

Examrace

Competitive Exams: Science and Technology DNA Barcode

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DNA Barcode

what's the Barcode?

1. DNA sequence analysis of a uniform target gene (genetic marker) in an organism's mitochondrial DNA to enable species identification is called DNA barcoding.

Ten Reasons for Barcoding Life

1. Works with Fragments. Barcoding can identify a species from bits and pieces, including undesirable animal or plant material in processed foodstuffs and morphologically unrecognizable products derived from protected or regulated species.
2. Works for all stage of life. Barcoding can identify a species in its many forms, from eggs and seed, through many forms, from eggs and seed, through larvae and seedlings, to adult sand flowers.
3. Unmasks look-alikes. Barcoding can distinguish among species that look alike, uncovering dangerous organisms masquerading as harmless ones and enabling a more accurate view of biodiversity.
4. Reduces ambiguity. A barcode provides an unambiguous digital identifying feature for identification of species, supplementing the more analog gradations of words, shapes and colors.
5. Makes expertise go further. Scientists can equip themselves with barcoding to speed identification of known organisms and facilitate rapid recognition of new species.
6. Democratizes access. A standardized library of barcodes will empower many more people to call any name the species around them.
7. Opens the way for an electronic handheld field guide. Barcoding links biological identification to advancing frontiers in DNA sequencing, electronics, and information science, paving the way for handheld devices or species identification.
8. Sprouts new leaves on the tree of life. Barcoding the similarities and differences among the estimated 10 million species of animals and plants will help show where their leaves belong on the tree of life.
9. Demonstrates value of collections. Compiling the library of barcodes begins with the multimillions of specimens in museums, herbaria, zoos, and gardens, and other

biological repositories, thus highlights their ongoing efforts to preserve and understand Earth's biodiversity.

10. Speeds writing the encyclopedia of life. A library of barcodes linked to named specimens will enhance public access to biological knowledge, helping to create an on-line encyclopedia of life on Earth.

Criticism

1. The greater applications of DNA barcoding in biological studies notwithstanding, this cannot be projected as the final word for species identification. There are many grey areas as well. In organisms where mtDNA genes are maternally inherited, one species with more than one mtDNA sequence, in cases of hybridisation, male-killing microorganisms, cytoplasmic incompatibility-including symbionts, horizontal gene transfer, etc there are chances of errors.
2. The fact is that both traditional taxonomy and molecular taxonomy using DNA barcodes are complementary. DNA barcodes should make species recognition in the field much easier and relatively error-free, especially where traditional methods are not practical. In addition, species identification should become more reliable, particularly for non-experts.

Promising Future

1. Initially referred to as DNA typing or profiling, the DNA barcoding initiative has taken this step forward, and several taxa have now been surveyed in their natural habitats using this technique. A complete DNA-based inventory of the Earth's present biota using large-scale high-throughput DNA barcoding is an ambitious proposal rivalling even the Human Genome Project.
2. Barcode of Life initiative (BoLI) is an international movement of researchers, research organizations, and users who are dedicated to developing DNA barcoding as a global standard for species identification.
3. DNA barcoding is an accurate, rapid, cost-effective, and universally accessible DNA-based system for species identification. DNA barcodes can help expand our knowledge by exploring many more species rapidly and inexpensively. Once widespread, this system will revolutionize access to biological information and affect research, policy, pest and disease control, food safety, resource management, conservation, education, recreation, and many other areas in which societies interact with biodiversity.

Courtesy: Science Reporter

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