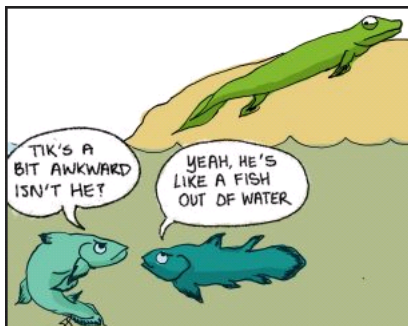


**C - Fossils C Rickards 2020 - Rickards Invitational Div. C - 12-05-2020****Welcome to Fossils C!**

This test is written by Ben Ehlert

**Rules:**

1. If you're suspected of cheating, you will be disqualified. Please uphold the ethics of Science Olympiad, as well as your morals. I really don't want to disqualify people.
2. There will be 50 minutes to complete this test.
3. Please try your best. Meme answers are NOT appreciated.
4. If you would like to leave a test review or complaint, please contact me on the forums (BennyTheJett) or Discord (BennyTheJett1#3979)
5. Good Luck. Have Fun!

**Resources Allowed:**

- Non-Graphing Calculators (1 per Partner)
- 2 inch binders (measured from the inside of the rings) (1 per partner)
- Scratch Paper
- Pencil
- Your Brain
- Logic
- Reasoning
- The Memes On The Front Of Your Binder

**1. (1.00 pts)**

Identify the above image to the lowest taxonomic level.

**Expected Answer:** Genus Archimedes

2. (2.00 pts) What part of this organism is preserved? Why only that specific part of the organism?

**Expected Answer:** Only the stalk of the Archimedes (1 pt). This is due to it being far less brittle than the mesh, which is often destroyed during the fossilization of the Archimedes (1 pt).

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3. (1.00 pts) If this organism is extinct, during what geologic period did this organism go extinct?

**Expected Answer:** The Permian Period.

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4. (1.00 pts)



The image above is a \_\_\_\_\_.

**Expected Answer:** Stromatolite

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5. (1.00 pts) This image was responsible for weakening the greenhouse effect on Earth. How did the beings of the above image do that?

**Expected Answer:** The cyanobacteria (stromatolites) oxidized methane (a potent greenhouse gas) into water and Carbon Dioxide (a weaker greenhouse gas). This in turn weakens the greenhouse effect.

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6. (1.00 pts) The coelacanth (latimeria) is an example of a what?

- ☐ A) Elvis Taxon
- ☒ B) Lazarus Taxon
- ☐ C) Living Fossil
- ☐ D) Wastebasket Taxon
- ☐ E) Zombie Taxon
- ☐ F) Tucker Taxon

7. (1.00 pts) About how long does an average coelacanth in the genus *Latimeria* live?

- ☐ A) 8 Years.
- ☐ B) 15 Years.
- ☐ C) 30 Years.
- ☐ D) 50 Years.
- ☐ E) 70 Years.
- ☒ F) 90 Years.

8. (1.00 pts)



Identify the above image to the lowest taxonomic level on the rule sheet.

**Expected Answer:** Tabulata

9. (1.00 pts) About how many species within this specimen have ever been discovered?

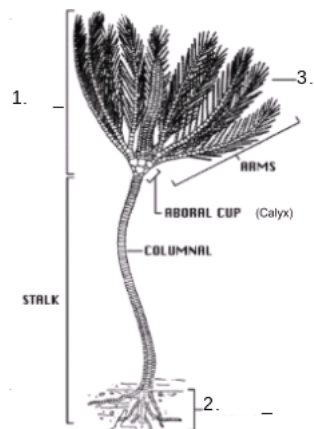
**Expected Answer:** 300

10. (2.00 pts)

Recent studies on this organism challenge its current taxonomic designation. The recent studies argue that this organism is actually what? Why do the studies suggest this?

**Expected Answer:** Recent Studies indicate that tabulate corals could actually be algae (1 point), due to the lack of septa (1 point), a key structural component of corals.

11. (1.00 pts)



Identify the image above to the lowest taxonomic level on the rule sheet.

**Expected Answer:** Crinoidea

12. (1.00 pts) In the above image, what part of the specimen is 1?

**Expected Answer:** Crown

13. (1.00 pts) In the above image, what part of the specimen is 2?

**Expected Answer:** Holdfast

14. (1.00 pts) In the image above, what part of the specimen is 3?

**Expected Answer:** Pinnule

15. (1.00 pts)



Identify the image to the lowest level on the rule sheet.

**Expected Answer:** Tryrannosaurus

16. (1.00 pts) Between the ages of 10 and 15 years old, about how many kilograms did this specimen add to its body mass?

**Expected Answer:** ~2500 kg (accept from 2200 to 2800)

17. (1.00 pts)

This specimen is regarded for having larger than normal olfactory bulbs for an animal with a brain its size. This likely means that this specimen had a really good sense of \_\_\_\_\_.

smell

18. (1.00 pts)



Identify the specimen above to the lowest level on the rule sheet.

**Expected Answer:** Titanis

**19. (1.00 pts)** About how many million years ago did this specimen come about?

**Expected Answer:** ~5 Million Years Ago (accept from 4 to 6 million years ago)

**20. (1.00 pts)** What is the leading theory as to what this specimen used its large skull for?

**Expected Answer:** Killing its prey via pecking it to death.

**21. (1.00 pts)** This specimen's generic name refers to what?

**Expected Answer:** The Ancient Greek Titans.

22. (1.00 pts) The above organism was one of the many animals that GABI impacted. What does GABI stand for?

**Expected Answer:** Great American Biotic Interchange

23. (1.00 pts) During what geologic era did GABI happen?

**Expected Answer:** Cenozoic

24. (1.00 pts) Who first proposed GABI? Hint: He is widely considered the father of modern biogeography.

**Expected Answer:** Alfred Wallace

25. (1.00 pts)



Identify the specimen to the lowest taxonomic level on the rule sheet.

**Expected Answer:** Leptaena

**26. (1.00 pts)** If this specimen is extinct, what geologic period did it go extinct?

**Expected Answer:** Carboniferous

**27. (1.00 pts)** On what continent are most of the fossils of this specimen found?

- ☐ A) North America
- ☐ B) South America
- ☒ C) Europe
- ☐ D) Asia
- ☐ E) Australia
- ☐ F) Africa

**28. (4.00 pts)** What is taphonomy? In which type of lagerstatte is taphonomy usually studied? List 4 taphonomic biases in the fossil record.

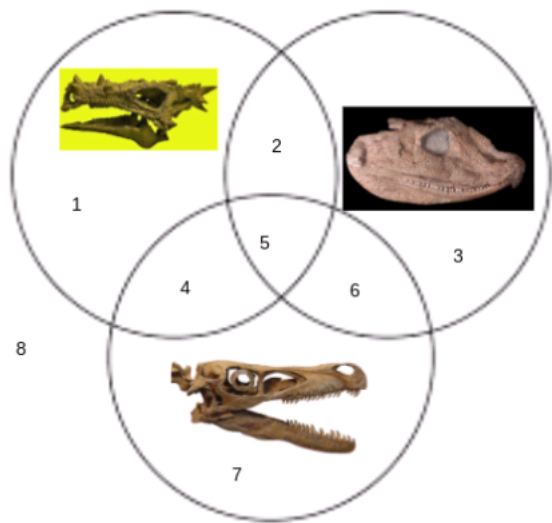
**Expected Answer:** Taphonomy is the study of how things die, decay, and fossilize (1 point). It is usually studied in Conservation (Konservat) Lagerstatte (1 point). Biases (.5 points for each correct answer. Only need 4 answers): \*Physical Attributes of the organism (hard body versus soft body) \*Characteristics of the habitat the organism died in (few fossils fossilize in deserts and other harsh environments) \*Mixing of fossils from different time periods (Zombie Taxons) \*Temporal Resolution (often hard to pinpoint exactly how old a fossil is, fewer fossils from a longer time ago) \*Gaps in the fossil record \*Human Bias

**29. (3.00 pts)** Explain how Doushantuo type preservation worked. In what environment is this preservation method most common? What would this preservation type preserve?

**Expected Answer:** In Doushantuo preservation, cells are fossilized (1 point) by the cells being replaced by phosphates BEFORE THE ORGANISM DECAYS (must have cells being replaced before organism decaying for the 1 point). This method is most common in environments with shallow and high energy waters (1 point).

**30. (0.00 pts)**





For the following questions, fill in the blank with the number that corresponds with the correct place in the Venn Diagram.

EXAMPLE: Which of these is a Monkey? \_\_\_\_\_

You would put in 8 because none of these are a monkey.

Please respond with ONLY THE NUMBER. No extra characters please. Please do not write anything in the "answer" portion of this question. You might be penalized if you do.

Expected Answer: -

31. (1.00 pts) Which of these is an Eryops? \_\_\_\_\_

8

32. (1.00 pts) Which of these was found in the Hell Creek formation? \_\_\_\_\_

1

33. (1.00 pts) Went extinct in the late cretaceous. \_\_\_\_\_

4

34. (1.00 pts) Hadrosaurid. \_\_\_\_\_

8

35. (1.00 pts) Within Class Reptilia. \_\_\_\_\_

36. (1.00 pts) Wastebasket taxon. \_\_\_\_\_

37. (1.00 pts) Known to be cold blooded. \_\_\_\_\_

38. (1.00 pts) Possessed 8 digits on each appendage. \_\_\_\_\_

39. (1.00 pts) What is as dubiofossil?

**Expected Answer:** Something that looks like a fossil, but can't be definitively confirmed to be a fossil or not.

40. (2.00 pts)



Is the above image a pseudofossil? If it's on the rule sheet, identify it please.

**Expected Answer:** The above image is a pseudofossil.

41. (1.00 pts)



Identify the above specimen.

**Expected Answer:** Copal

**42. (1.00 pts)** Name the 2 continents where this specimen is most commonly found

**Expected Answer:** Africa, South America

**43. (1.00 pts)** The root word for this specimen is derived from what civilization?

**Expected Answer:** The Aztecs

**44. (1.00 pts)** What is this specimen known for smelling like?

**Expected Answer:** Pine, Lemon (accept either, only need 1)

**45. (1.00 pts)**



How was this specimen fossilized?

**Expected Answer:** Carbonization

**46. (1.00 pts)** Identify this fossil to the lowest taxonomic level on the rule sheet if it is on the taxonomic rule sheet.

**Expected Answer:** Pecopteris

**47. (1.00 pts)**



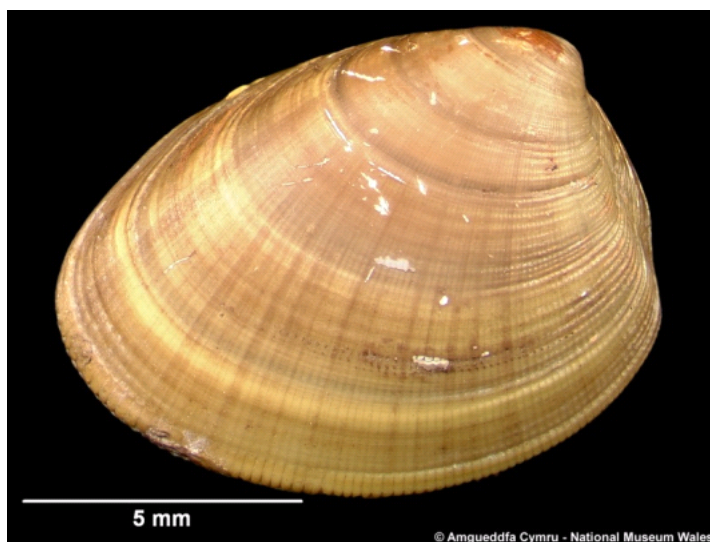
How was this preserved?

**Expected Answer:** Petrification

**48. (6.00 pts)**

Name one other name for the term "Resurrection Biology". Name 2 theorized methods of resurrection biology. Name 2 of the 6 most common species brought up for resurrection biology. Name the one animal that survived the process of Resurrection Biology past birth.

**Expected Answer:** Other Terms for Resurrection Biology: De-Extinction, Species Revivalism Theorized Methods: Cloning, Genome Editing, Back Breeding, Iterative Evolution  
Animals Frequently Brought Up: Woolly Mammoth, Pyrenean Ibex, Aurochs, Quaggas, Thylacine, Passenger Pigeon The animal that survived past birth: Pyrenean Ibex

**49. (1.00 pts)**

Identify the following specimen to the lowest level on the taxonomic rule sheet if it is on the rule sheet.

**Expected Answer:** Nucula

**50. (1.00 pts)** The above specimen existed in the Arenigian age, which is in the \_\_\_\_ period?

Ordovician

**51. (1.00 pts)** The maximum depth this specimen could live at was about how many meters deep?

**Expected Answer:** 200 meters (accept anywhere from 180-220).

**52. (1.00 pts)** Anoxic ocean conditions were thought to have caused mass extinctions in which 2 geologic eras?

**Expected Answer:** Paleozoic, Mesozoic (All or nothing)

**53. (2.00 pts)** During oceanic anoxic events, there are usually more fossils found in oceanic environments. Why is this?

**Expected Answer:** Animals tend to fossilize better when there is lower oxygen conditions, creating both more preserved specimens and better preserved specimens.

**54. (2.00 pts)** What is a van der Hammen cycle?

**Expected Answer:** A periodic decrease in the overall biodiversity of Earth.

**55. (1.00 pts)** About how long did Romer's Gap last?

**Expected Answer:** 15 Million Years (accept anywhere from 10 to 20 million years)

**56. (1.00 pts)**



Identify the above specimen to the lowest taxonomic level on the rule sheet if it is on the rule sheet. If it is not on the rule sheet, please answer "Not on List"

**Expected Answer:** Lepidodendron

**57. (1.00 pts)** This specimen is known to grow quite fast. About how many feet per year did this specimen grow?

**Expected Answer:** Acceptable Answers: anywhere from 10-11 Feet per Year

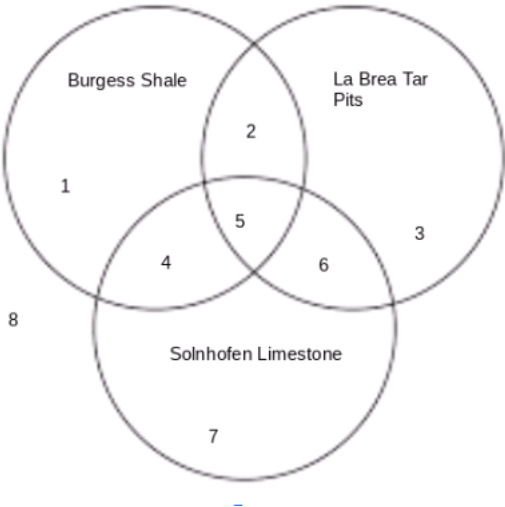
**58. (3.00 pts)** What role did this organism have in paving the way for modern day forests? Be specific.

**Expected Answer:** Decaying Lepidodendron organisms created more and deeper soil (1 pt), allowing plants to grow deeper roots (1 pt). This allowed new species of trees to spread inland and not rely as much on swampy habitats (1 pt)

**59. (2.00 pts)** What is dendrochronology?

**Expected Answer:** Dating tree rings (1 pt) TO THE EXACT YEAR THEY WERE FORMED (1 pt).

60. (0.00 pts)



For the following questions, fill in the blank with the number that corresponds with the correct place on the Venn Diagram.

EXAMPLE: Which of these is a Monkey? \_\_\_\_\_

You would fill in 8 because none of these are a monkey.

Please respond with ONLY THE NUMBER. No extra characters please. Please do not write anything in the "answer" portion of this question. You might be penalized if you do.

Expected Answer:

61. (1.00 pts) Konservat Lagerstätte \_\_\_\_\_

5

62. (1.00 pts) Konzentrat Lagerstätte \_\_\_\_\_

8

63. (1.00 pts) Likely formed due to brine seeping \_\_\_\_\_

1

64. (1.00 pts) Located within the United States \_\_\_\_\_



65. (1.00 pts) Known for having lots of tracks and burrows in it \_\_\_\_\_

66. (1.00 pts) Known to preserve dragonflies \_\_\_\_\_

67. (2.00 pts) What 2 characteristics are most commonly associated with oceanic anoxic events?

**Expected Answer:** Warm Climates, High Level of Carbon Dioxide

68. (2.00 pts) Anoxic ocean conditions during the \_\_\_\_\_ period are thought to be the source of creation of much of the world's natural gas and petroleum reserves.

69. (1.00 pts)



Identify this specimen to the lowest taxonomic level on the rule sheet.

**Expected Answer:** Calymene

70. (1.00 pts) This specimen has a \_\_\_\_\_ hypostome (I'm looking for the type of hypostome).

Natant

71. (1.00 pts) This specimen was authored in the year \_\_\_\_\_.

1822

72. (1.00 pts)



Identify the specimen to the lowest taxonomic level on the rule sheet.

**Expected Answer:** Rhynoconellida

73. (1.00 pts) Which of the following about this specimen is false?

- ☐ A) Has a pedicle.
- ☐ B) Biconvex.
- ☒ C) Strophic.
- ☐ D) Likely an evolutionary predecessor to *Atrypa*.
- ☐ E) Classified in 1949.
- ☐ F) Commisure is a zig-zag shape.

74. (1.00 pts)

I am in the phylum Mollusca. I average 65 millimeters in diameter (yes I am roughly circular). I went extinct in the Toarcian. I am a major index fossil for my geologic time period.

What genus am I?

**Expected Answer:** Dactylioceras

**75. (1.00 pts)** I am also theorized to have died shortly after spawning. What evidence do scientists have to support this theory?

**Expected Answer:** Finding places of mass mortalities (in areas where reproduction would be conducive) of this specimen are common.

**76. (1.00 pts)** I am an armored dinosaur that existed at the very end of the cretaceous period for only about 2 million years.

What genus am I?

**Expected Answer:** Ankylosaurus

**77. (1.00 pts)** What is the mode of life of this organism? (i.e Benthic Filter Feeder)

**Expected Answer:** Terrestrial Browser

**78. (1.00 pts)** I am a seed bearing shrub/small tree. "Tongue Leaf". I reached a maximum height of about 30 meters tall.

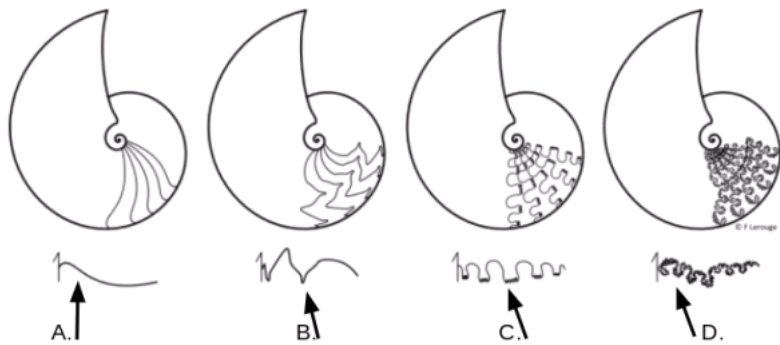
What genus am I?

**Expected Answer:** Glossopteris

**79. (1.00 pts)** Fossils of this genus were used as evidence to support the existence of what supercontinent?

**Expected Answer:** Gondwana/Gondwanaland

80. (4.00 pts)



Please identify the cephalopod sutures. In your answer please use the format below (or you risk not being scored):

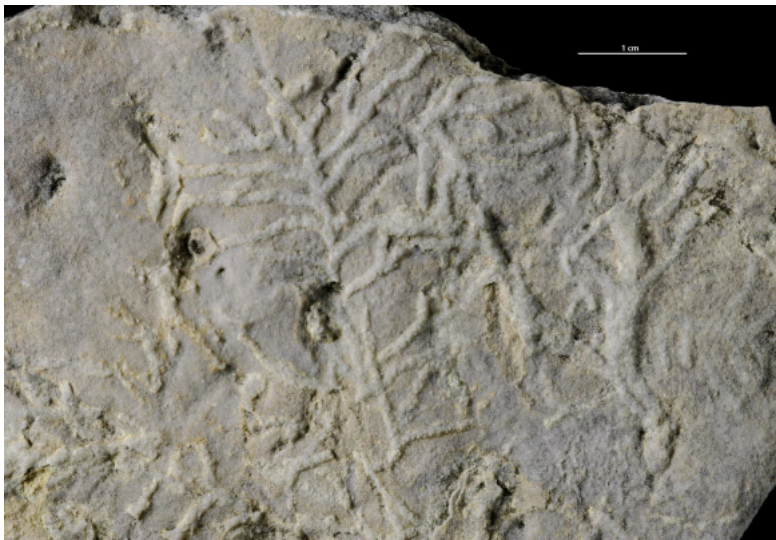
- A: [Answer]
- B: [Answer]
- C: [Answer]
- D: [Answer]

**Expected Answer:** A: Nautiloid B: Goniatitic C: Ceratitic D: Ammonitic

81. (1.00 pts) The Silurian and Devonian periods were commonly regarded as the age of the \_\_\_\_.

fishes

82. (1.00 pts)



What trace fossil is this?

**Expected Answer:** Chondrite/Burrow (accept either, only need 1)

**83. (1.00 pts)** What ichnogenera does this fall into?

**Expected Answer:** Chondrites

**84. (1.00 pts)**



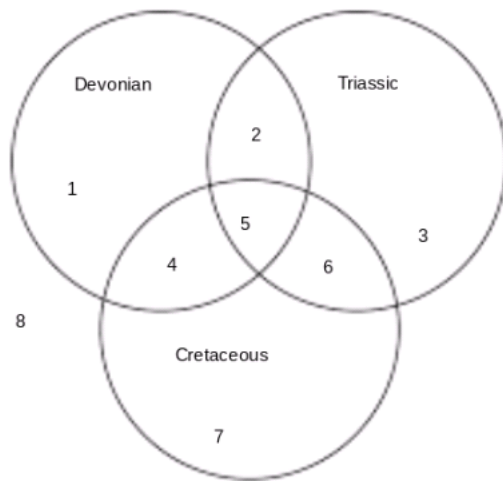
What type of trace fossil is this?

**Expected Answer:** Predation Mark

**85. (3.00 pts)** Thoroughly explain why and how volcanic ash deposits are frequently used for absolute and relative dating.

**Expected Answer:** Not all rocks are easy to absolutely date, however volcanic ash is (1 pt). By determining how old the deposits are, they can approximate how old fossils are by extrapolating a rate of sediment deposition (1 pt). They do know with certainty whether the ash or the fossils are older, due to superposition (1 pt).

**86. (0.00 pts)**



For the following questions, fill in the blank with the number that corresponds with what you see above.

EXAMPLE: Which of these is a Monkey? \_\_\_\_\_

You would fill in 8 because none of these are a monkey.

Please respond with ONLY THE NUMBER. No extra characters please. Please do not write anything in the "answer" portion of this question. You might be penalized if you do.

**Expected Answer:**

**87. (1.00 pts)** Age of the Reptiles. \_\_\_\_\_

**88. (1.00 pts)** Ended with a mass extinction. \_\_\_\_\_

**89. (1.00 pts)** Mean average atmospheric oxygen content was less than that of the modern earth. \_\_\_\_\_

**90. (1.00 pts)** Warmer on average than the current Earth. \_\_\_\_\_

91. (1.00 pts) Euramerica existed at the beginning of the geological period. \_\_\_\_\_

92. (1.00 pts) Pachycephalosaurus existed in this/these period(s). \_\_\_\_\_

93. (1.00 pts) the PaleoTethys Ocean existed. \_\_\_\_\_

94. (1.00 pts) Neotethys closed. \_\_\_\_\_

95. (1.00 pts)



Identify the specimen to the lowest level on the rule sheet.

**Expected Answer:** Testudines

96. (1.00 pts) Of the lagerstatte on the fossils list, which lagerstatte is this specimen most likely to be found in?

**Expected Answer:** Yixian Formation

97. (1.00 pts) A group of these specimens is usually called a \_\_\_\_\_.

**98. (3.00 pts)** List 3 reasons why the Cambrian Explosion was important to the evolution of animals.

**Expected Answer:** POTENTIAL ANSWERS INCLUDE: \*Evolved many phyla we see today \*Evolved more complex organisms \*Increased global biodiversity \*changed ecosystems, so new ecological niches could be established and occupied.

**99. (1.00 pts)** About how long did the Cambrian Biota Explosion last?

**Expected Answer:** 16 Million Years (Accept from 10 million to 25 million years)

**100. (1.00 pts)** What is meant by the term "background extinction rate"?

**Expected Answer:** How fast species are going extinct without human input or intervention.

**101. (1.00 pts)** About how many times higher is the rate of extinction of the Pleistocene-Holocene extinction than that of any other major mass extinction?

- ☐ A) 10 times
- ☐ B) 15 times
- ☐ C) 30 times
- ☒ D) 50 times
- ☐ E) 70 times
- ☐ F) 100 times

**102. (2.00 pts)**

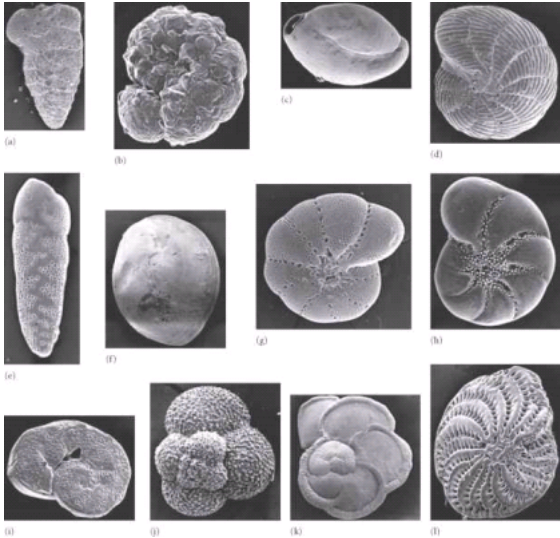




Identify the fossil to the lowest level on the rule sheet. If not on the rule sheet, please indicate so using "NOT ON THE SHEET" for points.

**Expected Answer:** Belemnitida

103. (2.00 pts)



Identify the image to lowest level on the fossils list (Yes, these are all the same thing). If not on the fossils list, write "NOT ON LIST" for full credit.

**Expected Answer:** Foraminifera

104. (1.00 pts) Which rock on the fossils list is best for preserving the earliest life forms on Earth?

**Expected Answer:** Chert

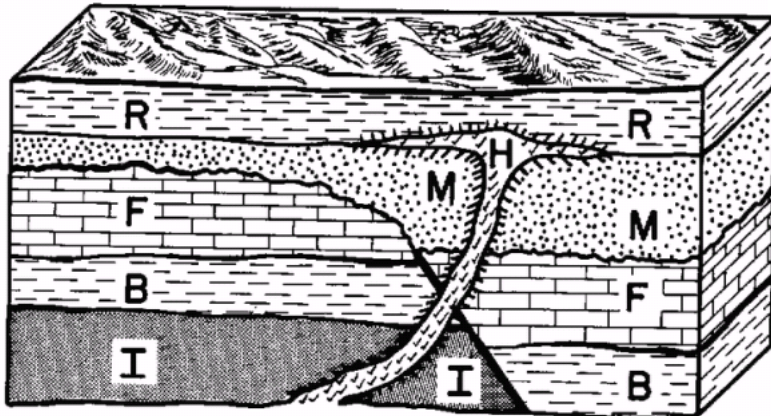
105. (1.00 pts) Which rock on the fossils list is the rock on the fossils list most commonly found as a constituent of petrified wood?

Expected Answer: Chert

106. (1.00 pts) Silicification is a type of \_\_\_\_.

Petrification

107. (0.00 pts)



The following questions will ask about the diagram above. The questions will be fill in the blank questions. Please respond using ONLY THE LETTER of the strata unless otherwise noted, or you risk losing points. DO NOT write anything in the "answer" portion of this question, or you risk losing points via penalty (at the ES's discretion).

Expected Answer:

108. (1.00 pts) Which of these layers is the oldest? \_\_\_\_

I

109. (1.00 pts) Letter F is most likely \_\_\_\_.

Limestone

**110. (1.00 pts)** What igneous intrusion is H?

**Expected Answer:** dike/dyke

**111. (1.00 pts)** This igneous intrusion is regarded as a \_\_\_\_\_ igneous intrusion.

Thanks for taking the test!

Again, if you have questions, concerns, complaints, or happy things to say, let me know via the forums (BennyTheJett) or discord (BennyTheJett1#3979).

Good luck with the rest of your events!

Also hmu with some good fossils memes. My binder cover's looking a little bland.