

**GLY 535 STRATIGRAPHIC PALEONTOLOGY  
SPRING 2009**

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Welcome to GLY 535! This course will focus on the stratigraphic context of fossils, the principles of biostratigraphy, and applications of these principles to stratigraphic problems. A seminar format will be used, involving discussion of readings from the published biostratigraphic literature, interspersed with some hands-on/lab activities. Additional required activities include participation in UNCW's student conference, "Darwin's Legacy: Evolution's Impact on Science and Culture," and a field trip that will allow us to apply the concepts discussed in class.

**READINGS:**

No suitable textbook for this course is currently in print. Instead, we will use readings from the primary literature published in a variety of books and journals. Selections will include both "classical" papers on biostratigraphy as well as recently published materials.

**COURSE REQUIREMENTS AND GRADING POLICY:**

Regular attendance and participation in class discussion is expected in this course. Students should read in advance and be prepared to discuss the materials assigned for each class session. Grading will be based on participation in the class discussions, a midterm and final examination, and various writing assignments and in-class exercises. Note: The UNCW Academic Honesty Policy will be adhered to in this course (see Student Handbook).

Grading:	midterm exam:	30% [take-home]
	final exam:	30% [take-home]
	writing/lab assignments:	20%
	class participation:	20%
	(includes oral presentation on quantitative methods)	

**FACULTY OFFICE HOURS:** On campus (DeLoach Hall 117) M 8:00-1:00, W 8:00 – 10:00, 1:00-3:00; other times by appointment (possibly at CMS).

**TENTATIVE SCHEDULE OF CLASS SESSIONS:**

Jan.	7	Introduction
	14	Historical Development of Stratigraphic Paleontology
	21	Review of Stratigraphic Nomenclature and Stratigraphic Codes
	28	Stratigraphic Codes (Applications)
Feb.	4	Geological Basis of Biostratigraphy: facies, sedimentation, stratigraphic completeness
	11	Geological Basis: taphonomy
	18	Biological Basis of Biostratigraphy: rates and modes of evolution

- 25 Biological Basis: coordinated stasis  
**Distribute TAKE-HOME MIDTERM (DUE DATE?)**
- Mar. 4 Biological Basis: paleoecology
- 11 SPRING BREAK/SEGSA**
- 18 Biological Basis: biogeography  
**19-21 “Darwin's Legacy: Evolution's Impact on Science and Culture”  
(WRITING ASSIGNMENT DUE DATE?)**
- 25 Graphic Correlation
- Apr. 1 Event Stratigraphy?
- 8 prep for Quantitative Methods?
- 15 Quantitative Methods **PRESENTATIONS?**
- 22 **FIELD TRIP; distribute TAKE-HOME FINAL**

**TAKE-HOME FINAL EXAMINATION DUE BY 11:00 A.M., MONDAY 5/4**

**READING LIST:**

**Historical Development of Stratigraphic Paleontology – 1/14**

- Hancock, J.M. 1977. The historic development of biostratigraphic correlation, p. 3-22, *in* E.G. Kauffman and J.E. Hazel (eds) Concepts and Methods of Biostratigraphy. Dowden, Hutchinson & Ross, Inc., Stroudsburg, PA.
- Mather, K.F. and S.L. Mason. 1970. A Source Book in Geology, 1400-1900. Harvard University Press, Cambridge, MA. Read selections by:
- Guettard, Map Showing the Rocks that Traverse France and England (p. 77-78)
  - Cuvier, Revolutions and Catastrophes in the History of the Earth (p. 188-193)
  - Cuvier and Brongniart, Stratigraphy of the Paris Basin (p. 194-200)
  - Smith, The Strata of England (p.201-204)
  - Lyell, Uniformitarianism; Subdivisions of the Tertiary Epoch (p. 263-273)

**Stratigraphic Nomenclature and Codes**

- **Review of Stratigraphic Nomenclature and Codes – 1/21**  
North American Commission on Stratigraphic Nomenclature. 2005. North American Stratigraphic Code. American Association of Petroleum Geologists Bulletin 89(11):1547-1591. Focus on Articles 48-54. <http://ngmdb.usgs.gov/Info/NACSN/Code2/code2.html>
- Murphy, M.A. and A. Salvador. International Stratigraphic Guide - An abridged version. International Subcommittee on Stratigraphic Classification of IUGS, International Commission on Stratigraphy. Skim; focus on chapters 1, 2, 7 and 10. [www.stratigraphy.org/guide.htm](http://www.stratigraphy.org/guide.htm)
- **Stratigraphic Codes (applications) – 1/28**  
Ernst, G. and E. Seibertz. 1977. Concepts and methods of echinoid biostratigraphy, p. 541-563, *in* Kauffman and Hazel.

- Berry, W.B.N., 1977. Graptolite Biostratigraphy: A Wedding of Classical Principles and Current Concepts, p. 321-338, *in* Kauffman and Hazel.
- Johnson, D.A. and C.A. Nigrini 1985. Time-transgressive late Cenozoic radiolarian events of the equatorial Indo-Pacific. *Science* 230:538-541.

### Geological Basis of Biostratigraphy

- ***Facies, sedimentation, and stratigraphic completeness*** – 2/4  
 Ager, D.V. 1993. The Nature of the Stratigraphical Record (3<sup>rd</sup> ed.). John Wiley & Sons, Chichester. Read chapters 3-6, p.43-97.  
 Holland, S.M., 1995. The stratigraphic distribution of fossils. *Paleobiology* 21(1):92-109.  
 Peters, S.E. 2008. Macrostratigraphy and Its Promise for Paleobiology, p. 205 -232, *in* Kelley, P.H., and R.K. Bambach, *From Evolution To Geobiology: Research Questions Driving Paleontology at the Start of a New Century*. Paleontological Society Papers 14.
- ***Taphonomic considerations*** – 2/11  
 Brett, C.E. and G.C. Baird. 1993. Taphonomic approaches to temporal resolution in stratigraphy: examples from Paleozoic marine mudrocks, p. 250-274, *in* S.M. Kidwell and A.K. Behrensmeier (eds) *Taphonomic Approaches to Time Resolution in Fossil Assemblages*. Short Courses in Paleontology 6. Paleontological Society.  
 Kidwell, S.K., and S.M. Holland, 2002. The quality of the fossil record: implications for evolutionary analyses. *Annual Review of Ecology and Systematics* 33:561-588.  
 Kowalewski, M. and Bambach, R., 2003. The Limits of Paleontological Resolution, p. 1-48 *in* Harries, P.J., *High Resolution Approaches in Stratigraphic Paleontology*, Kluwer Academic Publishers, Boston.

### Biological Basis of Biostratigraphy

- ***Rates and modes of evolution*** - 2/18  
 Eldredge, N. and S.J. Gould. 1977. Evolutionary models and biostratigraphic strategies, p.25-40, *in* Kauffman & Hazel.  
 Eldredge, N. et al. 2005. The dynamics of evolutionary stasis, p. 133-145, *in* Vrba, E., and N. Eldredge (eds), *Macroevolution: Diversity, Disparity, Contingency*. *Paleobiology* 31(2) Supplement.  
 Crampton, J.S., and A.S. Gale. 2005. A plastic boomerang: speciation and intraspecific evolution in the Cretaceous bivalve *Actinoceramus*. *Paleobiology* 31(4):559-577.
- ***Coordinated stasis*** – 2/25  
 Erwin, D.H. and R.L. Anstey. 1995. *New Approaches to Speciation in the Fossil Record*. Columbia University Press, New York. Read chapter 9 (Brett and Baird).  
 Holland, S.M., and M.E. Patzkowsky. 2007. Gradient Ecology of a Biotic Invasion: Biofacies of the Type Cincinnati Series (Upper Ordovician), Cincinnati, Ohio Region, USA. *Palaios* 22: 392-407.  
 McGowran, B. 2005. *Biostratigraphy: Microfossils and Geological Time*. Read p. 214-227.
- ***Paleoecology*** – 3/4  
 Jackson, J.B.C. 1977. Some relationships between habitat and biostratigraphic potential of marine benthos, p. 65-72, *in* Kauffman and Hazel.  
 Tang, C.M. 2001. Stability in ecological and paleoecological systems: variability at both short and long timescales, p. 63-81, *in* Allmon, W.D., and D.J. Bottjer, *Evolutionary Paleoecology*.  
 McGowran, B. 2005. *Biostratigraphy: Microfossils and Geological Time*. Read p. 248-262.

- **Biogeography** – 3/18

- Valentine, J.W. 1977. Biogeography and biostratigraphy, p. 143-162, *in* Kauffman and Hazel.
- Norris, R.D. 2000. Pelagic species diversity, biogeography, and evolution, p.236-258, *in* Erwin, D.H., and S.L. Wing, *Deep Time: Paleobiology's Perspective*. Paleobiology 26(4) Supplement.
- Stigall, A.L. 2008. Tracking Species in Space and Time: Assessing the Relationships Between Paleobiogeography, Paleoecology, and Macroevolution, p. 233-249, *in* Kelley, P.H., and R.K. Bambach, *From Evolution To Geobiology: Research Questions Driving Paleontology at the Start of a New Century*. Paleontological Society Papers 14.

**Graphic Correlation** – 3/25

- Carney, J.L., Pierce, R.W., 1995. Graphic correlation and composite standard databases as tools for the exploration biostratigrapher, p. 23-43, *in* Mann, K.O., Lane, H.R. (Eds.), *Graphic Correlation*. SEPM Spec. Publ. 53.

**Event Stratigraphy** – 4/1?

- Cisne, J.L. and B.D. Rabe. 1978. Coenocorrelation: gradient analysis of fossil communities and its application in stratigraphy. *Lethaia* 11:341-364.
- Brett, C.E., Algeo, T.J., and McLaughlin, P.I., 2003. Use of Event Beds and Sedimentary Cycles in High-Resolution Stratigraphic Correlation of Lithologically Repetitive Successions, p. 316-350, *in* Harries, P. J. *High Resolution Approaches in Stratigraphic Paleontology*, Kluwer Academic Publishers, Boston.

**Quantitative Methods**– 4/15?

**Selections made and presented by students!**