

Now 'bar codes' can track nature's inventory, too

Technique expected to reveal new species and put knowledge at anyone's fingertips

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Canadian researchers have co-authored a biodiversity study on DNA "bar coding" they say will pave the way for cataloguing every living thing on Earth and lead to the discovery of untold numbers of new species.

With this technology, the study authors envision the creation of a hand-held device that will allow the average person, within minutes, to identify any species of plant or animal life and access biological information about it.

"When we're finished codifying bar codes and creating this reference library for life, any person on the planet will be able to identify any organism," said co-author Paul Hebert, director of the Biodiversity Institute of Ontario at the University of Guelph.

"Any person equipped with a bar coder can walk through the forest and identify the life around them." "Bar coding is revealing legions of unrecognized species, and it's going to change the species count for the planet." The study by the University of Guelph and New York's Rockefeller University appears today in the journal *Molecular Ecology Notes*.

Researchers cataloguing birds across Canada and the United States through DNA bar coding discovered 15 new genetically distinct species, with variations nearly indistinguishable to the human eye. Researchers also found six new species of bats in Guyana.

bar coding Continued from A1 The researchers described their findings as "startling." But the 15 birds described in the study as separate species haven't yet officially been given unique identities. That, the researchers acknowledge, is "the subject of scientific discussion and debate." The aim of bar coding is to isolate a small piece of DNA and have it represented as a distinct numerical sequence about 650 digits long -- similar to bar codes on retail products -- using only the numbers 1 through 4.

That may seem unwieldy, but if an organism's entire DNA chain were to be represented that way, it would be about 3.5 billion digits.

The study also revealed sets of DNA "twins" -- species previously classified as distinct, such as the king eider and common eider duck, but that have the same 650-digit DNA bar code, although each would have a unique full DNA chain.

"We don't argue that all DNA twins should be lumped as single species," Hebert said. "DNA bar-coding is not perfect, but I don't know of any other human enterprise that's perfect." Hebert said the process is a relatively straightforward way for scientists to catalogue life on the planet.

"If you walk through a forest and look at a bird, you identify it by looking at its shape, its colour, its size, its sound," he said. "And that works very well with small groups of species, but when you begin to look at millions of species ... no human on the planet can keep all those traits straight." With today's technology, the process of DNA bar-coding requires about three hours and two or three pieces of equipment the size of dishwashers.

Hebert predicted that in 10 years, the process will take just minutes with a hand-held device the size of a global positioning system.

But will such portable and powerful technology take the fun and challenge out of birdwatching for the average Joe? Absolutely not, Hebert said.

"If you arrive in Tahiti in a ship directed by a global positioning system as opposed to star navigation, would it be any less enjoyable to get there?"

'PROVISIONAL NEW SPECIES'

Genetically distinct birds were found among the following species: northern fulmar, solitary sandpiper, western screech owl, warbling vireo, Mexican jay, western scrub-jay, mountain chickadee, bushtit, winter wren, marsh wren, Bewick's wren, hermit thrush and curve-billed thrasher.

'VIRTUALLY IDENTICAL'

Bird species found by researchers to be "virtually identical" included the snow goose and Ross's goose; the black, mallard and mottled ducks; the blue-winged and cinnamon teals; the king and common eiders; the western and Clark's grebes; the laughing and Franklin's gulls; the California, Herring, Thayer's, Iceland, lesser black-backed, western, glaucous-winged and glaucous gulls; the red-naped and red-breasted sapsuckers; the black-billed and yellow-billed magpies; the American and northwestern crows; the Townsend's and hermit warblers; the golden-crowned and white-crowned sparrows; the dark-eyed and yellow-eyed juncos; the snow and McKay's buntings; the great-tailed and boat-tailed grackles; and the common and hoary redpolls.

Ran with fact boxes "'Provisional New Species'" and "'Virtually Identical'", which have been appended to this story.

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