Teaching Paleontology

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Fossils are a fundamental component of the rock record

Fossil record provides repeated, natural ecological experiments

Dating of rocks

Taphonomy

Biodiversity

Evolution

Mass extinctions

Global change

Fossils can help solve geological and biological problems

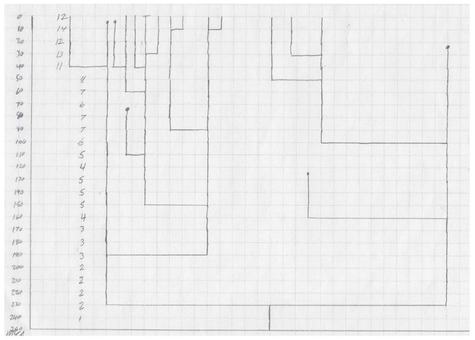
Temporal scale unavailable in modern ecological studies

Lab activities

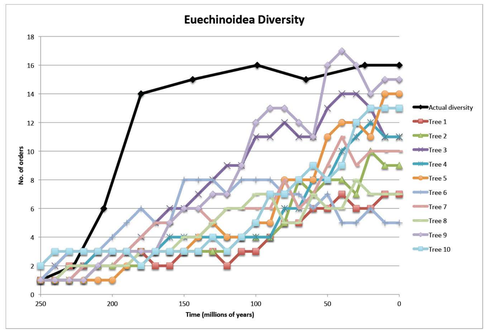
• Activities require students to carefully gather data and, in some cases, share the data with the class on Google documents in order to evaluate a hypothesis
• Activities cover concepts from lecture

Learning outcome: Students should be able to collect and analyze geologic information in laboratory settings; Students should be able to work collaboratively

Assessment: Lab activties are graded with a general rubric provided to students in the syllabus



Hypothetical phylogenetic tree generated from random numbers to test the hypothesis: diversification of post-Paleozoic echinoids is constant.



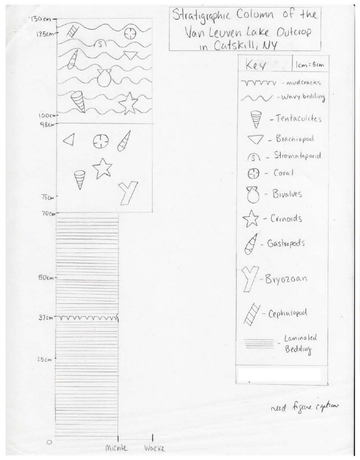
Diversity counts from a set of hypothetical phylogenetic trees are plotted with an actual diversity curve to determine if the actual curve falls within the range of random possibilites.

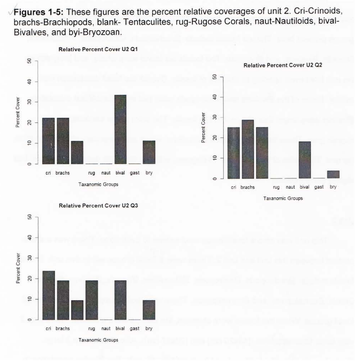
Field project

• Field trip to road outcrop south of Catskills, NY, which exposes uppermost Silurian–lowermost Devonian rocks
• Students collect sedimentological and paleontological data to determine depositional environments

Learning outcome: Students should be able to collect and analyze geologic information in the field; Students should be able to apply scientific reasoning to solve geologic problems

Assessment: Students draft a stratigraphic column, analyze fossil data, and write a report interpreting depositional environments





Figures 1-5: These figures are the percent relative coverages of unit 2. Cri-Crinoids, brachs-Brachiopods, blank- Tentaculites, rug-Rugose Corals, naut-Nautiloids, bival-Bivalves, and byi-Bryozoan.

Example of one type of data analysis for project. Bar graphs show relative percent coverage for different fossil groups. Bar graphs created in R.

Fossil of the week

• Invertebrate fossil group introduced each Friday in lecture
• Students spend time outside of class to learn the invertebrate groups
• Students also keep a lab notebook of fossil sketches
• Weekly quizzes

Learning outcome: Students should be able to identify common fossil invertebrates for analysis and evaluation in solving geologic problems

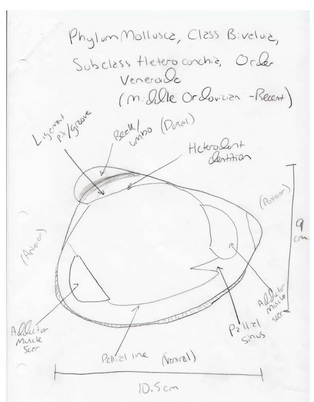
Assessment: Two practical exams

Subclass Heteroconchia

Order Veneroida

- Middle Ordovician – Recent
- Variable in shape
- All heterodont dentition
- Adductor muscles usually of same size
- Looks like a typical clam

http://www.scielo.org.pe/img/revistas/spb/v10n1/a06f04.jpg



Reading scienfitic papers

• Students read a short journal article (Geology, Science, Nature, or PNAS) on a current topic in paleontology
• Students will write a summary of their chosen scientific paper and then present the summary to the class through a Powerpoint presentation

Learning outcome: Students should be able to evaluate the scientific literature and communicate the information effectively through appropriate oral, visual, and written presentation

Assessment: First-draft of summary is graded and returned with corrections. Students submit a final summary with the opportunity to gain additional points. Students are also graded on their presentation. Rubrics are given to students at the beignning of the semester.