



# NEWSLETTER

## MARINE MICROBIOME

Since our last newsletter in June 2025, we've published new educational features, highlighted fresh research, and lined up end-of-year events at our web portal - did you find out which microbe is your match? Deep Dive at [marinemicrobiome.org](https://www.marinemicrobiome.org).

Here are some 2025 highlights of marine microbiome research and news, including how COP30 underscores why ocean microbes should be included in climate decisions:

### The marine microbiome: what we are learning

From open ocean gyres to our estuaries, microbes remain the hidden machinery of the sea-running carbon pumps, shaping food webs, and flagging change long before we see it at the surface. Three trends stand out this season:

#### Warming is reshaping the base of the food web.

New field-calibrated work reported in Nature Microbiology indicates that **Prochlorococcus** - the ocean's most abundant photosynthetic microbe - struggles as tropical and subtropical waters warm past its optimal temperatures, implying future **declines in biomass and productivity** across some of the very regions that currently depend on it, with implications for oxygen production, carbon export, and fisheries models. See: [Future ocean warming may cause large reductions in Prochlorococcus biomass and productivity](#) | Nature Microbiology

#### Chemistry is crossing red lines.

Multiple assessments now argue that global **ocean acidification has breached a planetary boundary**, with implications for calcifiers and impacts on the microbial processes that mediate carbonate chemistry and nutrient cycling. For the microbiome community, this strengthens the case for coupling carbonate system observations with multi-omics at sustained sites. See: ["Ticking timebomb": sea acidity has reached critical levels, threatening entire ecosystems - study](#) | [Ocean acidification](#) | The Guardian

#### Noteworthy Observations

- A **global synthesis of 1,885 depth profiles maps microplastics** from surface to deep waters and highlights how particle size governs transport and microbial colonization, providing key context for "plastisphere" ecology and biodegradation research (See: [The distribution of subsurface microplastics in the ocean](#) | Nature).
- A study shows that **predictable protein shifts in co-occurring bacteria can precede harmful algal blooms**, pointing to practical **early-warning biomarkers** for aquaculture and coastal managers (See: [Harmful algal blooms are preceded by a predictable and quantifiable shift in the oceanic microbiome](#) | Nature Communications).
- Long records in the California Current reveal climate-driven "seasons" in **microbial genomic diversity and function** that mirror warming patterns seen during ENSO events - useful guidance for where and how to track resilience (See: [Climate-driven succession in marine microbiome biodiversity and biogeochemical function](#) | Nature Communications).

EVERY SECOND BREATH YOU TAKE YOU CAN THANK THE OCEAN

WE PRODUCE OXYGEN!

## Highlights from stories posted at the [Marine Microbiome Portal](#)

**COP30: Highlighting why microbes matter:** Research underlines that microbial responses can amplify or dampen climate trajectories, supporting the need to include microbial dynamics to inform mitigation scenarios and adaptation finance. COP30, held Nov 10–21, 2025 in Belém, Brazil called for **inclusion of microbiome observing & FAIR data** into national adaptation plans, **investment in microbiome-informed early warning** for coastal risk, and **support of One Health linkages** across ocean–climate–public health.

Methodologically, the arc bends toward **integrated observing:** autonomous platforms and AI-assisted workflows to capture microbes and chemistry in real time; FAIR data pipelines so multi-omics can flow into models and policy; and One Health framings that connect ocean, climate, and people. COP30 focused minds on mitigation and adaptation, including folding microbiome indicators into national observing plans as a near-term, high-value step.

**Bottom line:** The tiniest ocean engineers are delivering outsized insight and early warnings. Generating this information in a comparable and decision-relevant manner will allow marine microbiome science to deliver solutions to some of our planet's most pressing issues. Learn more at [COP30: Why marine microbiomes must be on the climate agenda | marinemicrobiome.org](#); [Advocating for the Invisible Microbial Majority That Underpins a Healthy Planet | COP30 Programming](#); [Microbial solutions must be deployed against climate catastrophe | PMC](#)

### Prochlorococcus under pressure:

A Nature Microbiology study shows warming seas may **reduce biomass and productivity** of the ocean's most abundant oxygen-producing microbe, with knock-on effects for carbon uptake and food webs. Our post breaks down what it means and why models must factor microbial resilience.

**See:** [Prochlorococcus Under Pressure: Warming Seas Threaten Earth's Oxygen Engine | marinemicrobiome.org](#)

### AI-driven marine robotics:

From autonomous platforms to onboard computer vision, AI tools are accelerating **real-time microbiome monitoring** and early-warning capabilities for blooms and hypoxia.

**See:** [AI-Driven Marine Robotics for Microbiome Monitoring | marinemicrobiome.org](#)

### Tiny Giants:

Guest spotlight on why microbial processes are central to ocean futures, from biogeochemistry to fisheries.

**See:** [Tiny Giants: Marine Microbes' Pivotal Role in the Ocean's Future | marinemicrobiome.org](#)



### Deep Dive: The ocean microbiome on a changing planet:

Editorial context for the new **Ocean Microbiology** focus area and why integrated, open datasets matter.

**See:** [marinemicrobiome.org](#)

### The Immeasurable Value of Plankton:

A concise take on a broad review of plankton's contributions across **six impact domains**—ecology, climate, economy, and more.

**See:** [immeasurable value of plankton to humanity | BioScience | Oxford Academic](#)

## Events & Opportunities

- **8th International Conference on Microbiome Engineering** — Antwerp, **Dec 1-3, 2025**. Sessions span human, animal, soil and **marine microbiomes**, with engineering approaches across environments. [More](#)
- **Ecological drivers of seafloor microbiomes of the Puerto Rico Trench - Hybrid Dec 10, 2025**. Deep-sea microbiome seminar on processes shaping seafloor communities - carbon cycling, genomic novelty, and methods. [More](#)
- **Microbes in Microbiomes — Miami, Feb 2026**. The inaugural Microbes in Microbiomes conference aims to highlight the progress in microbiome science from structure to function with a focus on the individual microbes responsible for these important traits. [More](#)
- **Ocean Sciences Meeting (OSM 2026) in Glasgow - Feb 22-27 2026**. Flagship ocean meeting with strong microbial biogeochemistry and 'omics integration. [More](#)

### Get involved

- **Contribute a field note/data story:** Have a microbial indicator or workflow others could adopt? Pitch a 600–800-word piece (figures welcome).
- **Stay in the loop: The June 2025 newsletter and all back issues are archived here.**

## Learn More

### Bringing Microbial Tales to Light

For anyone fascinated by the microbial world that shapes our planet in subtle yet extraordinary ways, there is a true art in telling microbial stories. Over the years, many enthusiasts and experts have created platforms dedicated to sharing these tales, encouraging curiosity, discussion, and deeper appreciation for the small things that matter. Among the most respected of these is **Small Things Considered**, a blog that brings microbial stories to life by translating cutting-edge research into clear and engaging insights for scientists, students, and enthusiasts alike. Each post reveals how microbial communities function, adapt, and interact with their environment - reminding us of how profoundly these microscopic players influence life on Earth. Beyond this, numerous other blogs contribute to the field, highlighting diverse microbial niches, marine and terrestrial. Notable examples include **The Microbial Menagerie**, **The Joyful Microbe** and **The FEMSmicroBlog**, all offering valuable perspectives worth revisiting from time to time. We encourage all to explore these blogs and dive into the remarkable stories they share - each a reminder of how diverse the microbial world is and much there is still to be discovered.

### Stay up to Date - Please follow and share

