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A test case for DNA barcodes to identify species

Faced with what Ed Wilson calls the "worst wave of extinction since the dinosaurs died," the need for a fast and easy way to identify species has never been greater. With too few specialists to do the job, biologists are looking for high-throughput tools that can rapidly and accurately identify individuals from known species and from an entirely new species. In the open access journal, PLoS Biology, Paul Hebert and colleagues demonstrate the utility of their controversial "DNA barcoding" concept, which uses genes to identify species much like supermarket barcodes identify products. Using a region of one specific gene, they correctly identify 260 North American bird species.

The idea is that a short stretch of genetic code from a reference gene is sufficiently characteristic of one species to distinguish it from every other species, and that comparisons

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of sequence variations in that gene can also reveal evolutionary relationships among species. Hebert and colleagues tested the effectiveness of their genetic barcode in an extensive study of North American birds by comparing the 'species' identified from the barcode against those already established by taxonomic methods. They found that all 260 bird species had unique genetic barcodes. In the 130 species represented by two or more individuals, gene sequences were either identical or closest to other sequences within that species. The authors report that the genetic barcodes therefore "separate individuals into the categories that taxonomists call species."

As their technology matures, it could radically advance biologists' attempts to achieve the long-standing goal of cataloging life on earth, but the approach is very controversial, with critics questioning both the method and its applications. As Craig Moritz and Carla Cicero from the University of California, Berkeley, also point out in the correspondence section of this issue, the Hebert et al. study is "not yet a definitive test of the utility of DNA barcoding for either diagnosis of individuals or discovery of species." Future studies will have to determine whether these results can be generalized to animals in other ecosystems, but the authors argue that constructing a comprehensive library of barcodes will facilitate such efforts.

Citations:

1) Hebert P, et al. (2004) Identification of Birds through DNA Barcodes. PLoS Biol 2 (10): e312.

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2) Please also see the corresponding article:


DNA BARCODING: PROMISE AND PITFALLS

Citation: Moritz C, Cicero C (2004) DNA Barcoding: Promise and Pitfalls. PLoS Biol 2(10): e354.

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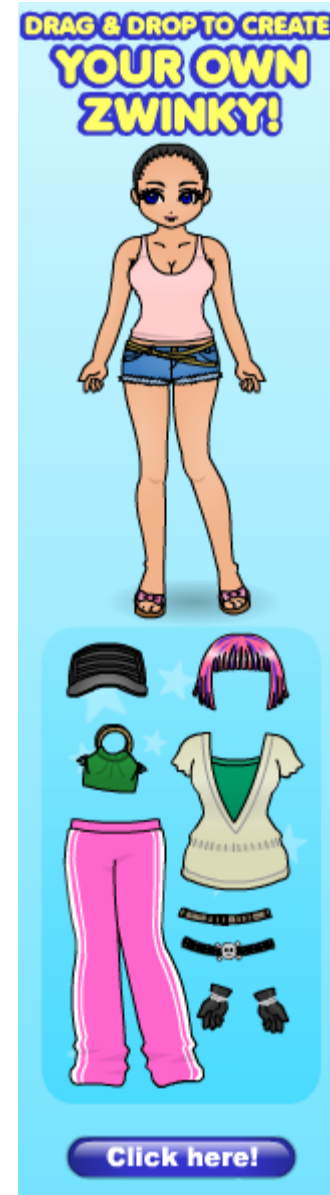
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