabs, shrimp, krill: they filled the ocean's jobs long ago.

Both are arthropods: animals with jointed legs and an outer skeleton.

B Two ways to harden armor

1 Insects

Harden their outer casing with an enzyme called MCO2 that uses oxygen. In open air, oxygen is everywhere.

2 Crustaceans

Harden their shells with calcium, which seawater supplies all around them.

A hypothesis, not proven

Proposed by Tsunaki Asano's team at Tokyo Metropolitan University. Springtails, close insect relatives, lack MCO2 genes, so it is not the whole story.

C The rule-breakers

1 Sea skaters

Halobates live their whole lives on the open ocean, skating on the surface. Hairs trap air, so they can breathe if dunked.

2 Salt is not the wall

Brine flies breed in Utah's Great Salt Lake, 2 to 7 times saltier than the sea.

So the barrier is not salt. The main ideas: armor chemistry, and crustaceans already holding every job in the sea.

The sea already had its armored arthropods.

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