DNA barcodes catalogue animals

A short genetic sequence is enough to identify nearly every species.

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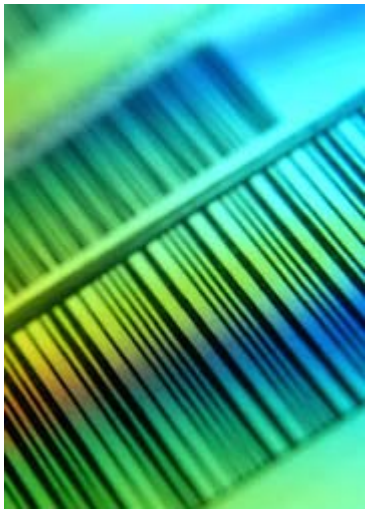
A simple genetic test can identify practically any animal species, say researchers. Soon, DNA barcodes may replace yellowing, scrawled labels for cataloguing biodiversity in museums.



It would take 20 years to give every animal species a DNA barcode.
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"It's a general identity sign for animal life," says geneticist Paul Hebert of the University of Guelph in Canada. His team identified DNA barcodes for a wide range of animal species and found that they should be 99.9999% accurate[1].

Several organizations, including the US National Museum of Natural History at the Smithsonian Institution in Washington DC, are also beginning to apply the technique.

"It's an exciting tool - thus far I've been impressed by the results," says museum entomologist Scott Miller. Members of museum staff are discussing whether to launch a large-scale barcoding effort for the museum's collections. Barcoding can work with small fragments, such as an insect's leg, and on specimens collected decades ago.

There could be as many as 10 million or even 100 million animal species. Biologists have described about a million so far - each new animal requires a lot of time and expertise. Genetic classification, which could be done by computers and robots, offers a rapid way to label and identify new samples.

"We may see comprehensive barcoding projects within five

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years," says Hebert, "and it's feasible to imagine a database of all animal life on the planet in 20 years." Such a scheme would cost about US$2 billion, he says.

Powerful code

The barcode is a sequence of about 650 DNA letters, found in a gene in mitochondrial DNA. Mitochondria - cellular powerhouses with their own genomes - are good for genetic identification because there are many copies in each cell, and their DNA evolves relatively quickly, creating differences between species.

By comparing more than 2,000 animal species, Hebert's team found that the sequence could tell nearly all of them apart. The only group that proved tricky was jellyfish and sea anemones, which seem to evolve too slowly for DNA differences between species to be a badge of identity.

Miller and his colleagues are including DNA barcodes in their descriptions of newly discovered moth species in Papua New Guinea. As well as describing new species, they have used the markers to match up the males, females and caterpillars of known species. The animals' different sexes and life stages look completely different.

Barcoding could also help to identify pest species, or to monitor commercial fishing, says Miller. But it won't replace the traditional methods of identifying and classifying species by their appearance, he says: "It's one more tool in the box, but we will always need backup."

References

1. Hebert, P. D. N., Ratsingham, S. & Dewaard, J. R.Barcoding animal life: cytochrome c oxidase subunit 1 divergences among closely related species.. *Proceedings of the Royal Society B* (2003). **|Article|**