THE GLOBE AND MAIL

DNA barcoding aims to protect species, food

Natalie Armstrong
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Call it a DNA digital Dewey Decimal System for all life on Earth.

Every species, from extinct to thriving, is set to get its own DNA barcode in an attempt to better track the ones that are endangered, as well as those being shipped across international borders as food or consumer products.

Researchers hope handheld mobile devices will be able to one day read these digital strips of rainbow-coloured barcodes – much like supermarket scanners – to identify different species by testing tissue samples on site and comparing them with a digital database.

The International Barcode of Life Project (iBOL), which says it is the world's first reference library of DNA barcodes and the world's largest biodiversity genomics project, is being built by scientists using fragments of DNA to create a database of all life forms.

“What we're trying to do is to create this global library of DNA barcodes – snippets, little chunks of DNA – that permit us to identify species,” Alex Smith, assistant professor of molecular ecology at the University of Guelph's Biodiversity Institute of Ontario, about 90 km west of Toronto.

So far DNA barcoding has helped identify the type of birds that forced last year's emergency landing of a flight on the Hudson River in New York. The researchers also discovered nearly one in four fish fillets are mislabeled in North America after referring to the library, which has 7,000 species of fish DNA barcodes, allowing the scientists to identify fillets that have been stripped of scales, skins and heads.

To get the barcodes, scientists use a short section of DNA extracted from a standardized region of tissue. Once the barcode is created, it's filed in the iBOL library.

Within a week, the barcode can be viewed publicly, online, by signing up for a free account at www.boldsystems.org, the site for Barcode of Life Datasystems (BOLD). Smith describes it as being like a label on a filing cabinet.

Just as the barcode scanner at a grocery store can identify lettuce, milk or steak, the DNA barcode sequence can be used to identify different species so that anyone who isn't a specialist – from an

elementary school student to a border patrol inspector – can identify the species, once technology to read the library is available.

The library has more than 87,000 formally described species with barcodes filed and more than 1 million total barcoded specimens.

Smith said humans live among at least 1.9 million named species, with total diversity within all those species adding up to millions more. Scientists estimate iBOL will have barcodes for all 10 million species of multicellular life within the next 20 years.

While the library is based in Canada, which led the early stages of DNA barcoding, 25 other countries are also involved.

“Most of life on the planet is not polar bears and Siberian tigers – most of life on the planet weighs less than a gram, is less than a centimetre long, and isn't visual. It experiences the world through taste and smell and we're not aware of its existence,” Smith said.

Aside from saving polar bears or tigers from extinction, the library is meant to help with more routine aspects of the global economy. That includes jobs such as ensuring the salmon or trout in markets and restaurants is accurately identified, or determining whether foods or other animal products crossing international borders are what they are claimed to be.

Smith said the barcodes will dramatically cut the time food shipments are held up at borders if technology to read the barcodes is available to determine whether a suspected pest on board is harmful.

Bob Hanner, associate director of the International Barcode of Life project, said the DNA barcode library will also help prevent the illegal exploitation of animals.

“Obviously trade in endangered species, in terms of the black market, is second only to narcotics right now,” Hanner said. “So it's a big deal to be able to identify if something is farmed alligator skin or endangered Cuban crocodile when it is involved in international commerce, and once it's tanned into a leather, these things can be very challenging.”

Both Smith and Hanner see handheld wireless devices and computer applications technology being developed to read the DNA barcode library out in the field.

“The time horizon for bringing in these kinds of new platforms for detection really depends on how quickly the public sector can motivate to complete the reference sequence library,” Hanner said.
