The body size, functional ecology, lithological affinity, and macroevolution

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Collaborators

- Matt Knope, ecology data
- History of Life interns, body size measurements
- Jon Payne & Shanan Peters
- Stanford School of Earth, Energy & Environmental Sciences



ESCALATION AND EXTINCTION SELECTIVITY: MORPHOLOGY VERSUS ISOTOPIC RECONSTRUCTION OF BIVALVE METABOLISM

GREGORY P. DIETL,¹ PATRICIA H. KELLEY,² REESE BARRICK,^{3,4} AND WILLIAM SHOWERS^{3,5}

 E_{2Def} Extinction selectivity and ecology in planktonic foraminifera

Richard D. Norris

Woods Hole Oceanographic Institution, Woods

Selectivity of End-Cretaceous Marine Bivalve Extinctions

David Jablonski* and David M. Raup

Environmental determinants of extinction selectivity in the fossil record

Shanan E. Peters¹ Extinction selectivity and ecology of

Neogene Caribbean reef corals

Kenneth G. Johnson,

³Departm

Direct and indirect effects of biological factors on extinction risk in fossil bivalves

Paul G. Harnik1Acidification, anoxia, and extinction: A multiple logistic regressionDepartment of Geolanalysis of extinction selectivity during the Middle and Late Permian

Matthew E. Clapham^{1*} and Jonathan L. Payne^{2*}

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Epicontinental Seas Versus Open-Ocean Settings: The Kinetics of Mass Extinction and Origination

Arnold I. Miller¹* and Michael Foote²





Polishchuk (2010)









Body Size





Bush et al. (2007)



Bush et al. (2007)



Feeding: Mean Biovolume





surfical/pelagic : infaunal motile : attached predator : non-pred.



Fossils & Lithology



Peters & Heim (2010)

Clastic & Carbonate



Macrostratigraphy



Peters (2008)

Lithological Affinity





probability of extinction: $q = 3 \div 8 = 0.375$



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probability of extinction: $q = 3 \div 8 = 0.375$ probability of survival: p = 1 - q = 0.625odds of extinction: $q \div p = 0.375 \div 0.625 = 0.6$

probability of extinction: $q = 3 \div 8 = 0.375$ probability of survival: p = 1 - q = 0.625odds of extinction: $q \div p = 0.375 \div 0.625 = 0.6$ log-odds of extinction: $\ln(0.6) = -0.51$

Logistic Regression



Logistic Regression











Extinction ~ Size + Carbonate + Predator + Surficial Origination ~ Size + Carbonate + Predator + Surficial











Conclusions

- Multiple logistic regression is a simple, straightforward method for assessing risk associated with multiple factors
- Relatively little selectivity for size + tiering
- Carbonate-associated taxa have increased extinction risk and decreased odds of origination during the post-Jurassic
- Predators show consistent selectivity for extinction and origination, reflecting high turnover