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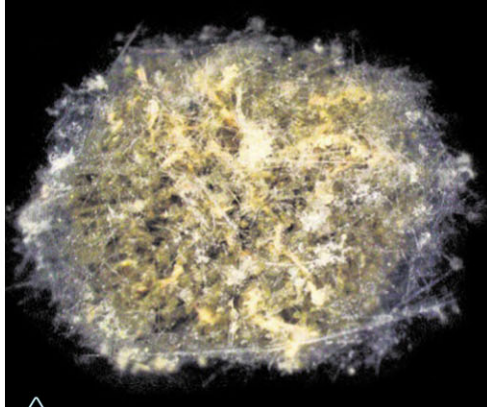
Creatures of another world

In the depths of the Pacific Ocean, somewhere between Hawaii and Mexico, is a whole other world unknown to mankind. From molluscs to sea anemones to brittle stars, an incredible diversity of organisms inhabit what is known as the Clarion-Clipperton Zone (CCZ). Despite extreme temperatures and little food, there are living things that can be found on the sea floor measuring about 6,000km by 1,000km. Researchers from the Keppel-National University of Singapore Corporate Laboratory went on a 37-day trip to the area between February and March, as part of an environmental survey organised by Keppel Corporation's Ocean Mineral Singapore, to study the collection of nodules from the seabed which contain metals such as copper, nickel and manganese. Using a special tool, they collected samples of the organisms on the seabed from their research vessel. Vanessa Liu takes a look at some of the creatures they found.

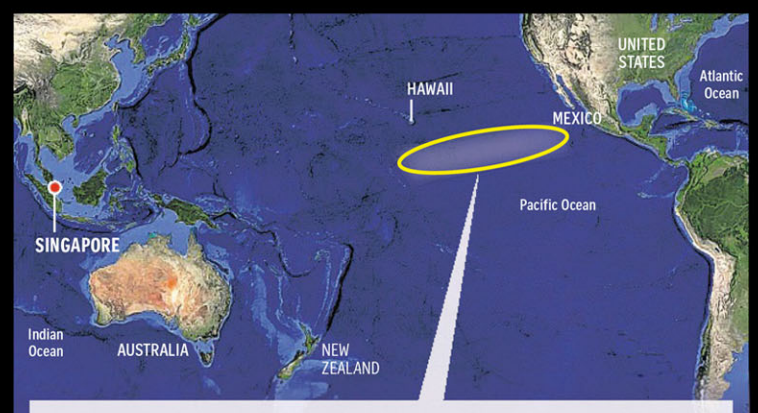


△ **Foraminifera**

- Possibly a species new to science, this creature belongs to a group of single-celled organisms known as foraminifera, which can be identified by the hard skeleton made of calcium carbonate that they secrete and surround themselves with.
- In this particular individual, the skeleton is made up of numerous glass-like needles woven together – a unique pattern not often seen in other members of the community found in the CCZ. Foraminifera use cellular extensions to collect food from its surroundings.

Polychaete worm ▷

- This deep-sea polychaete worm belongs to the Maldanidae family, the members of which are often referred to as bamboo worms because the elongated segments of their bodies are thought to resemble bamboo stems.
- This specimen, measuring more than 10cm in length, is one of the largest polychaete worms seen to date in the CCZ. Other species are mostly small – less than 2cm in length.
- Maldanids are not known to be fussy feeders: they feed by swallowing mud and digesting the organic matter in it.



CLARION-CLIPPERTON ZONE

Where and what is it?

- It spans about 4.5 million sq km across the central Pacific Ocean, outside the national jurisdiction of any country.
- The area with its manganese nodules was declared as a common resource for the benefit of mankind.

Unique environment and organisms

- Unlike other deep-sea habitats where heat, sulphides or methane from the earth's crust help sustain life, organisms in this region survive on very little food.
- That is one reason why most of the organisms found here are small – less than 2cm long – and relatively scarce but high in diversity.
- Many polymetallic nodules, containing commercially valuable metals such as manganese, cobalt, nickel and copper, can be found on the surface of the sea floor in the zone, formed over millions of years as a result of biological and chemical interactions.

△ **Tube of a jellyfish in its polyp stage**

- The tube seen here, attached to the surface of a manganese nodule, is the exoskeleton of a jellyfish belonging to the genus Nausithoe in its polyp stage, or the sedentary stage of a jellyfish's life cycle.
- When conditions are ideal, the polyp will move into the medusa stage of its life cycle and become the swimming jellyfish that we are familiar with.
- This particular chitinous tube is unique as most other jellyfish polyps have a soft-bodied appearance. Some polyps have been known to be able to survive for up to three years without food.

△ **Monoplacophoran limpet**

- A mollusc with an umbrella-shaped shell like that of a limpet, this specimen is distinct from all its relatives such as clams, snails and squids in that its organs – including hearts, kidneys, gills and shell muscles – are repeated serially along its length.
- These creatures were thought to have become extinct 375 million years ago, until living specimens were discovered in the 1950s with the rise of deep-sea exploration. Since then, some 29 species of such "living fossils" have been found in deep-sea habitats in the Pacific, Indian and Atlantic oceans.

◁ **Tanaidacean crustacean**

- This species of crustaceans, which belongs to the Portaratrum genus, is found only in deep-sea environments at depths of between 1,700m and 5,400m. They live in tubes constructed using silk secreted from their legs.
- All Portaratrum species possess a conspicuous spur on their tail segment and many have strong front limbs that allow them to dig into the mud quickly. They often serve as food for other carnivores.

◁ **Deep-sea sponge**

- Also likely new to science, this particular specimen of a deep-sea sponge belonging to the family Polymastiidae was collected from the surface of a manganese nodule. It is likely the smallest species known in the Polymastiidae family and has a simplified skeleton – a feature which possibly resulted from the very limited food available at these depths.
- Most sponges are filter-feeders: they continuously pump water through a network of internal canals and use the resulting current to bring suspended debris into itself.

△ **Isopod crustaceans**

- Possibly another species new to science, the two specimens here are isopods belonging to the Haploniscidae family. Isopods are small crustaceans – less than 2cm in length – with a flattened, elongate-oval body and seven pairs of legs. Some giant isopods from deeper waters can grow up to half a metre in length, however.
- Isopods are related to shrimps and crabs and can be found across diverse habitats such as forest floors, lakes, rocky shores and deep-sea environments.

◁ **Copepod crustaceans**

- These tiny benthic crustaceans, belonging to a group known as Harpacticoida, come in a variety of body shapes, and can be found near the seabed everywhere, from shallow coastal waters to the deep seas.
- Many of these copepods – which range in size from 0.06mm to 0.5mm – are believed to be new species. Identifying them and their spatial distribution could assist scientists in understanding the biology and ecology of the CCZ and help to manage mining activities here such that undue detriment to the ecosystem is minimised.

Source: NATIONAL UNIVERSITY OF SINGAPORE
PHOTOS: NATIONAL UNIVERSITY OF SINGAPORE, GOOGLE MAPS STRAITS TIMES GRAPHICS