Valdo

Basis for Final Grade (fully integrated between lecture and lab)

Assignment	% of final Grade
Class participation during paper summaries and discussions*	20%
Deportment (This means behavior. Be courteous to your fellow students during discussions)	5%
Written Midterm	25%
Written Final	25%
Phylogenetic Reconstruction Alignment Exercise #1	5%
Phylogenetic Reconstruction Model Selection Exercise #2	5%
Phylogenetic Reconstruction Exercise #3	15%
Total	**100%**

*During every discussion I will keep a running tab of who makes meaningful comments. If you do not make any meaningful contributions to the discussion, your participation grade for that day is zero.

Students will have until the end of the following week to contest any grades; after that time grades are final. Any questions about grades must be made in writing through email.

Grade Scale: 100-

and tablets are encouraged for note-taking and reference to papers. Internet will be disabled while in class. Use of internet during class will result in a zero participation grade for the course.

Accommodations Statement

Students with disabilities who are experiencing barriers in this course may contact the Access Office for assistance in determining and implementing reasonable accommodations. The Access Office is located in Farber Hall. The phone numbers are 229-245-2498 (V), 229-375-5871 (Video Phone), and 229-219-1348 (TTY). For more information, please visit http://www.valdosta.edu/student/disability or email access@valdosta.edu.

Academic Integrity

My Statement: You can probably get away with some cheating/plagiarism. But, if I catch you, I will do everything I can to kick you out of my class and impose all possible penalties. I have zero tolerance, so do not risk it.

University Prepared Statement: Academic integrity is the responsibility of all VSU faculty and students. Students are responsible for knowing and abiding by the Academic Integrity Policy as set forth in the Student Code of Conduct and the syllabus. All students are expected to do their own work and to uphold a high standard of academic ethics. Cheating (including plagiarism) will not be tolerated. The instructor

Tentative Lecture Schedule, BIOL 4010

Tentative Laboratory Schedule, BIOL 4010

Week **Topic:**

Guide to Readings:

Darwinism and Macroevolution

Mayr 1985: *Read pages 755-772; the best summary that I know of the major components of Darwinian evolutionary theory as synthesized in the mid twentieth century by Mayr and others. This course emphasizes controversies concerning whether and how these principles provide a complete and satisfactory foundation for macroevolutionary phenomena.*

Gould 1995: *Read 125-134; argues that a hierarchically expanded evolutionary theory is needed to accommodate macroevolutionary phenomena. This theory is a direct challenge to the utility of gradualism and natural selection, although it accepts the other major components of Darwinism.*

Simpson, G. G. (1944) - *excerpts from a classic work by the paleontologist credited with bringing paleontology and systematics into the Darwinian evolutionary synthesis, and discrediting formerly popular theories of orthogenesis and neo-Lamarckism. Stephen Jay Gould adopts Simpson's conceptual framework for the role of paleontology in evolutionary studies, but he challenges Simpson's substantive conclusions from it. Note especially Simpson's categorization of evolutionary modes and tempos, and how studies of fossils are intended to use measurements of tempo to infer mode.*

Pigliucci, M. (2008) -

The challenge from evolutionary developmental biology joins the challenge from evolutionary paleontology in claiming that traditional Darwinism is incomplete as a causal theory of macroevolution. Many specific topics of this article are covered in detail in later topics, and I do not expect you to understand all of the nuances of this paper at the start. Concentrate initially on why the Darwinian theory of the modern synthesis is perhaps inadequate to explain developmental and morphological evolution.

Construction of Higher Taxa

Simpson, G. G. (1953) *excerpts; note the emphasis on adaptationist principles in constructing higher taxonomic categories and evaluating their evolutionary origins, especially the concept of adaptive zone.*

uralism of the earlier book. Simpson's "evolutionary taxonomy" as presented here remains the foundation for paleontological meta-analyses of macroevolution.

Mayr, E. (1982) - *a concise summary and defense of evolutionary taxonomy following challenges by pheneticists and cladists. Note Mayr's defense of the important concept of "grade," an anathema to cladists.*

de Queiroz, K. (1988) - *a strong statement of the philosophical foundations of phylogenetic systematics (cladistics). Note especially the argument that the "evolutionary taxonomy" of Mayr and Simpson fails to serve Darwinian principles because it only puts an evolutionary veneer on an essentialistic taxonomic system.*

Evolutionary Morphology I

Wagner, G. P. (2007) - *further exploration of the hierarchical structure of homology, including the re7(, but)6(4ydt7)11pfuirect chanomi(o)nJTJs ho(i)-4(ca)9(l)-4(ev)8(ol)-4hoesin 9(t)-4(( )11(a)11(mat)9(i)6(ure)*

adaptation.

Carroll, S. B. (2008) ï *A good summary of the contributions of evolutionary developmental biology to an -regulation at the level of gene expression, a claim that has generated controversy. The author is a very influential evolutionary biologist and popular writer.*

Pattee, H. H. (1973) - *the work of a theoretical physicist who studies the origin of life and its hierarchical structure. It is an abstract paper with statements generalized to origins of individuality at any hierarchical interface. Evolution of new homologies through developmental synorganization is one example; evolution of new species through mate recognition systems is another one. Understanding this general model clarifies many macroevolutionary issues as instances of the origin of collective control constraints by a group of elements (cells, morphological structures, organisms). This is the general theory underlying evolution of individuality.*

Hall, B. K. (1998) ï *Read pages 93-99, then 307-310. The first assigned part extends the notion of developmental constraint to the concept of a Bauplan, a highly controversial structuralist explanation of the morphological differences among higher taxa. The second chapter introduces the important concept of genetic assimilation, which illustrates the plasticity of the relationship between genotype and phenotype (explored in depth in the following topics).*

Newman, S. A. and G. B. Müller (2000) - *Genetic machinery is considered an evolved set of constraints on the realization of forms made possible by the intrinsic properties of biological materials. The causal connections between genotype and phenotype are elaborated and in some ways reversed from conventional treatments. This is one of the most challenging and perhaps useful modifications of evolutionary theory to emerge from evolutionary developmental biology.*

Wagner, G. P., M. Pavlicev and J. M. Cheverud (2007) ï *A thoughtful and important coverage of the critical concept of modularity in evolution. Modularity is one of the key concepts underlying a proposed extended evolutionary synthesis to incorporate development and morphology into evolutionary theory.*

Evolutionary Morphology II, Adaptation

Cracraft, J. (1990) - *Cracraft criticizes the concept of evolutionary innovation and the proposed roles of novel features in evolutionary diversification. He presents a protocol for comparative study of evolutionary novelties. Cracraft's critique warns evolutionists that origin of a novelty is not sufficient to predict high rates of speciation and ecological diversification in the subsequent evolution of a population. Many contemporary researchers overlook the messages of this paper, making arguments that await severe criticism when these lessons are fully acknowledged.*

Wagner, G. P. and V. J. Lynch (21.0491 Tma(ut)6(i)-4(on o)11(f)-4(a)ǰTJETBTma

Brodie, E. D. III, K. V. Young and E. D. Brodie Jr. (2004) - *a response to the criticisms of Agosta and*

Reece et al. (2013) - *a paper in which I used the phylogeny from Reece et al. (2010) to execute phylogenetic comparative methods.*

Hierarchy of Sorting and Selection I

Gould, S. J. (1985) - *an excellent paper arguing for the temporal discontinuity of evolutionary processes. I have problems with Gould's use of evolutionary progress, and I find his description of the evolutionary timescales a bit too rigid; however, it is still one of my favorite papers.*

Vrba, E. S. and S. J. Gould (1986) - *The distinction between sorting and selection is long overdue and extremely important. The structure of the hierarchically expanded theory of selection is covered thoroughly. An expanded concept of individuality is very important here. This is among the most important papers covered in the class.*

McCune, A. R., K. S. Thomson and P. E. Olsen (1984) - *This example is a favorite one illustrating opposition between evolutionary processes acting at different tiers of evolutionary time. The conflicts occur between what are essentially the second and third tiers, but the timescale involved is greatly compressed relative to the expected occurrence of species selection and catastrophic species selection.*

Hierarchy of Sorting and Selection II

Lieberman, B. S. and E. S. Vrba (2005) - *an explanation of changing ideas on the contentious issue of species selection.*

Gould, S. J. (2002) - *This excerpt from Gould's 2002 book expands the general ideas presented in Vrba and Gould (1986) with a very helpful summary table. The concept of evolutionary drive is developed more explicitly here than in Gould's earlier writings on hierarchical expansion of evolutionary theory.*

Extinction I

Gould, S. J. (1991) - *Controversy over interpretation of the Burgess Shale arthropod fauna leads to an important distinction between morphological diversity and morphological disparity. The question of how to measure these factors is a highly debated topic and the subject of numerous recent papers.*

Briggs, D. E. G., R. A. Fortey and M. A. Wills (1992) - *These authors present an empirical refutation of Gould's interpretation of the Burgess Shale arthropod fauna using two different methods for quantifying morphospace. Are these authors successful in quantifying the relevant parameters and thereby refuting Gould's arguments?*

Briggs, D. E. G. and R. A. Fortey (2005) - *an update on the continuing problem of how to interpret the "Cambrian explosion."*

Extinction II

Jablonski D. (2005) - *an update on extinction peaks in evolution by a leading worker in this field.*

Alvarez, W. (1986) - *This paper describes the author's highly influential work showing that asteroid impacts provide the best explanation for a mass extinction at the K-T boundary. It also discusses periodicity of mass extinctions and the associated "death star" hypothesis. This is the work that most directly inspired Gould to recognize tier 3 of evolutionary time as a source of novel selective processes. To date, the K-T boundary remains the only extinction peak well corroborated as coinciding with an impact crisis.*

Van Valen, L. (1973) - *Few papers have been both as influential and as controversial as this one has been. The methodology of this paper relies on evolutionary taxonomy and presents a discovery that would not have been made using cladistic taxonomy. Cladists almost universally discredit this work. It gave us the "Red Queen's hypothesis" of evolution, which has had pervasive influence. This paper launched a highly idiosyncratic evolutionary journal, dedicated to the primacy of content over display.*