

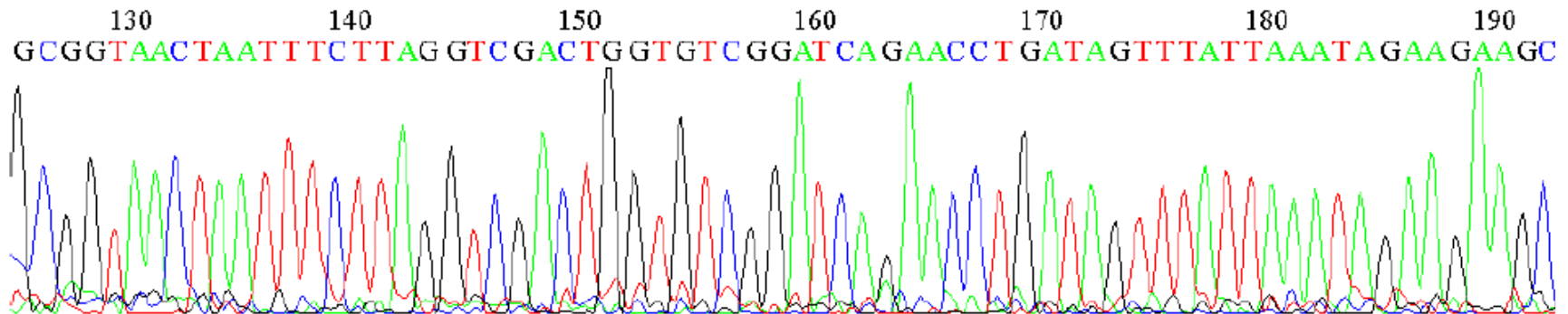
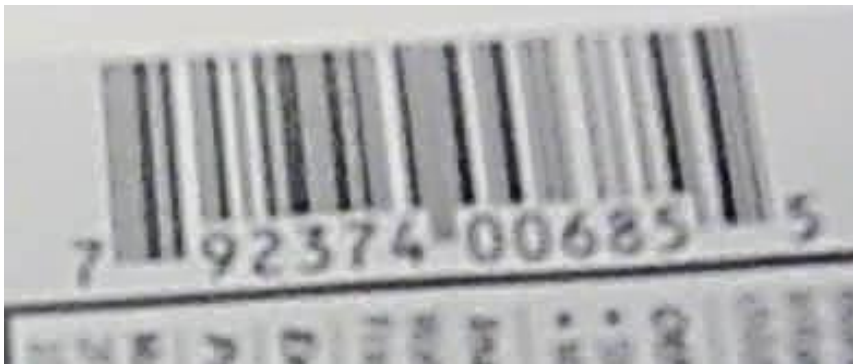
Beware of Bogus Barcodes!

Dr. David Campbell



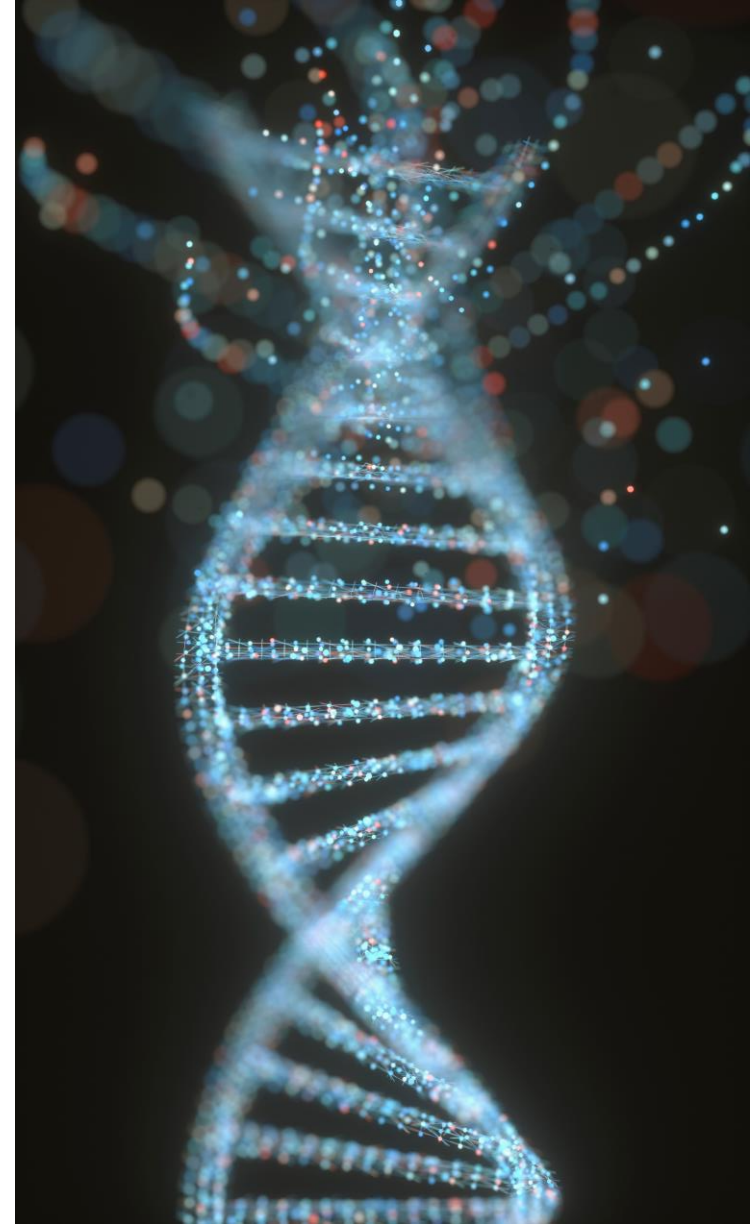
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Just as a UPC barcode is a familiar feature at stores, certain DNA sequences have been proposed as a barcode for living organisms



Advantages

- Everything has DNA
- No technical knowledge of features needed – just compare strings of A, G, C, T
- Much automation possible
- Environmental samples contain DNA
- Help with poorly studied areas, like here



Problems

- Everything else has DNA, too
- Reported dinosaur DNA was human
- Reported tree DNA was fungus
- Reported clam DNA was bacteria

It looks like a lizard, but my barcoder says it's a human



Misidentification

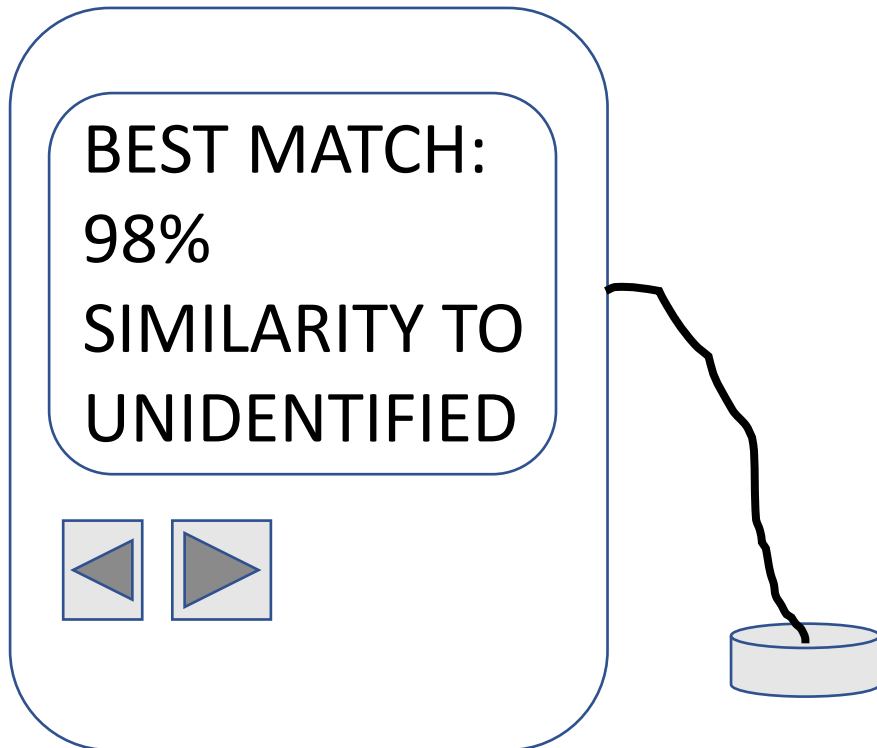
- DNA samples taken here would not give accurate relationships of cats

(photo
circulating
online)



Problems

- Accurate reference data
 - Someone who knows how to identify things has to have sampled previously
- Mysteries



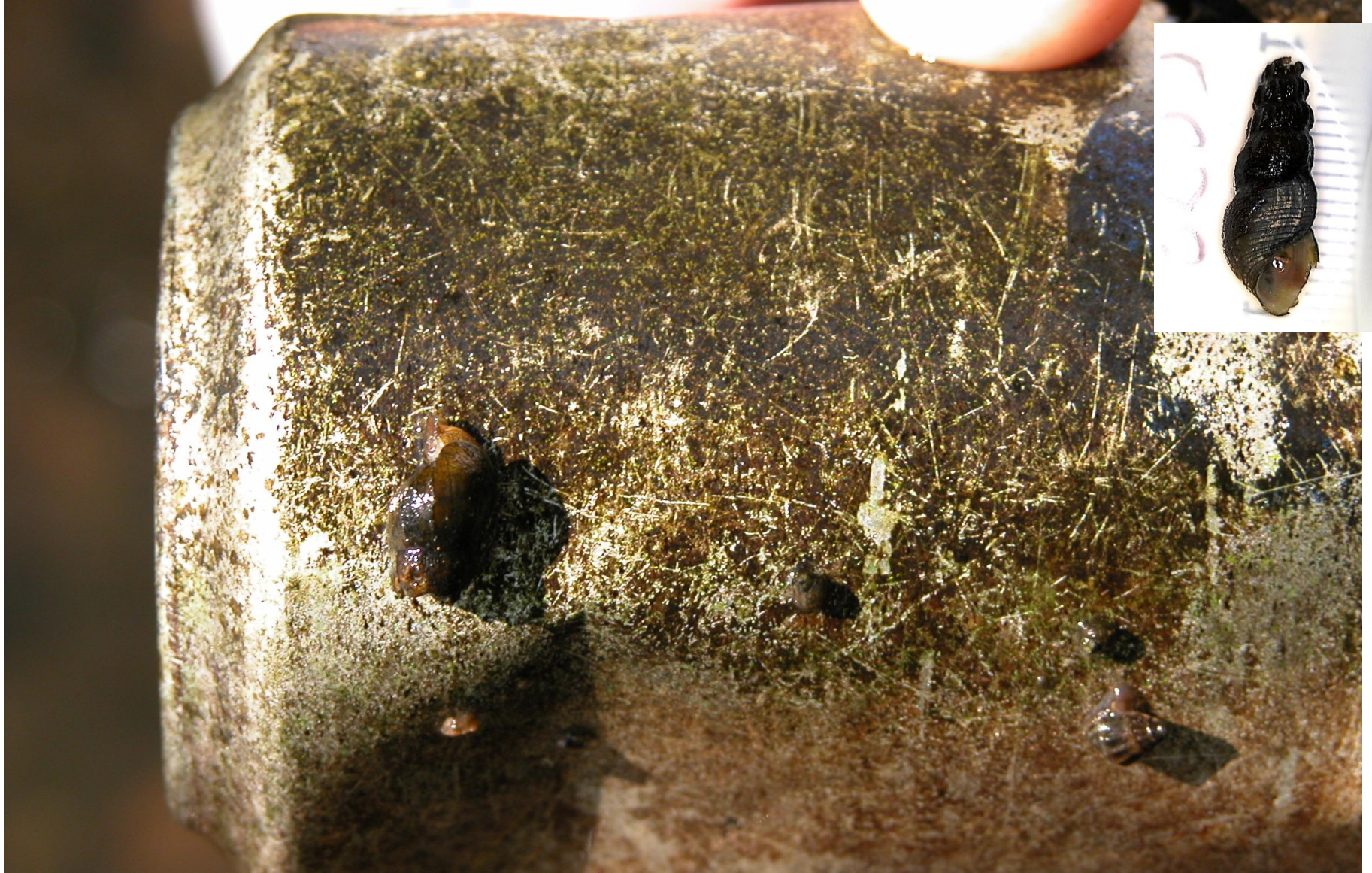
The DNA says that the bacteria in our sample resemble an unknown bacterium found on someone's skin

Problems

- “Barcode” DNA not always reliable
- Different organisms have different levels of variation in different areas of DNA: change too fast or too slow
- Pseudogenes
- Unknown causes

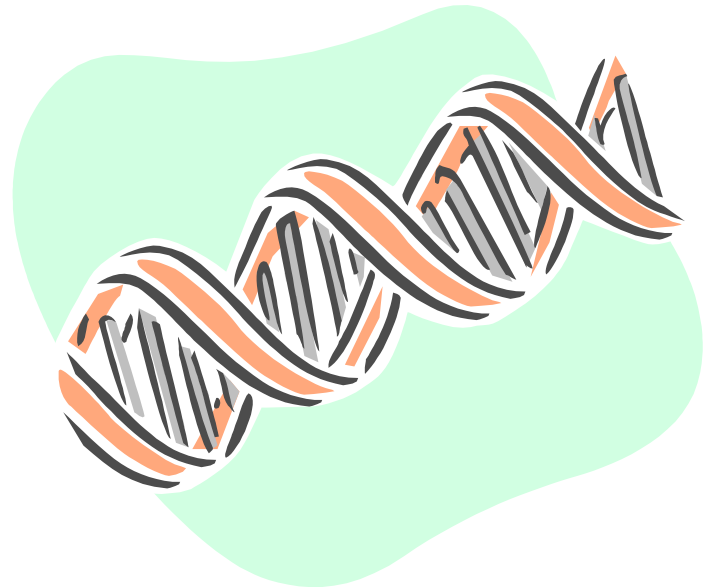


Pleurocerid and semisulcospirid snails: variability

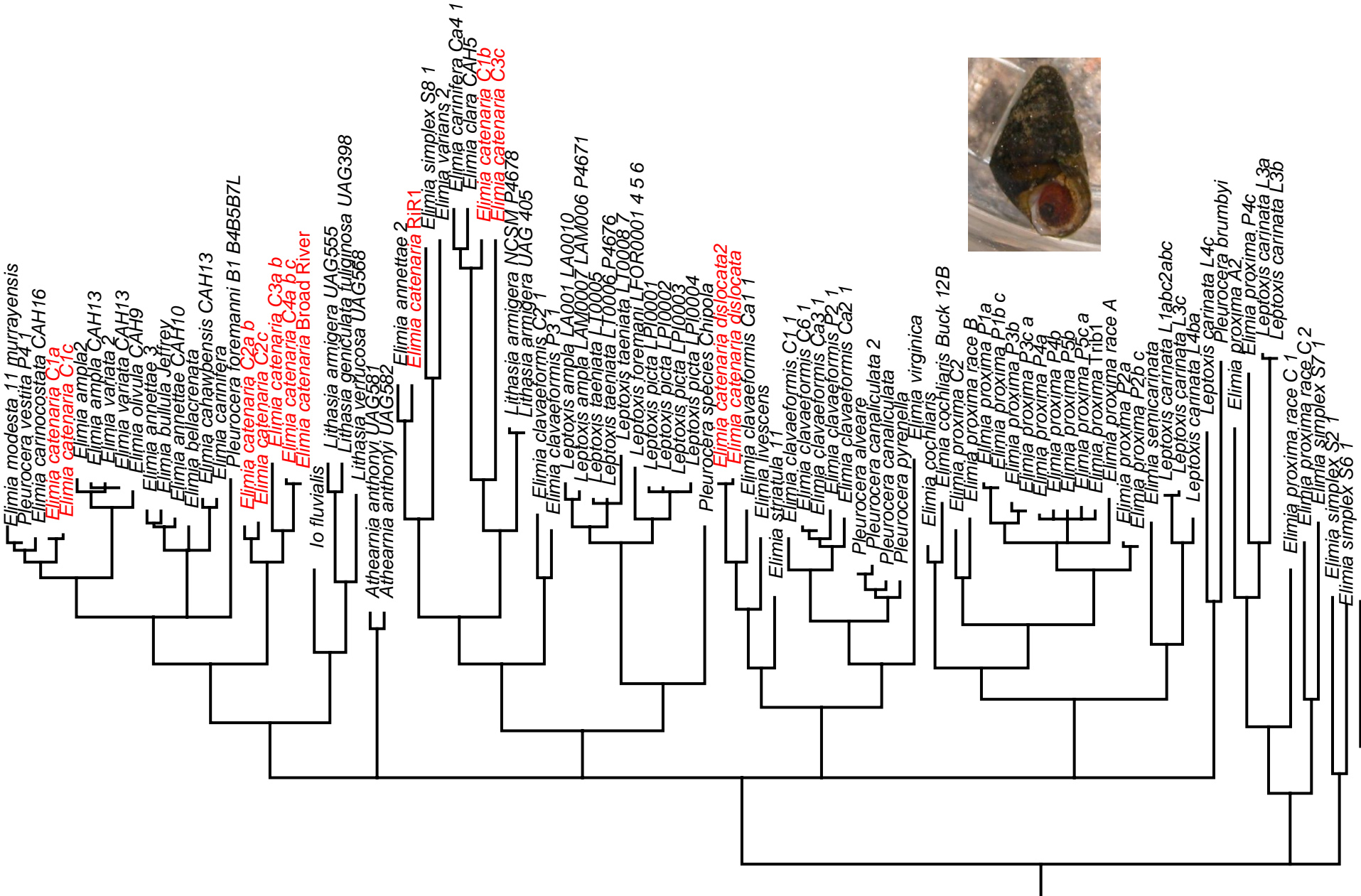


Extensive problems with unusual DNA sequences

- Many endangered species, species differences poorly understood – how to identify?

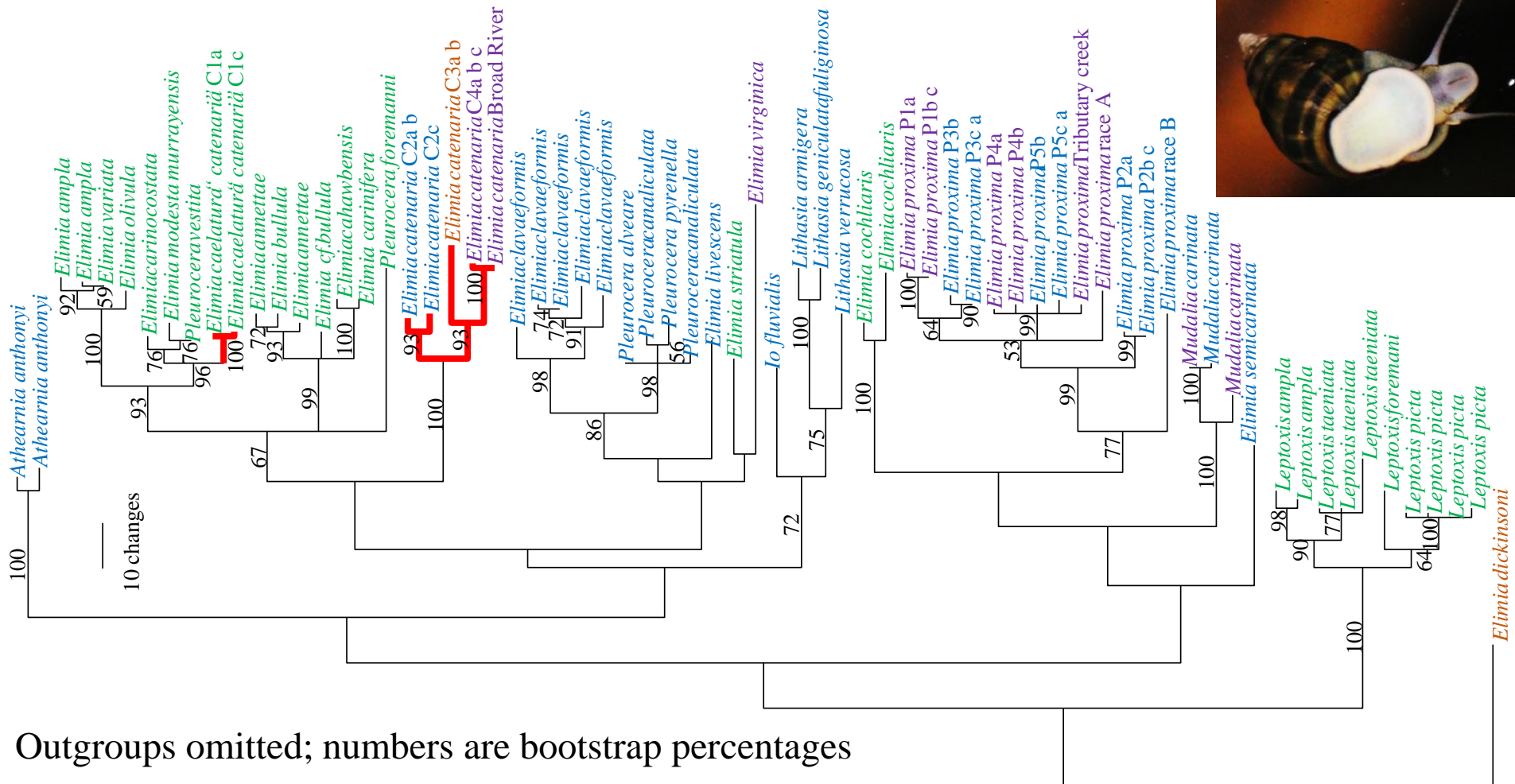


“Elimia catenaria” in several places in the tree. Cryptic species? High variation in few species? Longer branch = more different DNA



Horn Snails, E. North America, divergent protein sequences excluded:
much better geographic and morphological sense. *E. catenaria* forms a
single group plus one misidentification. Headwater forms cross divides

Blue=Tennessee, Ohio River systems Green=Mobile Orange=Chipola,
Chattahoochee Purple=Atlantic Mixed=same DNA from 2 places



Further work

- Analyses of multiple genes highlight problems with the “barcode” approach in these snails
- But the “barcode” sequences show some valid patterns

Other Problems

- Challenges of practical application
 - Environmental duration
 - Getting DNA into the barcoder

What kind of bear is that?

Go poke it with your barcoder and find out!



Summary

- Everybody having a barcoder unlikely
- Molecular ID useful, but requires error-checking and identification experts to verify information

Acknowledgements

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