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Compiling a Catalog of Life on Earth

Charlie Schmidt

Until recently, it might have seemed impossible. Some scientists estimate that 90 percent of Earth's species have not yet been identified; you'd need an enormous army of well-equipped biologists working night and day to even make a dent in that figure. But evolutionary biologist Paul Hebert of the University of Guelph in Ontario believes that he has found a way of accelerating the process. He has discovered a "bar code" embedded in the DNA of all animal life, from bacteria to monkeys, that functions like a fingerprint.

The bar code, a single gene that varies slightly from species to species, could pave the way for portable handheld gene sequencers that would enable scientists in the field to quickly scan for species' near-unique bar codes. The bar-code gene is called cytochrome *c* oxidase 1, or *co1*. Every creature's *co1* gene is different—Hebert's research shows that the gene's variations distinguish among species with 99.9999 percent accuracy. Hebert's *co1* bar-coding system would transform traditional taxonomy, the age-old, painstaking science of finding and naming living things. As the number of qualified taxonomists dwindles almost as fast as the populations of some endangered species, a DNA-based approach would surely re-energize the field. "With a bar-coding system in place," Hebert notes, "we wouldn't have to rely exclusively on taxonomy experts."

The new technique is already being put into action: Hebert's approach is now being used in the Census of Marine Life, a 50-plus-nation effort to catalog marine species. And in June the Moore Foundation announced a \$2.4-million effort to bar-code 225,000 species over the next three years. "There's no sustainable way to identify all biodiversity on Earth without resorting to technology," Hebert says. "With bar-coding, we could deliver on this goal within 20 to 30 years."

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