How cryptic is cryptic diversity? Machine learning approaches to fine scale variation in the morphology of *Emys marmorata*.

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May 2, 2013

Cryptic diversity

Emys marmorata

Morphological hypotheses

Phylogenetic hypotheses

Methods: morphometrics

- plastral ("belly") shape
- landmarks averaged across bilat axis
- total 13 landmarks, 7 on bilat axis, 6 off
- geographic information known/inferred

idealized plastral landmarks

Methods: unsupervised learning

Methods: supervised learning

Results: mophometrics

Results: gap clustering

Results: d-EAC

Results: multinomial logistic regression

Results: neural networks

Results: random forests

Best classification scheme

Future

Acknowledgements

- Ben Frable, Dallas Krentzel, Michael Foote
- COLLECTIONS