

Conservation Genetics in the Tropics

Mitochondrial DNA

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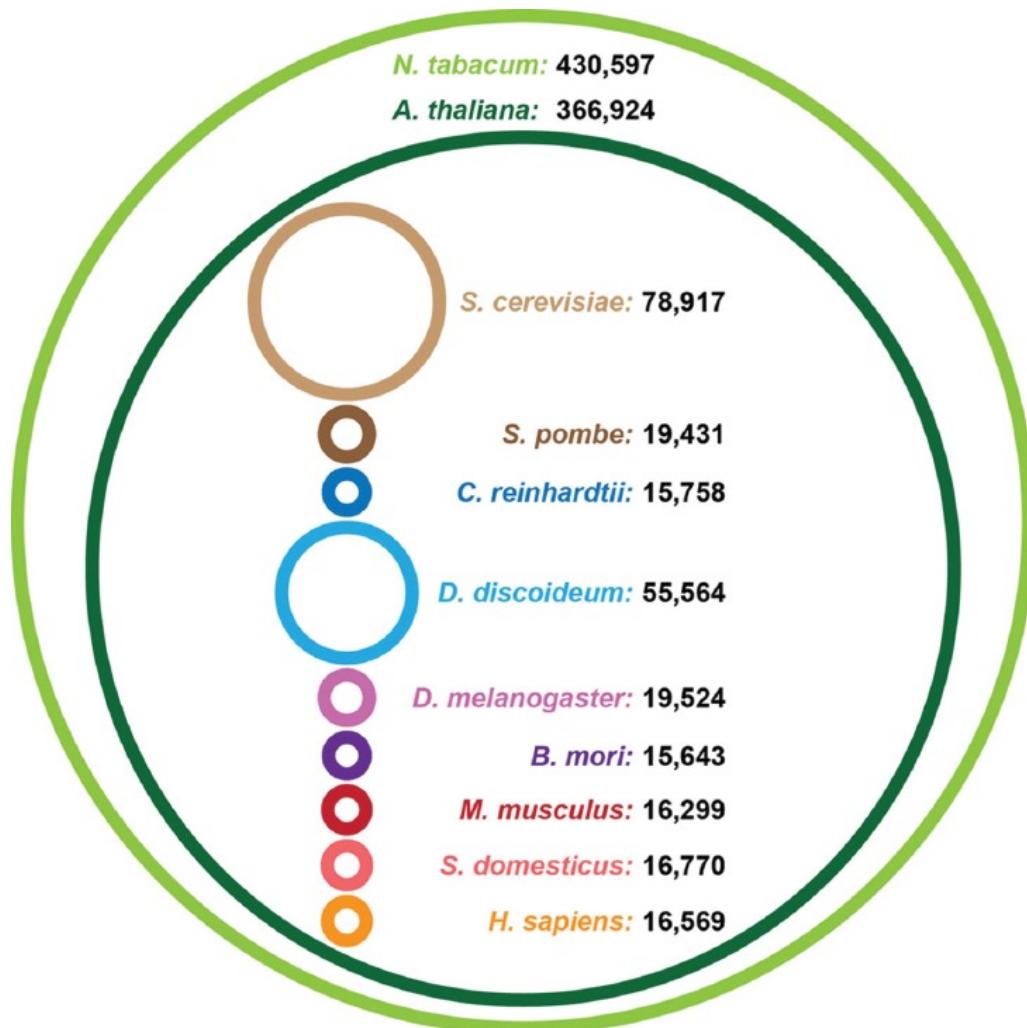
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mitochondrial DNA

- maternally inherited
- high copy number per nuclear genome
- high mutation rates
- no recombination
- no introns
- circular

Structure of mitogenomes

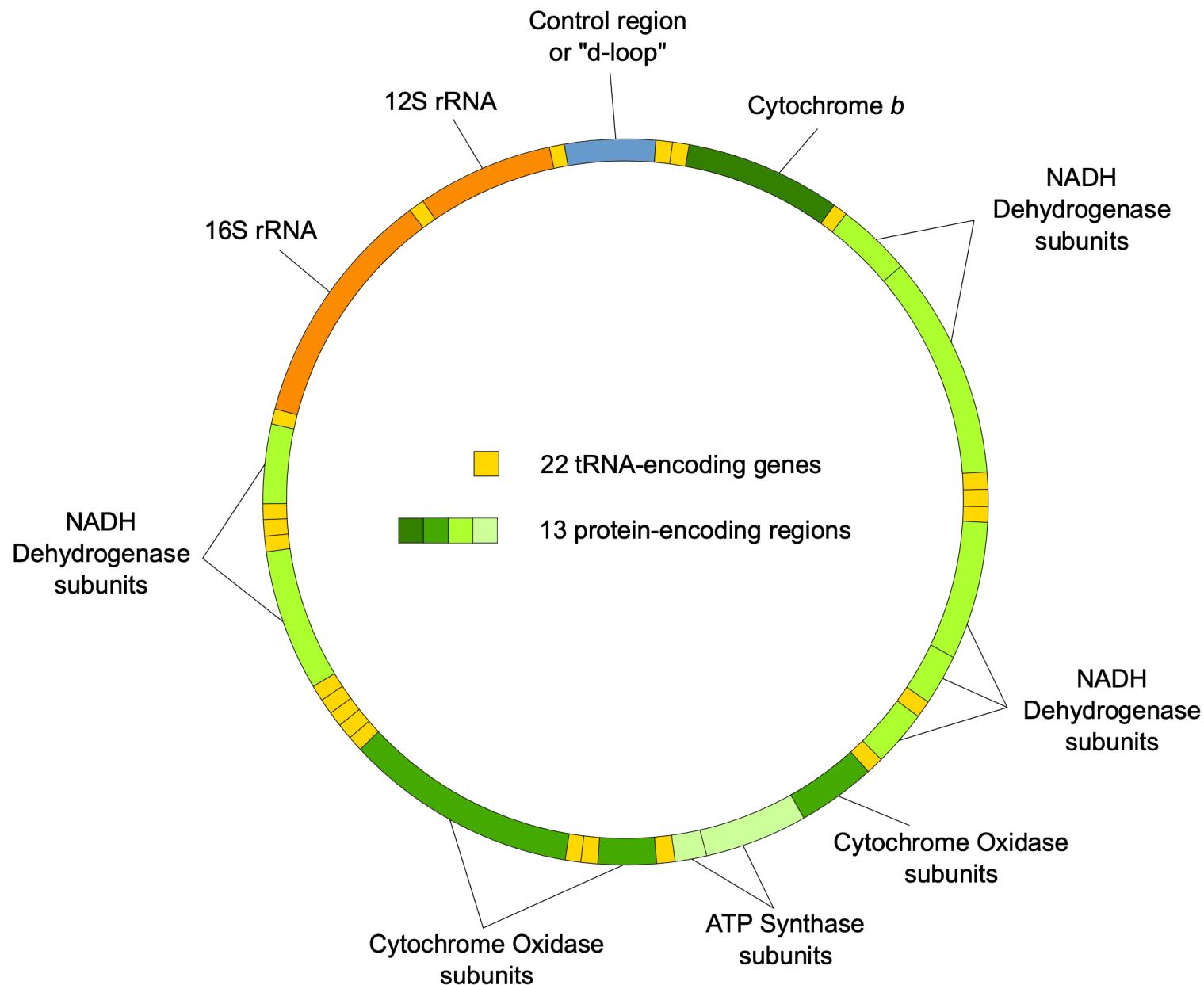


[doi: 10.2741/4531](https://doi.org/10.2741/4531)

doi: 10.1134/S0006297912130020

Kingdom	Introns	Size	Shape
Animal	No	11–28 kbp	Circular
Fungi, Plant, Protista	Yes	19–1000 kbp	Circular
Fungi, Plant, Protista	No	20–1000 kbp	Circular
Protista	No	1–200 kbp	Circular
Fungi, Plant, Protista	No	1–200 kbp	Linear
Protista	No	1–200 kbp	Linear

Structure of mitogenomes



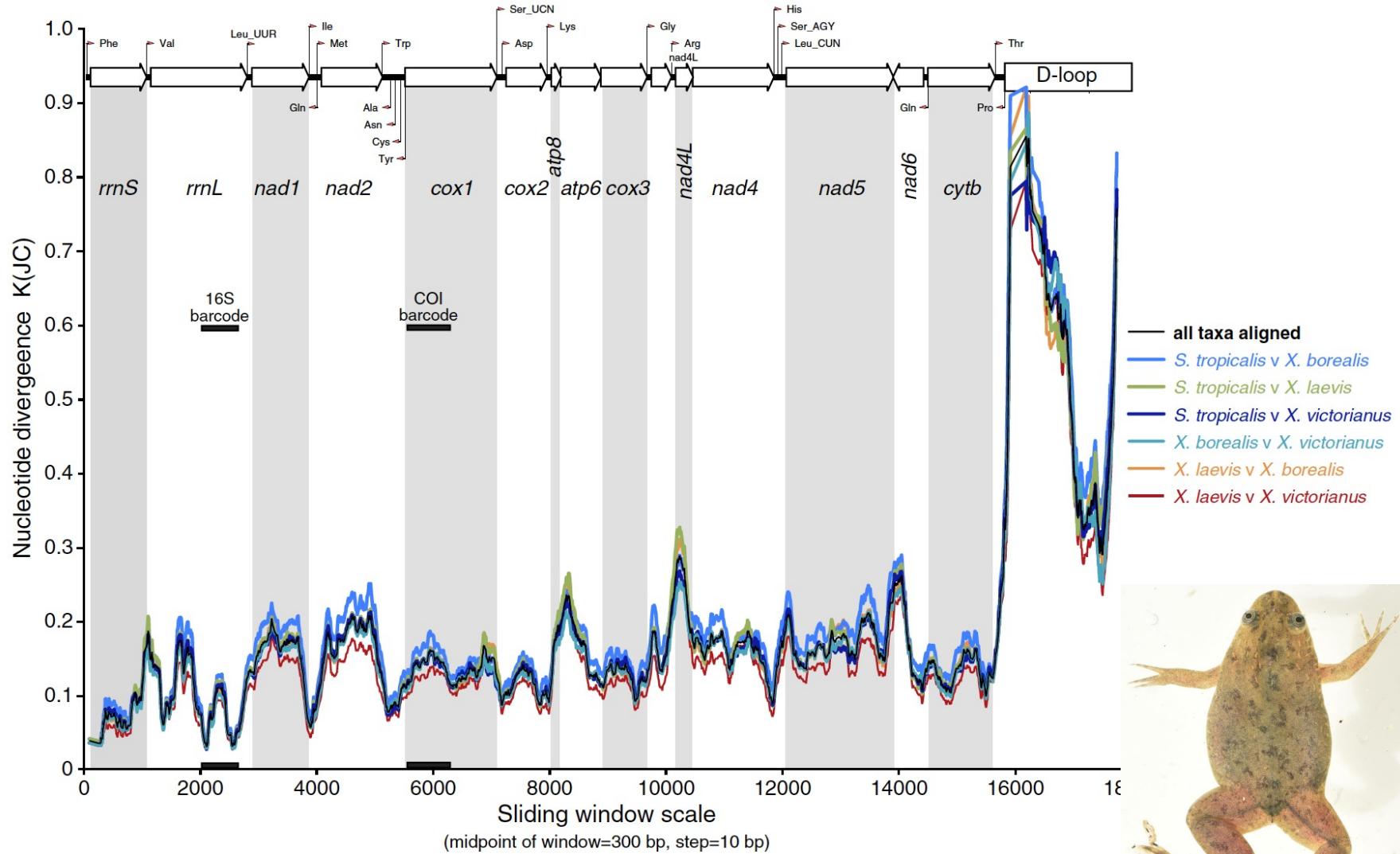
Cytochrome b

ATGAATYGGRRGMCAACCAAGTAGAACAYCCATTYATYATYATYGG
CTGAATCGGC GGACAACCAAGTTGAATA TCCATT CGTAATCATCGG
CTGAATTGGAGGCCAACCAAGTTGAACATCCATT TGTAATTATTGG
TTGAATCGGAGGGCAACCAAGTTGAACACCCATT CGTAATTATCGG
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ATGAATTGGAGGGACAGCCAGTAGAACACCCATT TATCATTATGG
ATGAATTGGAGGCCAACCAAGTAGAACATCCCTT CATTATCATCGG
ATGAATTGGGGGGCCAACCAAGTAGAACACCCATT TATTATATTGG
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ATGAATCGGAGGCCAACCAAGTAGAACACCCATT TATCATTATGG



Control region

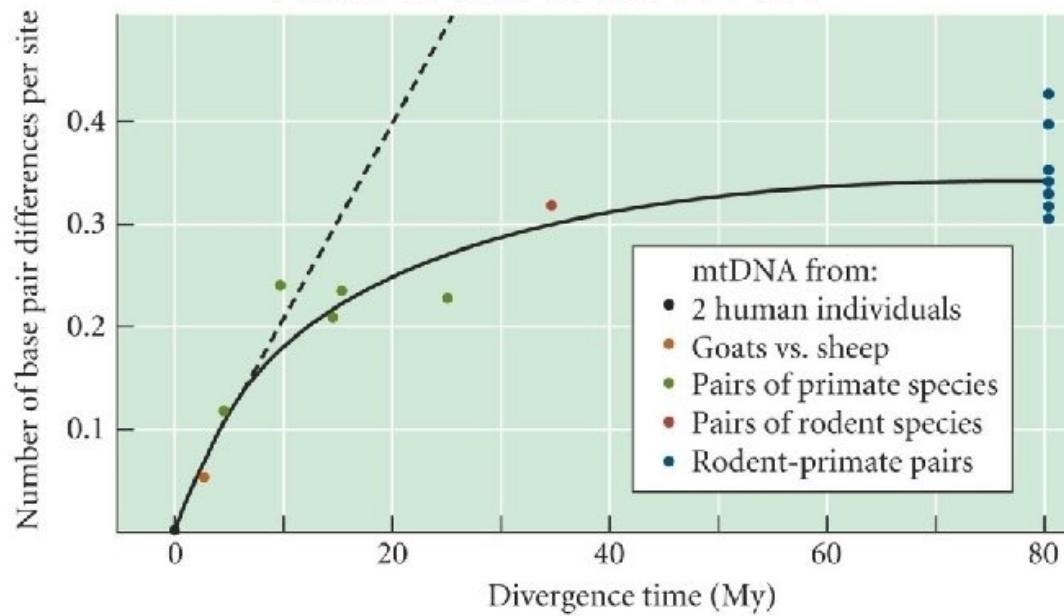
JHYWHMAYAACATGRMTATTNYYYDMWTACATTAADAT-AATGYT
CTTCTCCCACATGAATATTCAAGGACTTACATTAAATT AATGATC
TATACCCCTCATGTCTATCAAACACATACA - TAAAATT AATGTA
CTACTACAACATGTCTATTAAAC-CATACA - TAACAAT AATGAT-
ATACTACAACATGTATATTATT - TAATACA - TTAAATT AATGCTT
TTACCACAAACATGAATATTATC-TATACA - TTAAATC AATGCTC
ACACCCATACATGAATATTATCATAAATACA - TTAAATC AATGTTT
TCATAACCACATGAATATT - CTTTAATACATTAAATAT - AATGCTT
CCACAATAACATGAATATT - CTCATAACATTAAAAT - AATGTTTC
TTAACCAACATGAATATT - CTTTCATACATTAAAGAT - AATGTTT
CCAACCTAACATGAATATT - CTTTCATACATTAAAAT - AATGTTT
TCACAACAAACATGTCTACT - CTCAAATACATTAAAGAT - AATGCTT



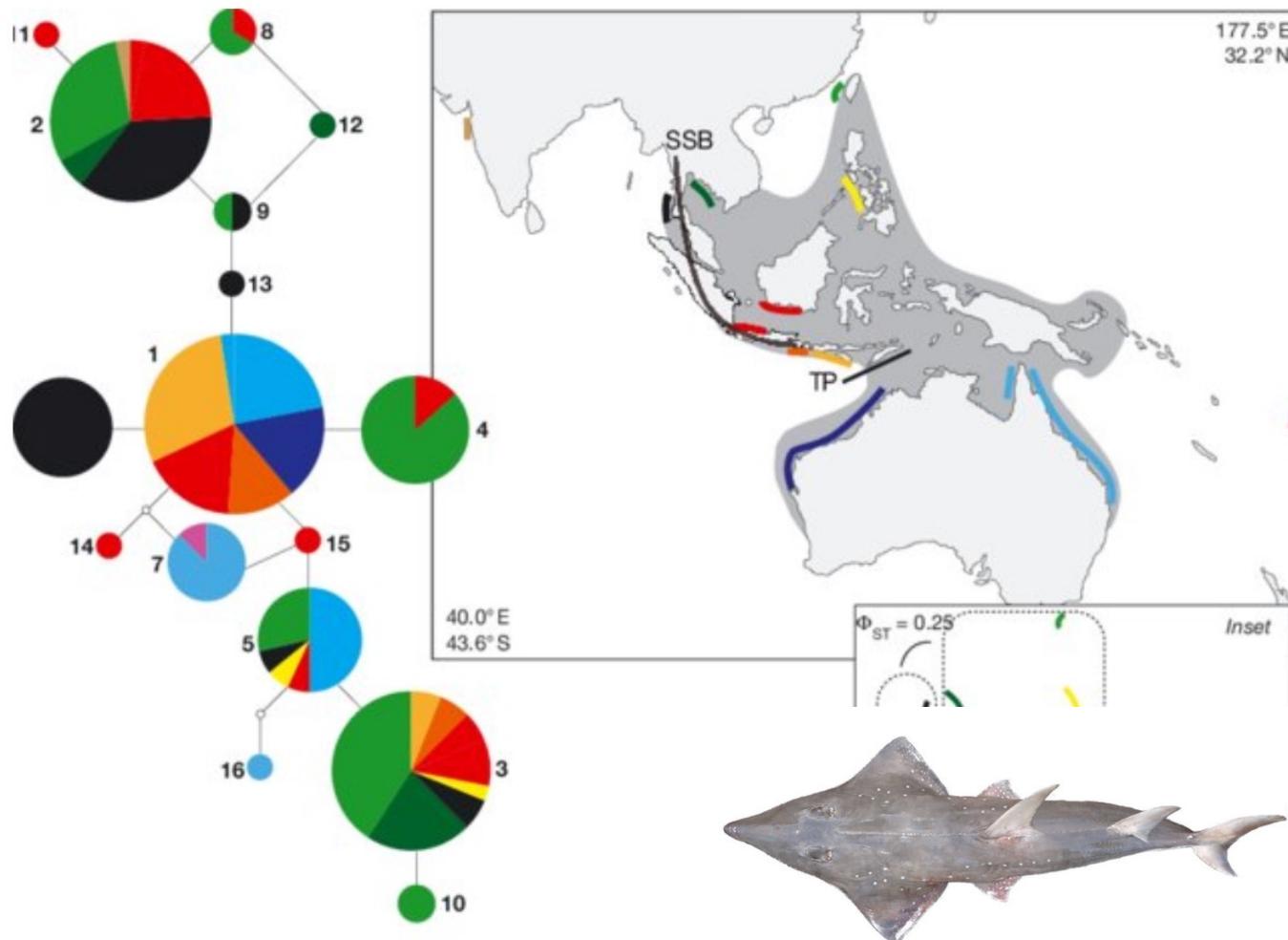
(doi:10.1186/1471-2164-13-496)



Saturation: mammalian mitochondrial DNA

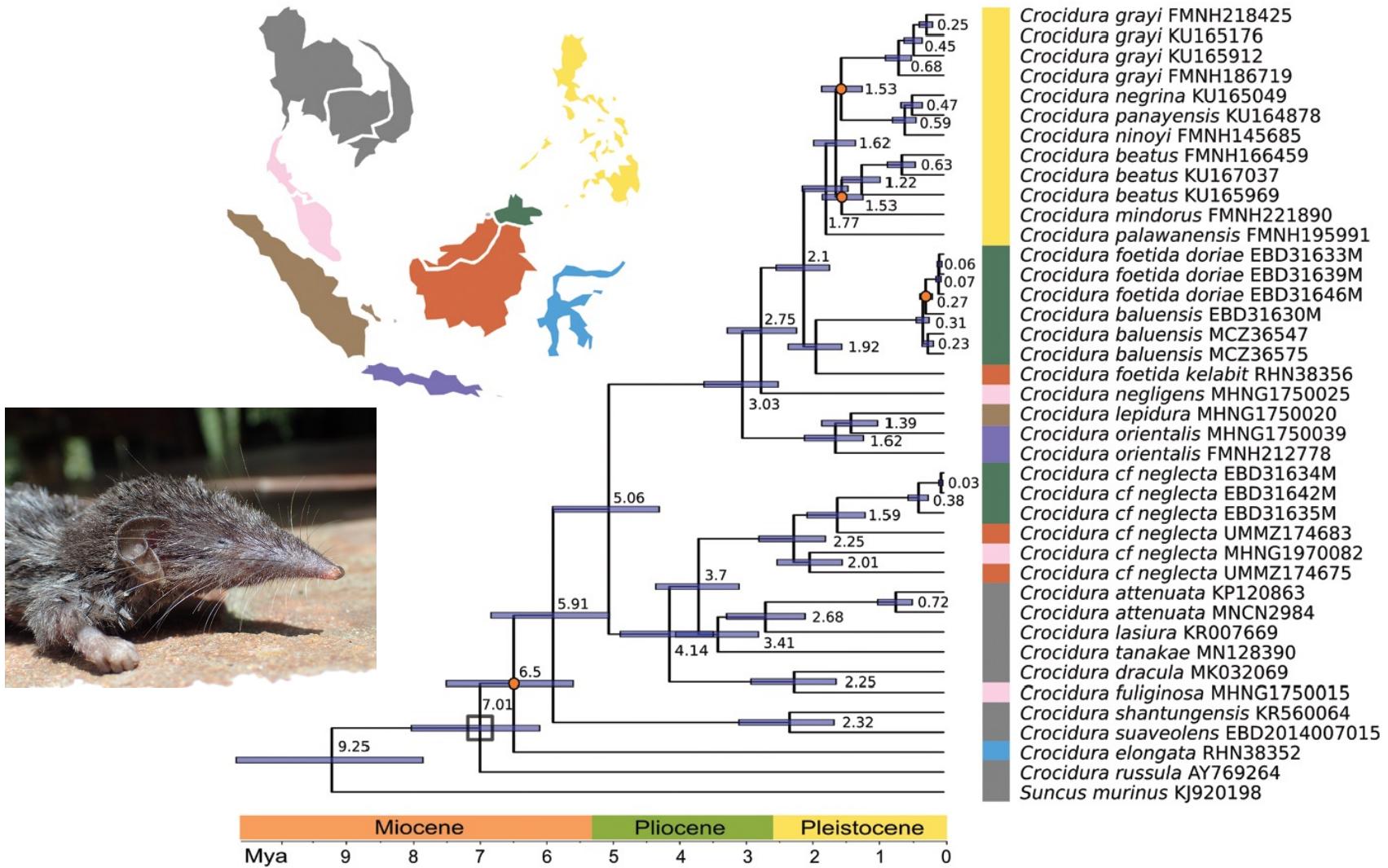


Control region: high genetic diversity -> phylogeography



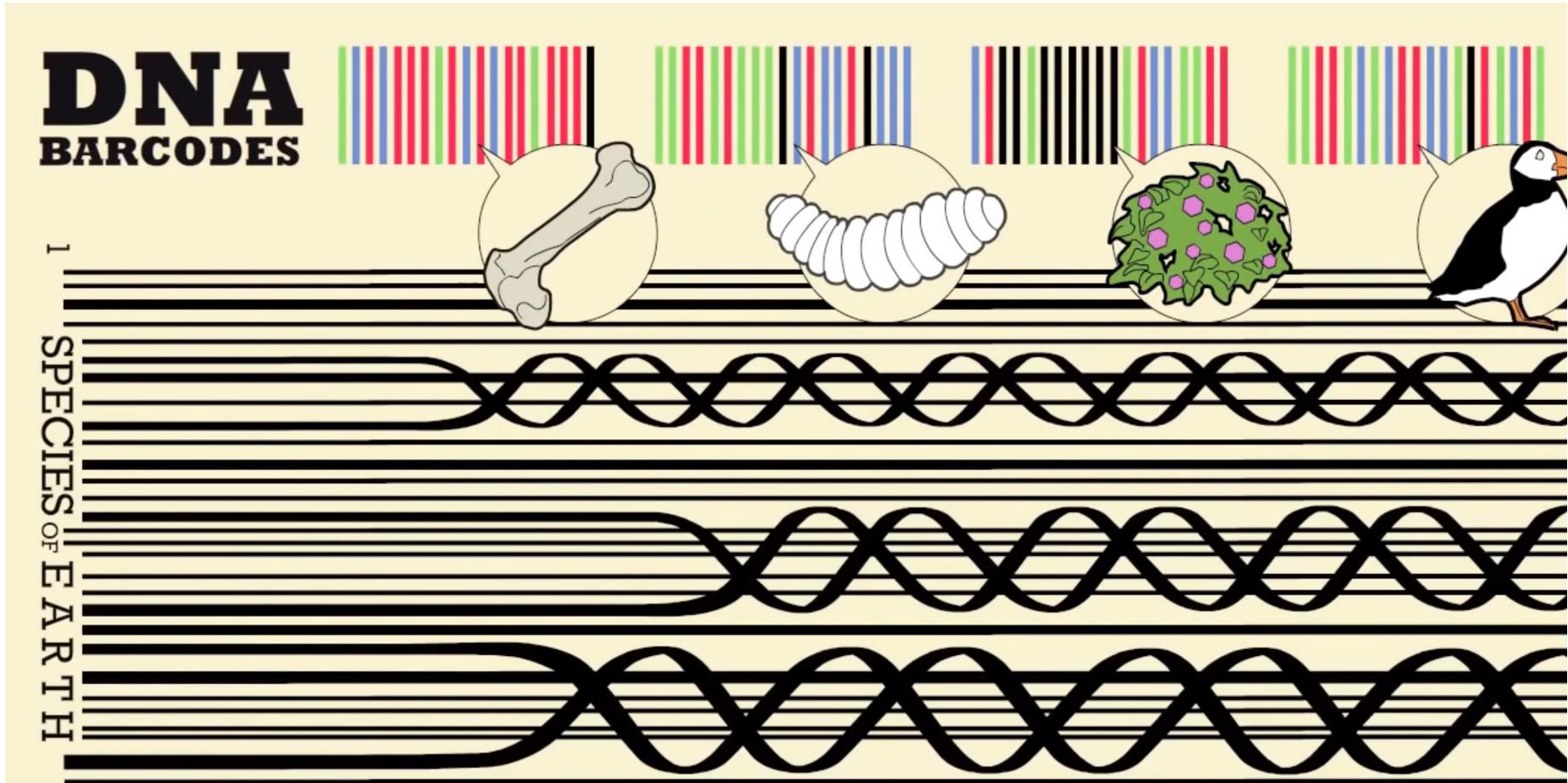
[10.3354/meps11617](https://doi.org/10.3354/meps11617)

Phylogenetics



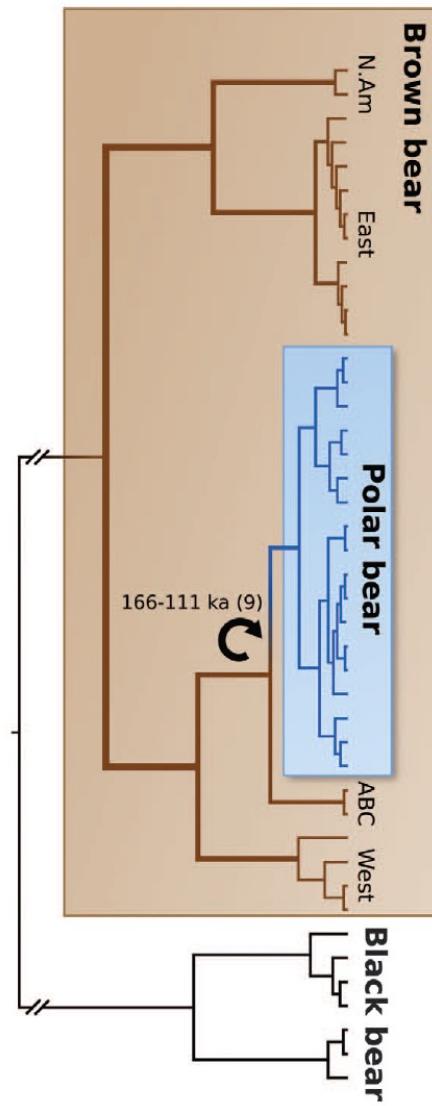
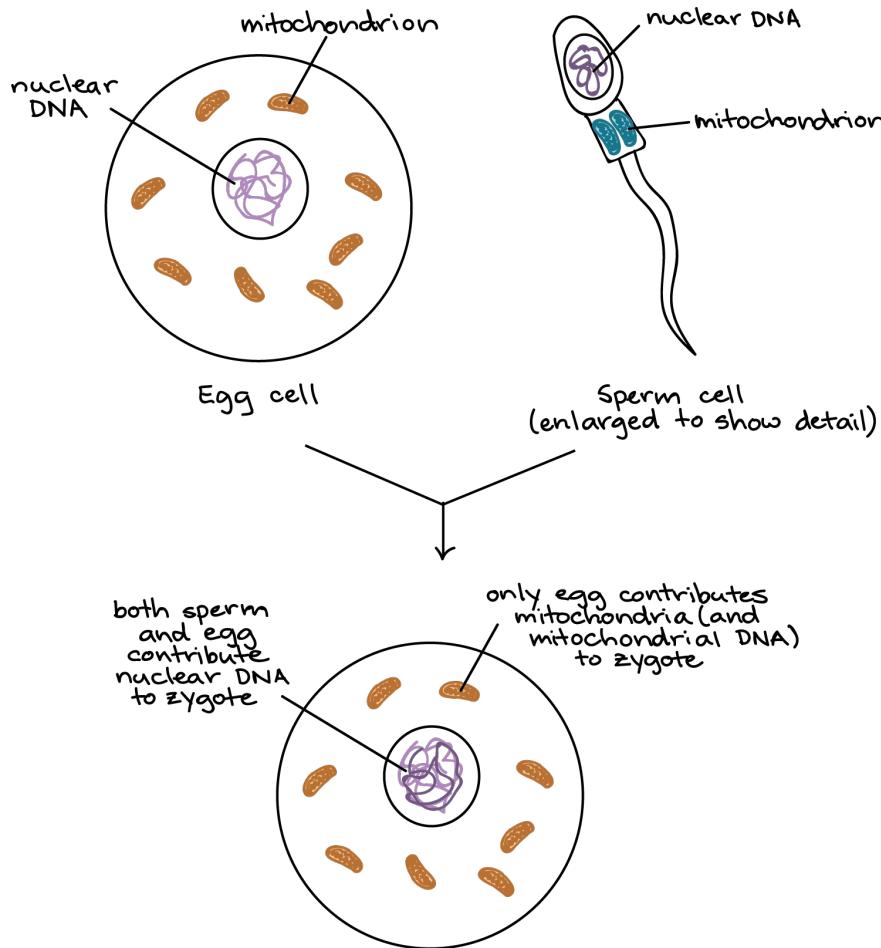
[10.1101/zoolinnaean/zlab045](https://doi.org/10.1101/zoolinnaean/zlab045)

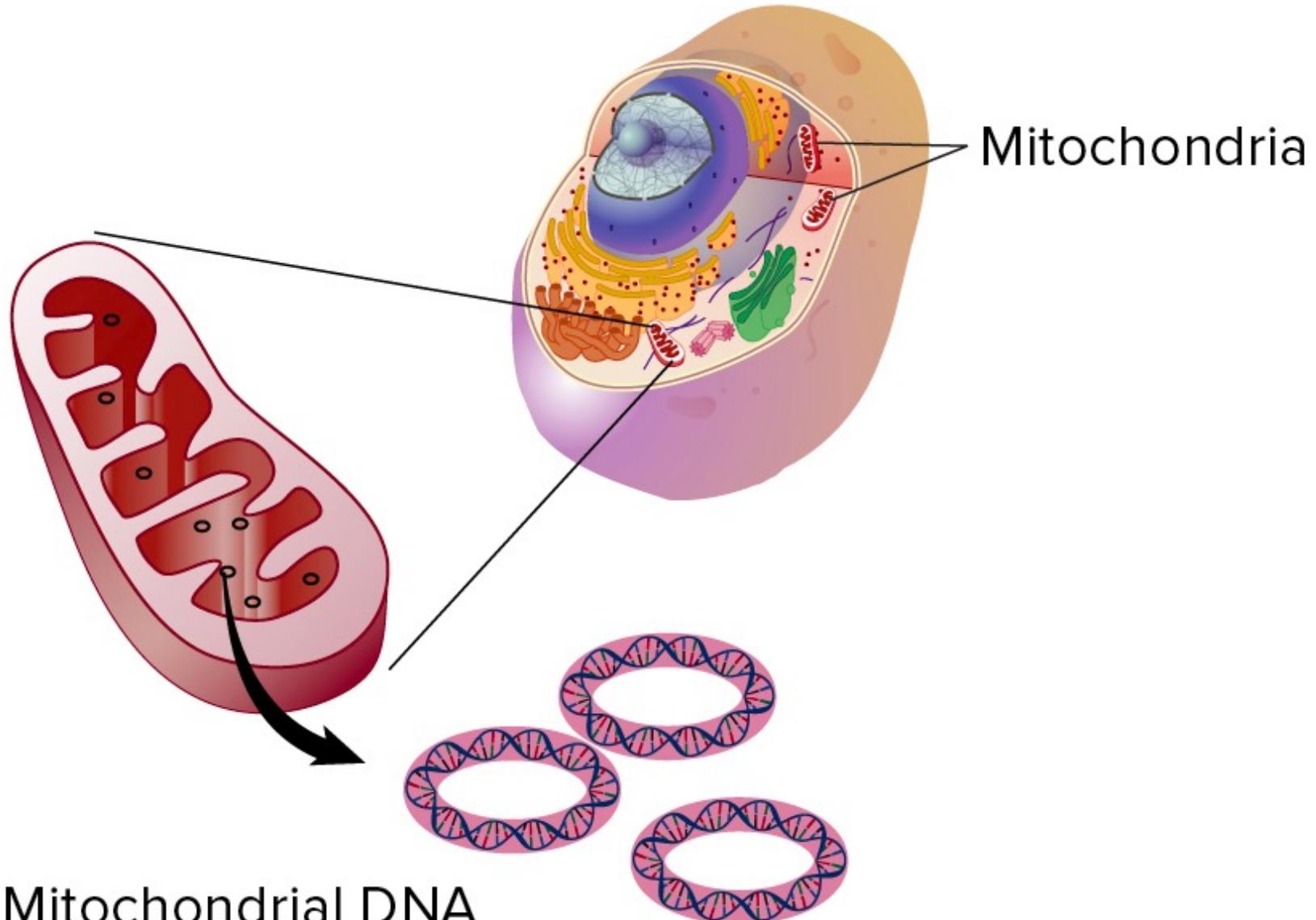
Barcode: COI



eg BOLD: The Barcode of Life Data System (www.barcodinglife.org)
doi: 10.1111/j.1471-8286.2006.01678.x

Maternal inheritance





Degraded or low concentrated DNA



Summary

- maternally inherited -> **sex-biased patterns**
- high copy number per nuclear genome -> **easy to study**
- high mutation rates -> **good for phylogeography / fast saturation**
- no recombination -> **linked markers**
- circular (one molecule) -> **linked markers**
- **Single-copy and homology between taxa: large comparable datasets.**

phylogeography: study of the spatial arrangements of genealogical lineages within conspecific populations (Avise 2000).

But: **limited utility for describing patterns of gene flow between populations within species and describing units of conservation.**

(Allendorf 2017; [10.1111/mec.13948](https://doi.org/10.1111/mec.13948))

Further readings:

