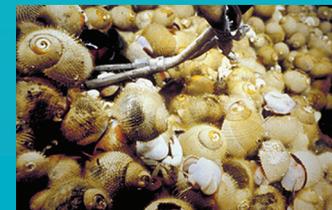


On the Seafloor, Different Species Thrive in Different Regions

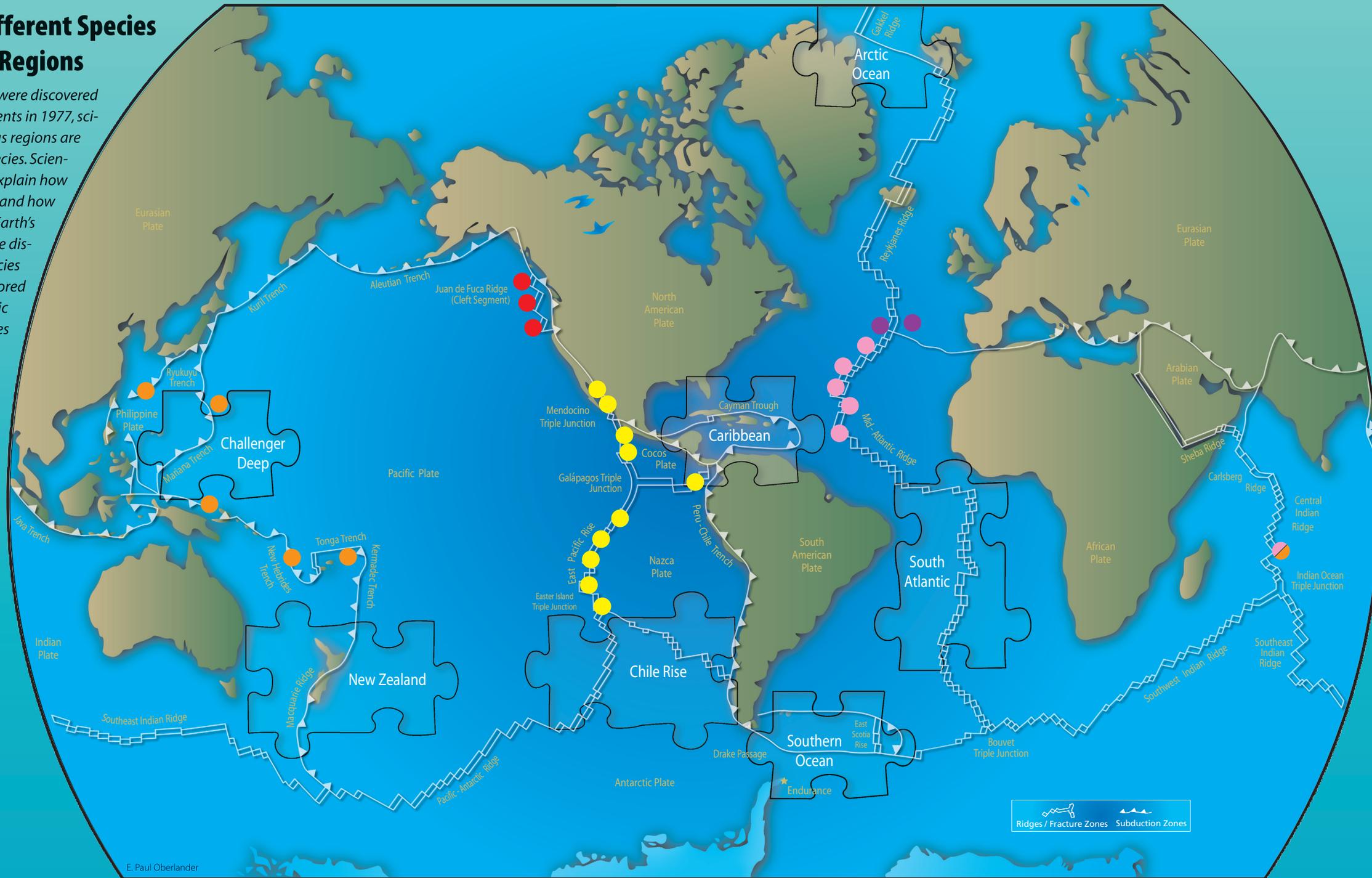
Soon after animal communities were discovered around seafloor hydrothermal vents in 1977, scientists found that vents in various regions are populated by distinct animal species. Scientists have been sorting clues to explain how seafloor populations are related and how they evolved and diverged over Earth's history. Scientists today recognize distinct assemblages of animal species in six major seafloor regions (colored dots) along the system of volcanic mountains and deep-sea trenches that form the borders of Earth's tectonic plates. But unexplored ocean regions remain critical missing pieces for assembling the full evolutionary puzzle.



● Northeast Pacific vent communities are dominated by "bushes" of skinny tube-worms called *Ridgea piscesae*.



● Western Pacific vent communities are dominated by barnacles and limpets, as well as hairy gastropods, shown above.



E. Paul Oberlander



● Shallow Atlantic vents (800-1700-meter depths) support dense clusters of mussels on black smoker chimneys.



● Deep Atlantic vent communities (2500-3650-meter depths) are dominated by swarms of shrimp called *Rimicaris exoculata*.



● Central Indian vent communities are populated by Western Pacific-type fauna, but also have North Atlantic-type shrimp species.



● Eastern Pacific vent communities are dominated by tall, fat tubeworms called *Riftia pachyptila*.



Challenger Deep

Unusual life forms may have evolved under conditions of extreme pressure in this 11,000-meter-deep trench, the deepest part of the world's oceans.

New Zealand

This region has a full spectrum of habitats supporting seafloor life (hydrothermal vents, cold seeps, whale carcasses, and wood from shipwrecks and trees) in close proximity. How have species evolved in these diverse settings?

Chile Rise

This region has a variety of chemosynthetic habitats and geological features in close proximity. How do seafloor populations diverge or converge at this triple junction on the "highway" of mid-ocean ridges?

Southern Ocean

The Drake Passage may act as a key link or bottleneck for larval dispersal between the Atlantic and Pacific. Whale carcasses and shipwrecks (such as *Shackleton's Endurance*) may offer refuges or stepping-stones between vents.

South Atlantic

Powerful currents and huge seafloor chasms (fracture zones) may act as barriers blocking the dispersal of vent larvae and disconnecting vent populations in the North and South Atlantic.

Caribbean

In this region, methane seeping from the seafloor also supports animal communities. Did animals migrate between "cold seeps" and nearby hot vents over evolutionary history?

Arctic Ocean

The Arctic Ocean has never had deep connections with other major oceans. It may harbor fundamentally different vent animals that evolved in isolation over the past 25 million years.