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Oceans teem with bacteria, many unknown-study

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By Alister Doyle, Environment Correspondent

OSLO (Reuters) - The oceans are teeming with 10 to 100 more types of bacteria than previously believed, many of them unknown, according to a study released on Monday that has jolted scientists' understanding of evolution in the seas.

Using a new genetic mapping technique, U.S., Dutch and Spanish scientists said they found more than 20,000 different types of microbe in a single liter (1.8 pint) of water from deep sites in the Pacific and Atlantic Oceans.

"These observations blow away all previous estimates of bacterial diversity in the ocean," said lead author Mitchell Sogin of the Marine Biological Laboratory at Wood's Hole, Massachusetts.

He said past studies had suggested that one liter of water would contain 1,000 to 3,000 types of microbe -- the oldest form of life on the planet. Microbes make up more than 90 percent of the total mass of life in the seas, from bacteria to whales.

"We've found 10 or maybe 100 times more diversity in sea water than anyone imagined was present," he said. The study was part of a global Census of Marine Life and was published by the Proceedings of the U.S. National Academy of Sciences journal.

Sogin said the findings suggested there might be more than 10 million types of bacteria in the seas alone. "If you're interested in new frontiers, things to discover, all you have to do is go to the ocean," Sogin said.

Until recent years, estimates of the total number of species on earth -- from microbes to elephants -- were below a million. The new findings suggest that a swimmer swallowing a mouthful of sea water may be consuming perhaps 1,000 types of bacteria.

"RARE BIOSPHERE"

The report said that many of the types of bacteria found at the sample sites -- including a hydrothermal vent at a subsea volcano off Oregon -- were present in very low numbers, in what they called a "rare biosphere."

"Not only are they diverse from each other but they are very diverse from anything we have in the molecular database," Sogin said. The variety could upset normal understanding of the make-up of life in the oceans, and how it evolved.

One possibility was that some types of microbe were rare in some parts of the oceans but common in others -- challenging traditional views of the seas as a homogenous bacterial soup.

"There might be a 'bio-geography' of micro-organisms in the sea, something that microbiologists have been debating for perhaps hundreds of years," Sogin said.

Another possibility was that rare bacteria were tolerated in a habitat because they produced something -- perhaps an enzyme or vitamin -- that more common species needed.

A side-effect of tolerating scarce types of bacteria was that they might prove to be a reserve of spare parts to help ocean life rebound after some cataclysm such as a giant asteroid or an Ice Age, Sogin said.

Some rare species, for instance, might have genes allowing them to thrive if large tracts of the oceans froze. Bacteria can exchange genetic material relatively easily, speeding adaptation and recovery of the total ocean population.

Sogin said the variety of life might also benefit pharmaceutical and biotechnology firms. "If you have a business plan based on

drugs from diverse microbes the study should be very encouraging," he said.

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