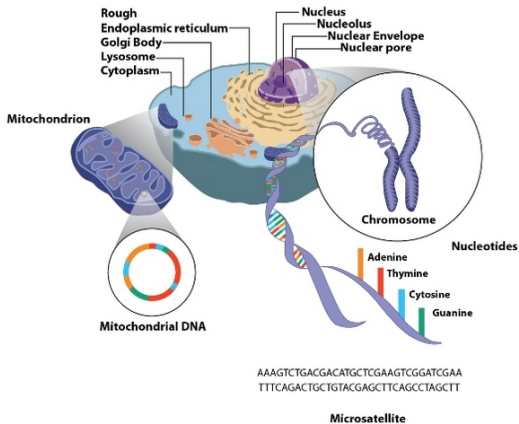


Identificação molecular de espécies usando DNA
barcoding
Molecular species identification using DNA
Barcoding

September 22nd, 2026



Fonte

Barcoding animal life: cytochrome *c* oxidase subunit 1 divergences among closely related species

Paul D. N. Hebert*, Sujeevan Ratnasingham and Jeremy R. deWaard

Department of Zoology, University of Guelph, Guelph, Ontario N1G 2W1, Canada

* Author for correspondence (phebert@uoguelph.ca).

Recd 09.03.03; Acctptd 28.03.03; Online 15.05.03

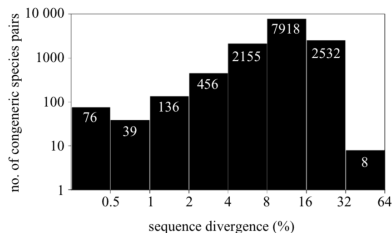


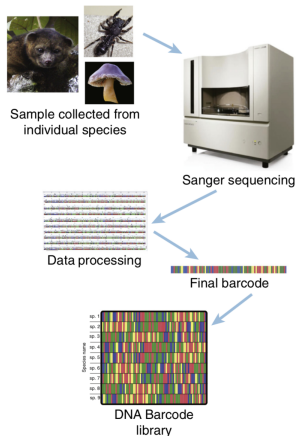
Figure 1. COI sequence divergences for 13 320 congeneric pairs of animal species belonging to 11 phyla.

Hebert et al. 2003 *Biology Letters*

Método standard: DNA Barcoding

Standard method: DNA Barcoding

- 1 Extração de DNA
DNA extraction
- 2 Seleção do barcode de DNA
DNA barcode selection
- 3 Amplificação (PCR)
Amplification (PCR)
- 4 Sequenciação
Sequencing
- 5 Comparação de uma sequência com uma base de dados
Matching the sequence against a database
- 6 Identificação de espécies
Species identification

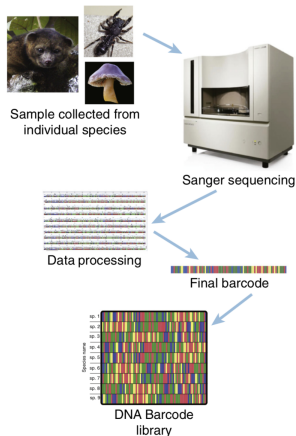


Kress et al. 2015 *Trends in Ecology and Evolution*

Marcadores de DNA

DNA barcoding Markers

- CO1 - subunidade I do citocromo c oxidase
CO1 cytochrome oxidase subunit 1
(mitochondrial)
- RNA ribossômico 16S do genoma mitocondrial
16S ribosomal RNA (mitochondrial)
- RNA ribossômico 12S do genoma mitocondrial
12S ribosomal RNA (mitochondrial)
- Região ITS do DNA ribossômico nuclear
Internal transcribed spacer (ITS, nuclear)
- RNA ribossômico 28S
28S ribosomal RNA (nuclear)
- RNA ribossômico 18S
18S ribosomal RNA (nuclear)

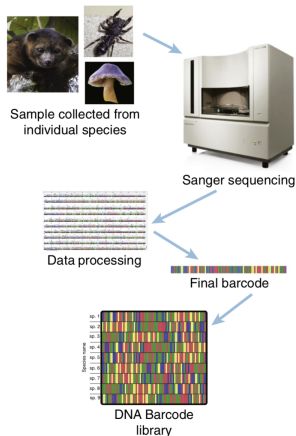


Kress et al. 2015 *Trends in Ecology and Evolution*

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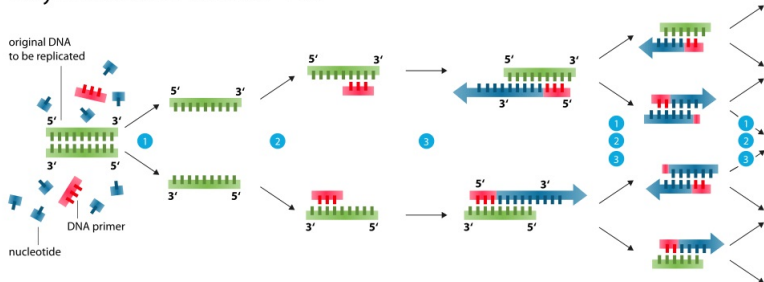
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Kress et al. 2015 *Trends in Ecology and Evolution*

Polymerase chain reaction - PCR



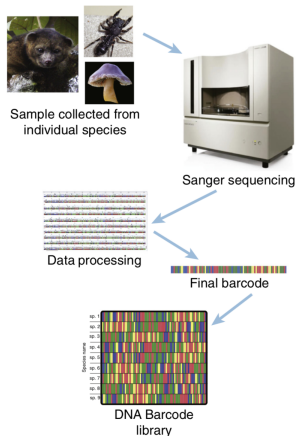
- 1 **Denaturation** at 94-96°C
- 2 **Annealing** at ~68°C
- 3 **Elongation** at ca. 72 °C

<https://microbiologyinfo.com>

Método standard: DNA Barcoding

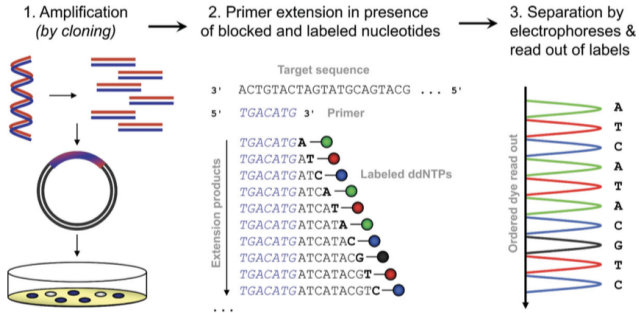
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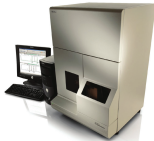
Kress et al. 2015 *Trends in Ecology and Evolution*

Sanger Sequencing



Kircher and Kelso 2010 *Methods, Models and Techniques*

1st Generation



ABI (Sanger)

2nd Generation



Roche 454



Illumina HiSeq



Life Technologies IonTorrent

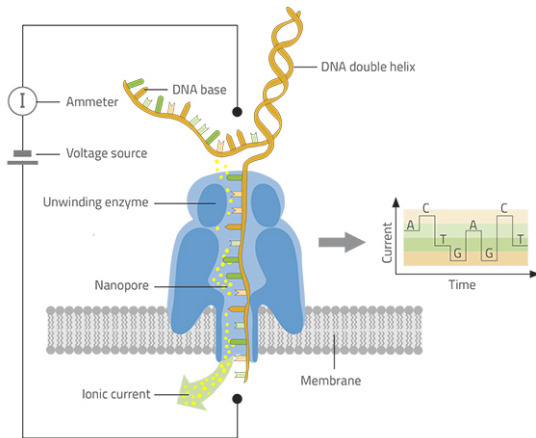
3rd Generation



Oxford Nanopore MinION



Pacific Biosciences RSII

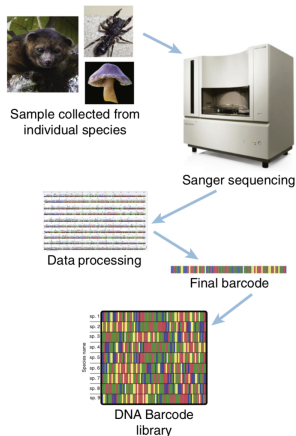


Kerstin Goepfrich (www.scienceinschool.org)

Método standard: DNA Barcoding

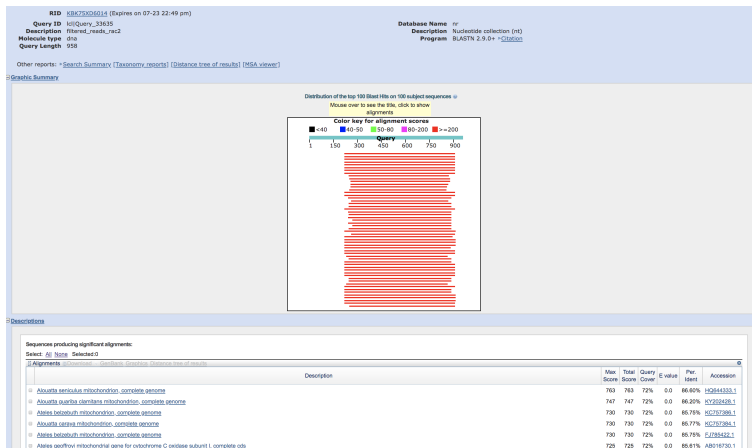
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Kress et al. 2015 *Trends in Ecology and Evolution*

Comparação da sequencia com sequencias-tipo de uma base de dados Matching the sequence against a database



Barcoding de DNA de elevado rendimento

High-throughput DNA-barcoding

- Analisar em conjunto centenas a milhares de amostras
Multiplexing of hundreds to thousands of samples

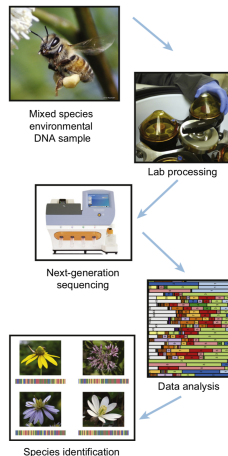
Metabarcoding e DNA ambiental (eDNA)

Metabarcoding and environmental DNA (eDNA)

- Amostras de comunidades (conjuntos de espécies)
Community samples (species pools)
- Amostras de solo, de água, de estômago
Soil, Water and Stomach samples

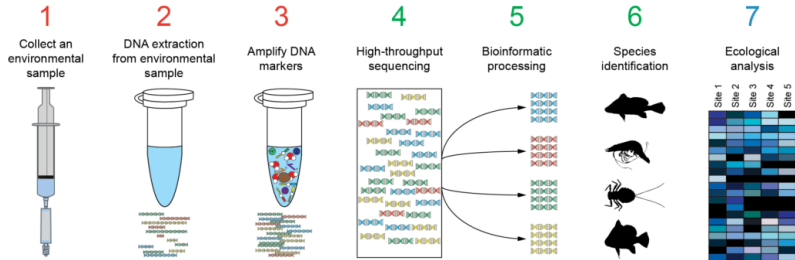
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- Monitorização de Espécies Invasivas ou Espécies Ameaçadas
Monitoring of Invasive or Endangered species
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Biodiversity assessment/inventory
- Detecção de Pestes
Pest detection



Kress et al. 2015 *Trends in Ecology and Evolution*

Metabarcoding



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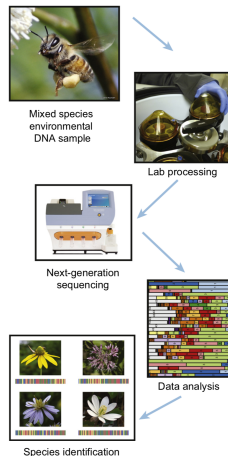
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Metabarcoding

