

Beneski Museum of Natural History – Amherst College
'A Day at the Museum' of Exploration and Discovery

Formation of the Solar System

1. Find the **meteorite collection** at the east end of the hallway on the First Floor.
What types of meteorites are on display in the Museum?

2. What is the name of the meteorite that formed **Meteor Crater** near Winslow Arizona? What type of meteorite is it?

3. What is the **significance** of meteorites?

4. What is the **age of all the meteorites** in the Amherst College collection?

Fossil Preservation – Second Floor

5. What usually gets **preserved** as fossils? List some examples seen in the collection.

6. What are some of the **ways that fossils can form**? List five examples.

7. What are **trace fossils**? How do they differ from body fossils? What is the largest collection of trace fossils in the Beneski Museum?

8. Why are fossils important for understanding the **evolution of life** on Earth?

Early Life on Earth – Second Floor

9. What is *Cryptozoon proliferum*?

10. What is the geochemical and evolutionary significance of **stromatolites** in the evolution of planet Earth? When were they common in the rock record?

11. Are these **trace fossils or body fossils**?

Emergence of Animals – Second Floor

12. What is *Climactichnites*?

13. What is the **age** of this specimen?

14. How did stromatolites **pave the way** for the emergence of true multicellular animals?

15. **What kind of animal** may have made this track? Do you have other ideas?

16. What was the **likely environment** in which these tracks were made? What is the evidence?

17. Are these **trace fossils or body fossils**?

Invertebrate Paleontology and Evolution – Second Floor

18. What major **invertebrate phyla** are represented in the Beneski Museum? Which of these groups are now extinct?

‘Day at the Museum’ – Beneski Museum of Natural History

19. How do **rudist bivalve clams** differ from other types of bivalves? In what type of environment did the rudist bivalves live? When did rudist bivalves live?

20. What is the defining characteristic of **echinoderms**? What major groups of echinoderms are represented in the collection?

21. How are **brachiopods** similar to bivalve molluscs? How do they differ?

22. What characterizes the **trilobite** exoskeleton? What types of niches did trilobites fill?

23. How are **graptolites** typically preserved in rocks? When were they particularly common in the rock record?

24. How do **nautiloids** differ from **ammonoids**? What is the purpose of the chambers in nautiloids and ammonoids?

25. Find the **glass sponge**; what is the *Genus* and *species* name and age?

26. Find one example of a **colonial coral**; what is the *Genus* name and age?

27. What characteristics of fossil species would make them useful for establishing the **relative age** of the rocks they are found in? Cite 3 examples of ‘**index fossils**’.

28. What is **convergent evolution**? What 3 organisms exemplify convergent evolution in the collection? What is the explanation for convergence in these 3 phyla?

29. What is **divergent evolution**? What 2 organisms exemplify divergent evolution in the collection, and how do they differ?

30. What was the **most diverse group of marine invertebrates** during the Paleozoic Era?

Fish Evolution – First Floor

31. What feeding modes were **jawless fish** limited to?

32. When do **fish with jaws** show up in the rock record? What advantages did the evolution of the jaw give to fish?

33. What are the **4 major groups of jawed fish**? Cite one characteristic feature of each group.

34. Which was the first group to evolve **jaws**? Which groups are now extinct? Which group gave rise to the tetrapods (land animals)?

35. What was the most diverse group of **Mesozoic age sharks**?

36. What was the name of the largest known **shark**?

37. What are possible functional reasons for the fin spines in the **Acanthodians**?

38. The major modern Osteichthyan fish are the **Teleosts**. What 4 features allow them to occupy nearly every fresh water and marine niche?

Tetrapod Evolution: Crawling out of Water and onto Land – First Floor

39. When did the transition from water to land occur?

40. What were the skeletal and physiological **adaptations for life on land**?

41. How do vertebrae of **aquatic** animals differ from **terrestrial vertebrates**?

42. Was *Dimetrodon* a dinosaur? When did it live?

43. What is an **amniote**?

44. What is the age of **oldest amniotic organism**?

45. The amniotes can be divided into three groups based on the **number of openings (temporal fenestra) on each side of the skull**. What are these three groups and cite one example of each?

Paleozoic Vertebrate Paleontology and Evolution – Second Floor

46. What kind of fish was *Dunkleosteus terrelli*? When did it live? What is the evidence that they were predators? How do they differ from modern bony fish?

47. What was *Eryops megasephalus* and when did it live? What is an amphibian? How does it differ from fish and reptiles? What is some of the evidence that this organism spent much of its time in the water?

48. What was *Edaphosaurus* and when did it live? What characteristics suggest an herbivorous diet? What is the feature of the skull that is the defining feature of the synapsids?

49. What was *Dicynodon sollasi* and when did it live?

50. Place *Dunkleosteus*, *Edaphosaurus*, *Dicynodon*, and *Eryops* in stratigraphic order, from oldest to youngest.

Mesozoic Vertebrate Paleontology and Evolution – Lower Level

51. What are the two fundamental groups of dinosaurs, and what are their defining characteristics?

52. What are the **4 track types** found in the Connecticut River Valley? What are some of the characteristics of each?

53. What is the evidence of the **ancient environment** of the latest Triassic-Early Jurassic rift basin of the Connecticut River Valley?

54. Why is the **Bone Cabin Quarry** one of the most significant dinosaur localities in the world?

55. What type of dinosaur was *Dryosaurus altus*, and what is its age? Was this species a carnivore or an herbivore? What is the evidence?

56. Which groups of Mesozoic reptiles went back to the **aquatic realm**?

57. What group of saurischian was *Diplodocus longus* a part of, and what were the characteristics of this group of large dinosaurs?
58. What type of dinosaur was *Tyrannosaurus rex*? When did this species live?
59. What type of dinosaur was *Triceratops*? What is the frill, and what was its function?
60. Did *Triceratops* and *Tyrannosaurus rex* likely come into contact? What is your evidence for or against?

Cenozoic Vertebrate Paleontology and Evolution – First Floor

61. What are the two major groups of **ungulates (hoofed mammals)** shown on the mammal wall? How do they differ from one another?
62. What are some of the **now-extinct carnivores from the Cenozoic Era**? What are some of the characteristics of these groups? What niches did they fill?
63. What are the major skeletal and physiological adaptations in **horse evolution**? What environmental conditions may have driven these evolutionary changes?

**Overview of the Geology of Massachusetts and Southern New England –
Timeline on Second Floor**

64. What were the **3 major geological events** that shaped our region over the past 600 million years? Cite a modern example of each.

65. When did **shallow seas** cover the region that is now New England and New York State?

66. When did **collisional tectonics** (i.e., convergence) affect this region? Give an age range. How did convergent tectonics affect our region?

67. When did **rifting** (i.e., divergence) take place? How did divergent tectonics affect our region?

68. When was our region **glaciated**? Was there a single glacial event, or multiple events?

**Rift Basin History: The Mesozoic History of the Connecticut River Valley –
Second Floor**

69. What is the **rifting of the Deerfield Basin** portion of the Connecticut River Valley associated with?

70. What kind of environments existed in the **Deerfield Basin** during the late Triassic and early Jurassic Periods?

71. What **species of fish** lived in the rift valley lakes of that time?

**Dinosaur Trackways: The Connecticut River Valley’s Paleontological
Treasure – Lower Level**

72. Why don’t we have **dinosaur bones** preserved in the region?

73. How are the **dinosaur tracks** formed?

74. What are the different **kinds of impressions** that can be made?

75. What kinds of things do **dinosaur tracks** tell us?

76. Who were the **trackmakers**?

**Glacial History of the Connecticut River Valley (Second Floor) and Life
during the Pleistocene (First Floor)**

77. What is the **evidence for glaciation** in the area? Cite at least 3 examples.

78. What was a **dominant feature of the landscape** of our area as the Laurentide Ice Sheet melted?

79. What caused the **large ice sheets** to grow and expand south into our region, repeatedly?

80. What were some of the prominent **Ice Age mammals** of the time?

81. What are the differences between **mammoths and mastodons**?

82. What happened in the **Pleistocene Extinction Event**?

83. What might have **caused this extinction** event?

Final Piece:

84. Write a question, or series of related questions, that could be incorporated into this exercise.