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ESI Special Topics, November 2004
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Paul Hebert answers a few questions about this month's fast moving front in the field of Biology & Biochemistry.

Field: Biology & Biochemistry

Article: Biological identifications through DNA barcodes

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Journal: PROC ROY SOC LONDON SER B, 270: (1512) 313-321, FEB 7 2003
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ST: Why do you think your paper is highly cited?

Our paper on DNA barcoding has been highly cited, in part, because it proposes a simple solution to a complex problem. In it, we provided initial proof that it will be possible to develop a highly effective identification system for members of the animal kingdom, based on the survey of sequence diversity in a single, standardized gene region. Although our paper has now gained many supportive citations, its citation count has certainly been reinforced by those who are critical of our conclusions. However, the basis for these concerns is being eroded as new DNA barcode papers gain publication.

"Over the past five years, it has become much simpler to isolate and sequence specific gene regions"

ST: Does it describe a new discovery or a new methodology?

Although antecedent papers had shown that DNA-based identification systems could be highly effective for small taxonomic assemblages, our paper was the first to suggest that a single-gene system could be effective for broad swaths of life. Aside from revealing this fact, our paper showed that sequence variation among individuals of a species was so small that a

reference library of DNA barcodes needs to include just a few representatives of each species. Because a DNA barcoding system will revolutionize our ability to identify organisms, it will act as an enabling tool for much biological research as well. Also, by easing access to identifications, it has many practical applications.

ST: Could you summarize the significance of your paper in laymen's terms?

We live on a planet populated by millions of species, most of which remain unknown despite more than 250 years of scientific effort. Our work has revealed that sequence diversity in a short, standardized segment of the genome (a.k.a. DNA barcoding) can reliably discriminate species in large assemblages of life. The synthesis of comprehensive DNA barcode libraries will enable new instrumentation allowing the rapid identification of organisms and will speed the registration of life's diversity. The development of DNA barcoding systems also has important implications for the conservation of life and for managing species with negative impacts on human health or economic systems.

ST: How did you become involved in this research?

I have had a long-time interest in biodiversity and have worked in varied geographic regions, including the tropics. As a consequence, I was sensitized to the difficulties in identifying life. My laboratory has employed genetic approaches to aid the discrimination of species for more than 30 years, but these applications were only effective for small assemblages of species. Over the past five years, it has become much simpler to isolate and sequence specific gene regions. These were the critical technical advances that were needed before it was possible to consider a general DNA-based solution to species identification.

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