

The *Tara*'s inspiring 20 years at sea

A research ship's voyages to understand marine biodiversity show how visionary thinking can boost understanding of the natural world – and help to better preserve it.

Scientists have known for decades that the biodiversity we know is a fraction of the biodiversity that exists. Even when it comes to perhaps the simplest measure, the number of species, researchers estimate that there could be anywhere between 3 million and 100 million species, of which some 1.7 million have been described. Every year, the names of some 10,000 new ones get added to the list.

Gathering good biodiversity data can be a mission in itself, especially on marine biodiversity. One dependable source is a schooner called *Tara*, which celebrates 20 years at sea as a research ship this year. *Tara* has been to the Arctic Ocean and the Mediterranean Sea. Last week, researchers reported the results of its latest voyage, Tara Pacific, a two-year expedition across the Pacific Ocean, published in a collection of articles in Springer Nature journals (go.nature.com/45puzhk).

Coral reefs are among Earth's most diverse ecosystems, supporting 25% of marine life and providing services such as food, jobs and coastal protection to nearly one billion people worldwide. One region of the Pacific, the Coral Triangle – which includes the waters of Indonesia, Malaysia and the Philippines – has around 75% of the world's coral species. But these nurseries for marine life are under threat: globally, around 50% of living corals have been lost since the 1950s (T. D. Eddy *et al. One Earth* 4, 1278–1285; 2021). Moreover, climate change poses a large risk to their continued survival.

One of Tara Pacific's research groups has been focusing on genetic diversity – in particular, that of microbial communities (bacteria and archaea) living in Pacific Ocean corals. The scientists, led by marine microbiologist Pierre Galand at the Banyuls Oceanological Observatory in Banyuls-sur-Mer, France, collected more than 5,000 samples, and focused on analysing the 16S ribosomal DNA marker gene, which is used to identify and classify microorganisms. They found around half a million distinct DNA sequences known as amplicon sequence variants (ASVs), which can be used as a measure of the genetic diversity in a sample (*Nature* <https://doi.org/kddz>; 2023). From these data, the researchers estimated that the microbial diversity of coral reefs globally is probably around 2.8 million ASVs (P. E. Galand *et al. Nature Commun.* 14, 3039; 2023). For comparison, this is close to the lower end of one genetic-diversity estimate of all of Earth's bacterial and archaeal communities – a proposed range of 2.72 million and 5.44 million ASVs (S. Louca *et al. PLoS Biol.* 17, e3000106; 2019). Galand and his colleagues' work, which



The *Tara* during its 100,000-kilometre voyage around the Pacific Ocean.

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builds on smaller-scale studies of coral reefs (M. Chiarello *et al. Proc. R. Soc. B* 287, 20200642; 2020), confirms that Earth's microbial genetic diversity is much higher and richer than previously thought.

The research ship has a stirring and unusual back story. Its original captain was Peter Blake, a much-decorated professional yachtsman from New Zealand. After retirement, Blake became an environmental envoy to the United Nations but was killed by pirates at the mouth of the Amazon River while on an expedition in 2001. Agnès Troublé, a French fashion designer known as Agnès B, and her son Etienne Bourgois acquired the boat, determined to continue Blake's original vision. They established the Tara Ocean Foundation and invited scientists and research funders to join them on various missions.

The logistics of converting a schooner into a floating laboratory and taking it on a 100,000-kilometre journey cannot be underestimated, especially considering the present complicated relations between Pacific nations. And then there's the logistics of the research itself: organizing 3,000 dives; sending samples for PCR analysis en route; keeping the voyage on track.

Researchers must continue to build on the work being reported and refine our understanding of the importance of diversity for safeguarding ecosystem stability and function. The project is a great example of visionary thinkers such as Troublé and Bourgois working closely with funders and scientists to help us to understand the breathtaking diversity of the world around us before it is too late. When it comes to preserving the natural systems we all depend on, more such collaborations are needed.