10 things to know about...
DNA barcoding

UNIVERSITY of GUELPH

CHANGING LIVES
IMPROVING LIFE



DNA barcoding—rapid, efficient, and digital—is changing the way we see the world. It's a new frontier in scientific discovery.

1 Homegrown

The development of DNA barcoding showcases Canadian innovation. In 2003, University of Guelph researcher and Order of Canada appointee Paul Hebert, discovered along with colleagues that a short mitochondrial gene sequence could help to identify most animal species. They called this biological identifier a "DNA barcode," and proposed building a global universal barcode library. Since then, DNA barcoding has spread across the world, inspiring researchers to use DNA to aid in the species identification of hundreds of new and overlooked species. With vast ecological applications, DNA barcoding is now being used to trace food contaminants, identify mislabeled foods and other products, improve pest and disease control and aid in the regulation of international trade and markets.

2 Effective

DNA barcoding offers an effective method to record and identify different species around the world. Within 10 years, the University of Guelph and the international barcode community have generated more than four million barcodes for 500,000 species. DNA barcodes, origin information, and the identification of each specimen found is noted in the Barcode of Life Data System (BOLD), an interactive DNA sequence database and workbench developed and maintained by the Biodiversity Institute of Ontario (BIO) at the University of Guelph.

3 Economical

Early identification with DNA barcoding to control invasive species and other pests can save forestry and agricultural industries billions in lost production. DNA barcoding can also help consumers in identifying mislabeled food products. Barcode surveys conducted in Canada, Ireland, Spain, United Kingdom, and United States in 2011 showed that 10-50 per cent of fish products were mislabeled, including those sold at popular restaurants and stores.

4 Educational

DNA barcoding changes complex scientific knowledge into a simple language which can be understood by broader audiences. At the University of Guelph, BIO and Open Learning and Educational Support offer an online course: Introduction to DNA Barcoding. This eight-week course provides participants a basic understanding of barcoding, genetics, and a DNA-based approach to species identification.

5 Unprecedented

More than four million animals, plants, and fungi species have been barcoded so far by the International Barcode of Life Project (iBOL). The iBOL project is the largest biodiversity genomics initiative ever undertaken, consisting of global partnerships with hundreds of researchers from dozens of nations. From every part of the world, researchers have signed on to help in the construction of a digital identification system for life on Earth.

6 Global

To realize the goal of community access to barcode records, the iBOL project is using the BOLD interface to create a global network. Currently, the iBOL endeavor includes nearly 30 countries, and has joined forces with the UN in an agreement to work towards protecting and enhancing biodiversity nationally and internationally. All this offers a way to bring about policy changes, improved threatened species protection, and new safeguards for public health.

7 Ecological

DNA barcoding works from just a small part of the organism, revealing major features. For example, gut contents and feces have revealed hidden predator-prey relationships, allowing researchers to discover a network of interactions that underpin food web systems. The success of DNA barcoding comes from having genetic resources that provide species identification based on short DNA sequences.

8 Engaging

DNA barcoding engages minds in scientific innovation. A new iPhone app called Lifescanner has been developed so that citizen scientists can take part in exploring the diversity of life around them. Lifescanner provides user-friendly access to scientific records, which can help to identify species found during a hike, or even in the backyard. The School Malaise Trap program, another effective tool that engages youth, aims to give students a look into the life of biologists who work with DNA barcoding.

9 Transformative

Every year, an estimated 50,000 plants and animals species become extinct. DNA barcoding is transforming the way we monitor the world and improving environmental surveillance. BIO's Canadian Centre for DNA Barcoding (CCDB) has produced 73 per cent of the 4.3 million sequences in the global DNA barcode library database. Last year 142 researchers from 95 research institutes in 25 countries used the CCDB's analytical services.

10 Marketable

The CCDB offers species-identification services to researchers, governments, and industry. Combined with the CCDB's high workflow, scientists now have access to more than 10,000 species-IDs per week of freshwater indicator species, commonly used for Environmental Impact Assessments. The effectiveness of DNA barcodes is leading to new business opportunities as private sector firms begin investing with barcode research groups.

The University of Guelph's Biodiversity Institute of Ontario (BIO) is the global leader in barcoding technology, research and education. BIO has collaborated with more than 1,000 researchers in over 50 nations, and been instrumental in the genesis of the iBOL project.

Biodiversity Institute of Ontario
University of Guelph,
50 Stone Road East,
Guelph, ON, Canada N1G 2W1
519-824-4120 x56393
Fax: 519-824-5703

BIO Biodiversity Institute of Ontario

www.biodiversity.ca