

Book Expands Biological Classifications to Account for 'Alien' Life

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What would you call an alien if you encountered it on the street tomorrow? What if that alien didn't come from another world but rather was created in a laboratory right here on Earth and functioned differently from other Earth life?

Either way, Peter Ward has the beginnings of an answer. In a new book, the University of Washington paleontologist puts forth an expanded "tree of life," or biological classification system, to account for a variety of life forms that would not fit in the current system.

Among them are viruses, long considered to be non-living bits of protein and nucleic acid but which Ward argues are as alive as the many parasites that infect humans and other organisms. The revamped classification system also would include life based on RNA instead of DNA, and life found away from Earth that likely would be based on silicon or elements other than the carbon-hydrogen-oxygen-nitrogen mixture that is the backbone of life on Earth.

"To get to DNA life you had to go through non-DNA life, which we no longer have," Ward said. "But just because a type of life goes extinct doesn't mean you don't classify it. Otherwise you wouldn't have dinosaurs on the tree of life. And until now there hasn't been any place to put RNA life."

In the current popular classification system the highest levels are three domains – bacteria, archaea and eukarya, the last of which includes all

animals. Ward's plan places those three domains within a larger dominion, which he calls "terroan" to signify Earth origins. Another dominion he calls "ribosa" because it is based on ribonucleic acid, or RNA. Other dominions could be formed to cover life discovered to have a different base than DNA or RNA.

The dominions would be placed within broader classifications called "arborea," which contain life that does not mix with that of other arborea. The Earth arborea would contain all life forms found on this planet and other arborea would contain life found away from Earth.

Ward presents his new model in a book called "Life As We Do Not Know It: The NASA Search for (and Synthesis of) Alien Life," published by Viking and being released Thursday.

The new system is already necessary, he said, because "alien" life has been created in laboratories on Earth. That includes microbes with at least one amino acid beyond the 20 in the DNA of native Earth life, or organisms that have been genetically modified, Ward said. It also includes some life forms that have been modified to be much simpler than what is normally found on Earth.

"We may never find other life away from Earth, but we have already made aliens on this planet and we will continue to do so at an increasing pace," he said. "In the last five years we've come to realize that we can make microbial life in a lot more ways than Mother Earth did."

Ward believes that if life is found away from Earth, at least some could be based on elements such as silicon, perhaps in combination with carbon. Because environments are far colder on moons and planets farther from the sun, he said, it is less likely that life on the moons of Saturn and Jupiter, for instance, will use water as Earth life does. Instead, those organisms are more likely to use compounds such as

ammonia that remain liquid at very low temperatures.

Ward is one of several faculty members in the UW's groundbreaking graduate program in astrobiology. The program, the first of its kind, started in 1998 with a grant from the National Science Foundation and has since been bolstered by funding from the National Aeronautics and Space Administration. Students work in a variety of areas, such as astronomy, microbiology and oceanography, to prepare themselves for the search for life away from Earth.

Ward also was a co-author, with UW astronomer Donald Brownlee, of a popular book called "Rare Earth," published in 2000. The book advanced the idea that simple microbial life might be very common in the universe but complex life is probably so rare and dispersed that Earth inhabitants might never encounter another intelligence. Ward said his beliefs haven't changed from the basic "Rare Earth" premise, but it is becoming clearer that simple life found away from Earth could take forms not previously expected. That's already happening in Earthbound laboratories.

"I hope people will wake up and realize this is a whole new biology," Ward said. "There's going to be a zoo of aliens on Earth in the next two decades just from what we make."

Source: University of Washington

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