

How we discovered a new giant crustacean on the deepest depths of the ocean floor

June 1 2021, by Johanna Weston



Eurythenes atacamensis, a giant scavenging amphipod from hadal depths of the Peru-Chile Trench. Credit: [Alan Jamieson](#), Author provided

Discovering a new species and placing it on the tree of life is a big responsibility. I have been fortunate to name four species from some of the [deepest](#), most remote and [least sampled](#) parts of the ocean. Each new species helps us uncover how life thrives in the [hadal zone](#) (anywhere deeper than 6,000 meters or 3.7 miles). Now, let me introduce you to [Eurythenes atacamensis](#).

Eurythenes atacamensis is an amphipod, a type of crustacean closely related to a shrimp, endemic to the [Peru-Chile Trench](#) (also known as the Atacama Trench). Measuring more than 8cm in length, it is nearly twice the size of its nearest relative, making it a giant. Spanning an extensive vertical range, juveniles and adults can be found in the trench between 4,974 to 8,081 meters. This includes the deepest point, known as Richard's Deep.

It is one of the most abundant members of the trench community, joining a trio of snailfish and long-legged, spider-like [isopods](#). As a [scavenger](#), this amphipod plays a critical role within the food web by intercepting and redistributing food sinking down from above. They quickly detect and consume new carrion, like the mackerel bait we used to coax individuals into the trap. Unfortunately, they can accidentally ingest [microplastics](#) too.

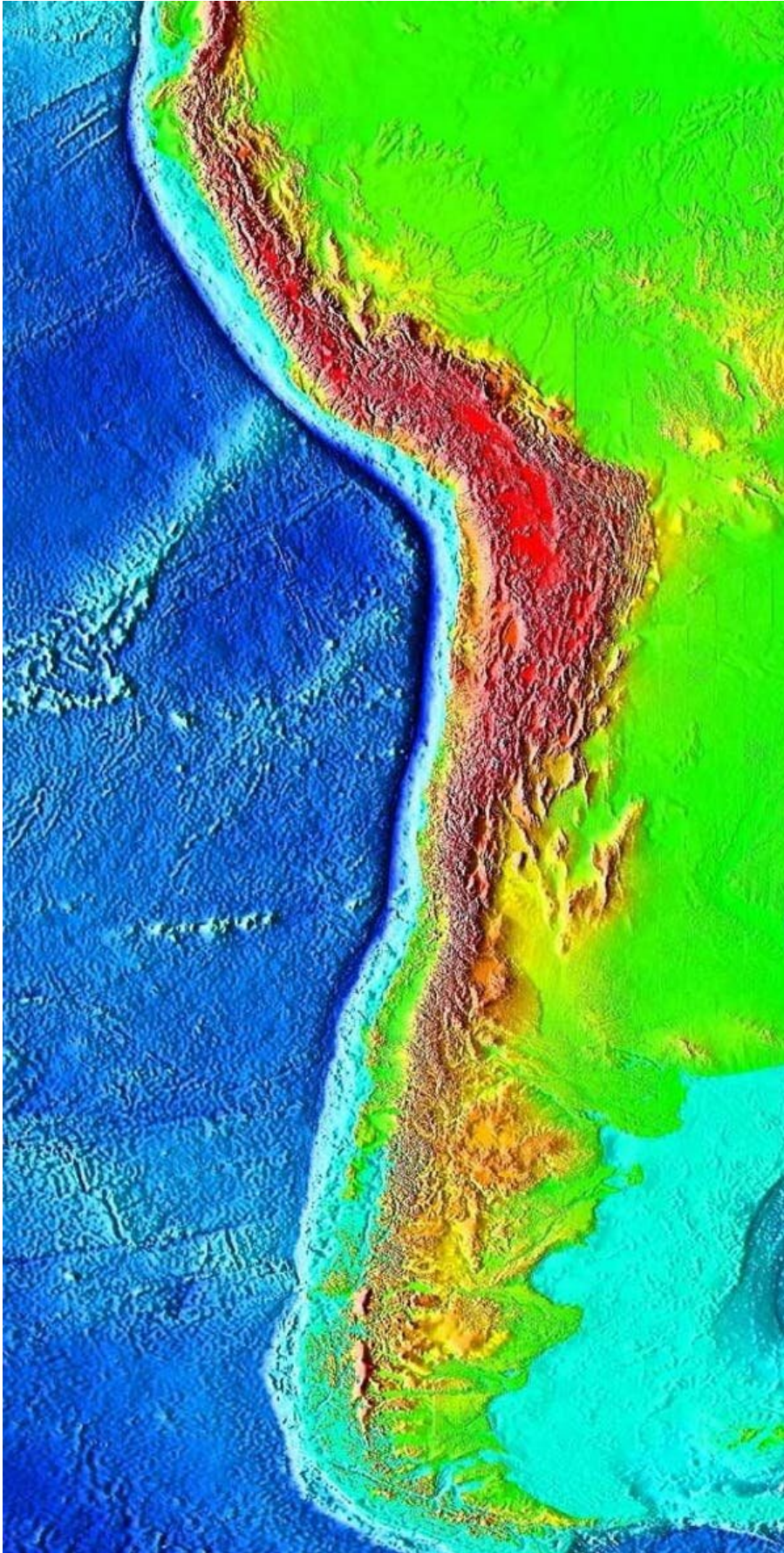
Their home is one of [35 trenches](#) that reach hadal depths. These trenches are formed by a geologic process called subduction (where one tectonic plate is forced under another causing the ocean floor to quickly plunge). The volume of the Atacama Trench is almost the same as the neighboring Andes mountain range, also created by the tectonic subduction zone.

Compared to the conditions at the surface, the [hadal \(or deep-sea\) environment](#) seems extreme. It is pitch black with water temperatures varying between 1°C and 4°C at the deepest points. The hydrostatic pressure at hadal depths ranges from 600 to 1,100 atmospheres—equivalent to placing one-ton on the end of your finger.

But this environment is entirely normal to the organisms that live there. Hadal inhabitants have a suite of biochemical, morphological and behavioral [adaptions](#) that allow them to thrive in the trenches. Studying these ecosystems is not an easy task—which is why the [hadal zone](#) has

been understudied compared to shallower parts of the ocean.

In 2018 two international research expeditions focused on the southern portion of the Atacama Trench. Scientists first set off on the Chilean vessel, RV Cabo de Hornos, to study the deepest part of the trench, Richard's Deep, as part of the [Atacamex expedition](#). A month later, scientists on the German vessel, RV Sonne, [studied](#) the wider trench ecosystem, sampling from 2,500 meters to Richard's Deep.

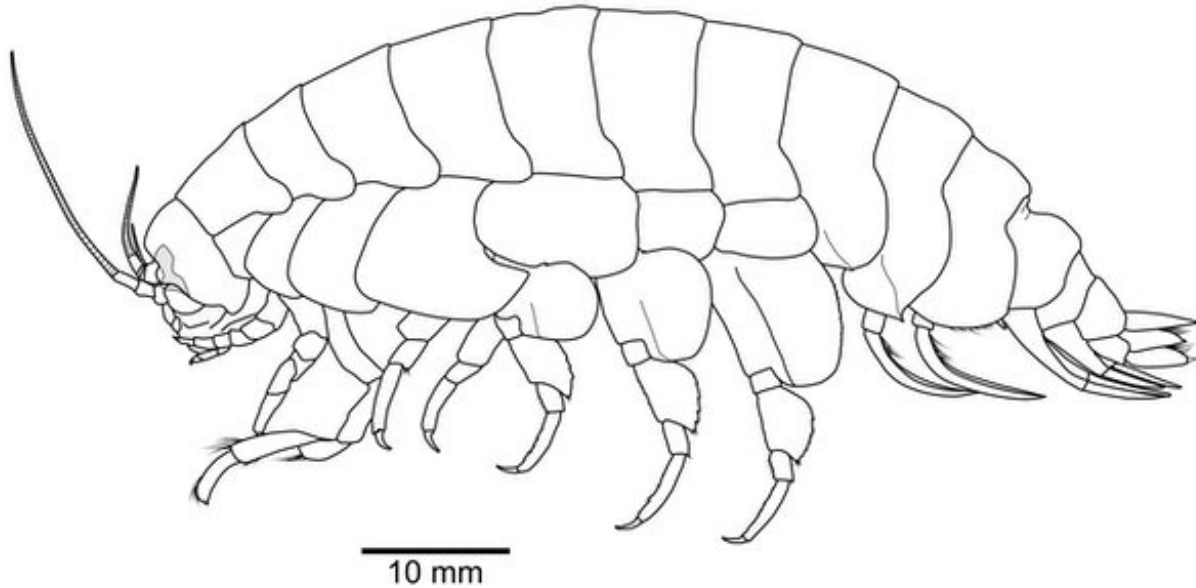


Atacama Trench in dark blue running along the spine of Peru to Chile. Credit: NOAA/Wikipedia, Author provided

During the expeditions, unmanned submersibles called [landers](#) were deployed. Landers were equipped with robust deep-sea imaging equipment and baited traps to bring animals up for closer inspection. Both expeditions were a success and collected hundreds of hours of footage and thousands of amphipods—including *Eurythenes atacamensis*—as well as a new [species](#) of snailfish, affectionately nicknamed the "Little Purple Lovely" until its official scientific name is decided.

Once the specimens were back on land, the detailed work to sort, measure, identify and describe new species commenced. *Eurythenes atacamensis* is a member of a well-studied deep-sea genus (*Eurythenes*), which is notorious for what is known as [cryptic speciation](#). In other words, when it is hard to visually tell one species from another. The fantastic photographs of *Eurythenes atacamensis* were actually taken back in a [2009 expedition](#) to the trench.

At the time, it was first identified as *Eurythenes gryllus*. With the new 2018 specimens, we accounted for cryptic speciation by applying an [integrative taxonomy approach](#)—pairing traditional morphology (the detailed study of an organism's shape) with DNA barcoding. This latest research showed it was actually a different and undescribed species.



Scientific illustration of the *Eurythenes atacamensis* holotype, a female from 8052 metres in the Atacama Trench. Credit: Johanna Weston/Marine Biodiversity, Author provided

This taxonomic process helped us categorize organisms so we could more easily communicate the biological information. Together, the detailed visual assessment and genetics gave us a clear result that *Eurythenes atacamensis* was a [new species](#). Once confident in the data, we selected several individuals to be described and illustrated. These individuals are called type specimens—the most important of which is the [holotype](#) or the "name-bearing" specimen. We chose the name *atacamensis* in tribute to its home.

This discovery is another piece in the puzzle of understanding the world that we live in and the subtle interactions between organisms and their environment. It helps us understand how life thrives in the deepest parts of the ocean, under conditions that seem impossible to terrestrial mammals like us. It also gives us a glimpse into the hadal zone—not an

extreme habitat bereft of life, but one filled with extraordinary biodiversity.

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