

Species check in aisle six DNA barcodes

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A unique library is aiming to keep a record of every single species of animal, plant, fungus and organism on Earth by cataloguing their DNA just like the UPC symbols found on soup cans and cookie bags.

Working with a \$5-million grant from Genome Canada, Paul Hebert, a professor at the University of Guelph, is developing what he calls the Barcode of Life Initiative -- a first-of-its-kind DNA "barcode" library that could save millions of dollars by detecting invasive pests and ensure Canadians get what they pay for at their local supermarket.

Already two and a half years into the project, Dr. Hebert hopes to use the funding to catalogue all of the world's fish within the next five years, using a process that has helped him compile roughly 10,000 species in the library to date.

He said cells can be skimmed off a frog's skin, a bird's feather or the scales of a fish. A tiny portion of DNA, distinct and unique to that particular species, can then be extracted from those cells and converted into a 650-line coloured barcode that corresponds solely to that species.

"The idea is to associate with every species on the planet its little unique diagnostic barcode," he said. "It's effectively sufficient to tell apart every species on our planet."

According to the Barcode of Life Web site, humans have been cataloguing plant and animal life for 250 years but have only managed to record about 10-15% of the estimated 10 to 100 million species of life on Earth.

Dr. Hebert believed his library can help speed up the process, hoping that it can spur rapid progress towards completing the "inventory of life" on the planet within the next 20 years.

"I think everyone is used to telling organisms apart by their appearance," he said. "There is too much life on the planet to reliably use this as a method for distinguishing species."

"You can gain an ability to identify a species by looking at a tiny snippet of its DNA."

This process of tabulating can also spark discovery. Dr. Hebert said four "overlooked" birds were found amidst the first 130 recorded in North America, and that a new type of shark was uncovered while cataloguing fish.

"There is a very high diversity of unknown life on our planet," he said. "One of the big benefits of this project won't just be connecting barcodes to known species but the discovery of life."

Dr. Hebert also believed that the Barcode of Life Initiative can help manage the threat of species foreign to Canada such as the emerald ash borer and zebra mussels, which by his estimate have already cost the Canadian lumber industry and water treatment facilities millions of dollars.

He said if Canadian authorities had recognized earlier they were dealing with a foreign species and properly identified it, they may have had better luck in controlling the threat.

"They invaded because we don't have very good biological surveillance capabilities," he said. "The time when you can perhaps hold [the species] back is slightly after their arrival and, frankly, in most cases we don't recognize they've arrived because we don't have the ability to recognize them."

He also said the library has a practical impact for the everyday consumer, quoting a recent study that said 70% of the red snapper being sold in some eastern and central U.S. states was not actually red snapper but in some cases a fish of lower value. "If each animal and plant species has its own barcode, we'll be able to walk into any fishmarket in Canada and ascertain if there's been a substitution."

Dr. Hebert hopes to eventually have hand-held scanners manufactured that would allow wildlife enthusiasts to explore woodlands across the world and satisfy their own curiosity by determining exactly what species of beast or flora they cross paths with.

"I think most humans would agree we have some responsibility to protect other life forms," he said. "You can't protect life if you can't recognize it."

