Review for the first exam – Historical Geology –

Expect any question on the material from the lectures, from Levin, Chapters 1-7; Milsom & Rigby, Chapters 3,4,6, and 9; and Gould, Introductions and Chapters 1 & 2. Memorize the time scale that Professor Shakel gave you.

1. What are fossils and give examples of things that are fossils and things that are NOT really a fossil.

2. What are stromatolites?

3. What is relative age dating and give examples.

4. What is protein synthesis.

5. What are the chains in DNA/RNA that are linked together by the four organic bases?

6. What is the appearance in an organism of a trait never before present in any of its ancestors called?

7. What is the oldest fossil evidence of life of any kind (on Earth) and where was it found in?

8. What was the Nobel-Prize-winning experiments of Dr. Miller at the University of Chicago in the 1950's and why was it important?

9. What is the idea that continents enlarge and "grow" by accretion of new materials around their margins?

10. What are shield, cratons, platforms?

11. What are cephalopods, what do they include, and what group do they belong to?:

12. What is a adaptive convergence and what is a good example?

13. Explain and be able to recognize the principles of : uniformitarianism., lateral continuity, original horizontality, superposition, unconformity.

14 What are amino acids and what is an essential ingredient of all amino acids?

15. What is fermentation and what relationship does it have to early Earth?

16 What are prokaryotic organisms, what do they include, when did they develop and what are their characteristics?

17. Why did a reduced atmosphere is favored for the early stages of the development of life?

18. What is the main aspect of the theory of evolution that we credit to Charles Darwin and how does it work?

19. Explain the difference between an angular unconformity, nonconformity, and disconformity and be able to recognize examples.

20. What are the essential elements of proteins?

21. What is "BIF", how old is it, what is its origin, and what type of mineral resource is it?

22. What is a "reduced" atmosphere and what would it contain?

23. What is the principle of original horizontality and the principle of superposition?

24. What is life as we know it on Earth based primarily on?

25. What are horn corals, what do they include, and what group do they belong to?:

26 What are ammonites, what group do they belong to, and when did they live?

27. A trend amongst biologists to divide life into three "super-kingdoms", or "domains" comes about mainly from what?

28. Tell the time significance of a contact that is an angular unconformity, and what difference (if any) there is if the contact in question were actually a disconformity.

29. What was / is the "Miller Experiment" and what did / does it have to do with the history of the earth?

30. What is (was) a trilobite?

31. What is (was) a crinoid?

32. What is (was) an ammonite?

33. In recent years it has become known that most life forms associated with deep sea hot springs actually receive most of their requisite nutrients from symbiotic chemosynthetic algae that live within the tissue of the animals.
    a) What would this knowledge lead us to conclude regarding any selective advantage/disadvantages relating to the origins of life on this planet?
    b) Does this association indicate the animals living around "black smokers" are among the first advanced life forms to develop in the oceans? (Why or why not?)

33. What is the molecular relationship between DNA/RNA and proteins? (Explain in some detail!)

34. What are the characteristics of the Archean? The Proterozoic? How do they differ in atmosphere, rock type, fossils, temperature, etc.?

35. Describe the difference between brachiopods and bivalves (pelecypods) in physical features and phyla that they belong to.

36. What are some of the major ore minerals in the Precambrian that are less common in the Phanerozoic?

Historical Geology Date _____ Name _____
Dr. Jan Rasmussen 520-603-7656 janras@comcast.net www.janrasmussen.com

These are the lecture topics since the mid-term exam:

Sauk sequence – Cambrian and Early Ordovician

1. What are cratonic sequences, what are the characteristics, who started the idea, and what causes them?

2. What is a transgressive sequence and how do you recognize it?

3. What is a regressive sequence and how do you recognize it?

4. What is the principle of temporal transgressiong?

5. What are the characteristics of a passive margin and what is an example?

6. How did the fossils of the Early Cambrian differ from those of the Late Cambrian?

7. What fossils occur in the Early Ordovician?

8. What is the transcontinental arch and where was it located?

9. How do the sediments of a passive margin differ from those of the continental interior?

10. How do the sediments of the Early Ordovician differ from those of the Cambrian?

11. What are the Cambrian formations in the Grand Canyon and what are their characteristics?

12. What is glauconite-bearing sediments and where does it form?

13. What was the plate tectonic scenario at the beginning of the Cambrian?

14. What is the Burgess Shale fauna?

Tippecanoe Sequence = Middle Ordovician – Late Silurian

1. What is the difference between Ordovician fossils and Cambrian fossils?
Cambrian =

Ordovician =

2. Why did stromatolites decline during Ordovician time?

3. What kind of reef communities developed in the Ordovician?

4. What major continental movements took place late in the Ordovician?

5. Why did sea level drop suddenly near the end of the Ordovician?

6. How long was the ice age?

7. What orogeny occurred in eastern North America and what did it consist of?

8. What kind of margin was eastern North America? Western North America?

9. What is a clastic wedge? Where is the Queenstown clastic wedge and what is it made of?

10. What sedimentary rock is at the base of the Tippecanoe Sequence in the central U.S.? and why is it the way it is?

11. What is an eurypterid?

12. What is the evidence that part of the Atlantic coastal states was once part of another continent that included Europe?

13. What kinds of ores occur in the Clinton group near Birmingham, Alabama and what economic influence did it have?

14. What other types of ore are typical of the Ordovician and Silurian rocks?

15. What types of environments and deposits occurred in the Silurian of the Michigan Basin?

16. What are ophiolites? And What environments do they indicate?

17. What are flysch deposits?

18. What are molasse deposits and where do they occur?

19. What is the plate tectonic history of the eastern U.S. and what is the evidence for it?

20. Are there any Tippecanoe sedimentary rocks in Arizona?

Kaskaskia Sequence – Devonian and Mississippian

1. What orogeny was responsible for the beginning of this sequence?

2. What is the Devonian known for in the fossil record?

3. What were some of the animals that first appeared in the Devonian?

4. What is the basal sandstone of the Kaskaskia sequence?

5. Describe the Catskill clastic wedge, its environment, rock composition, and its location and composition.

6. What are tabulate corals and give some examples?

7. What are rugose corals and give some examples/

8. What types of brachiopods were common in the Devonian?

9. What types of fishes developed in the Early Devonian? Late Devonian?

10. What types of plants and trees occurred in the Devonian?

11. What types of environments were occurring in Arizona in the Devonian?

12. What types of environments occurred in Arizona in the Mississippian?

13. What types of thick rock formations occur throughout the Central and western U.S. of Mississippian age and what occurs in those rocks?

14. What was the paleogeography of most of the U.S. during the Mississippian?

15. How is oolitic limestone formed and what does it look like?

16. What types of fossils are most common in the Mississippian?

17. What mineral and energy resources are common from the Mississippian?

Absaroka sequence – Pennsylvanian, Permian, Triassic

1. What orogeny represents the beginning of the Absaroka sequence?

2. What was the paleogeography of the Pennyslvanian?

3. What environment was common, especially in the eastern U.S. and Europe, that led to what great energy resource?

4. When did the first reptiles appear?

5. What new types of plants and trees were common then?

6. In the Late Pennsylvanian, what was happening in the Appalachians, Oauchitas and Marathon Mts. of Texas? Why?

7. What was happening in the western U.S. in terms of paleogeography and ancestral Rocky Mountains?

8. What types of sandstones occurred adjacent to the uplifts in the western U.S.?

9. What types of vertebrates were common in the Pennsylvanian?

10. Describe the Antler orogeny – where was it and what type of structure do we now see ? How is this shown on a map (the teeth –triangles0 point to upper or lower plate?)

11. What are cyclothems? And what is the sequence of rock types from bottom to top? What resource did this create and what environment did it come from? What caused this periodicity?

12. What was the paleogeography in the eastern U.S. in the Late Pennsylvanian-Permian?

13. What type of deposit is in the Paradox basin and why?

14. What continents were crashing into which?

15. What color and type of rocks are in the Arizona-Utah area of Late Permian - Triassic age? What environment did this represent?

16. What environment was common in the west Texas area and why is this important to our energy resources?

17. What types of plants and trees were common in the Triassic?

18. What was the environment at the end of the Permian and beginning Triassic?

19. What types of animals lived in the Late Triassic in the Petrified Forest area?

20. What was happening in the east coast of the U.S. in Late Triassic time? And what did this represent in terms of plate tectonics? What type of rocks are evidence of this?

21. After the Paleoxoic ended, the western U.S. became the leading edge of the plate motion. What did this mean in terms of where the mountain building was occurring and what types of rocks?

22. Why are there petrified logs in the Triassic Chinle Formation (Petrified Forest Member)? Whjat environment did this represent? And where did the silica come from?

23. When was the biggest marine animal extinction event? What types of animals became extinct? Why did this happen?

Zuni sequence – Jurassic and Cretaceous

1. What orogenies occurred during the Jurassic? Where? What is the evidence?

2. What orogeny occurred during the Cretaceous? Where? What is the evidence?

3. What orogeny occurred at the end of the Cretaceous, beginning of the Tertiary and where is the evidence?

4. What ore deposits are associated with the above orogeny here in Arizona?

5. What major group of animals developed strongly in the Jurassic?

6. When did the birds first appear in the fossil record?

7. Describe the Jurassic paleogeography. What ocean opened first?

8. When did the Gulf of Mexico start to form and what were some of the earliest deposits? What environment did this represent?

9. How is that deposit important to the preservation of oil?

10. What was the environment like in western North America? What type of sandstone was important and what was its environment? Where was this environment located with respect to the equator and the trade winds and dry conditions?

11. What were some of the famous dinosaurs of the Jurassic?

12. What national parks capitalize on the scenery of Jurassic rocks?

13. What rocks of Jurassic age occur near Tucson?

14. What major porphyry copper deposit is of Jurassic age in Arizona?

15. Describe the paleogeography of the Middle Cretaceous in the central and western U.S. What types of rock deposits did this produce and how are they used today?

16. What animals made up the reefs of the Cretaceous? What is the composition of the White Cliffs of Dover?

17. What types of rocks were being emplaced deep below the Sierra Nevada Mountains? Why are these rocks at the surface today?

18. What is a batholith and where are the biggest ones now found?

19. Describe the three types of energy resources from the Mesozoic and describe how and when they formed?

20. What are some Cretaceous rhyolite flows near Tucson and what type of environment do they represent?

21. What types of ore deposits are common in southern Arizona and how did they form?

22. What orogeny ended the Zuni sequence?

23. What was the environment all over the world at this time?

Tejas sequence – Tertiary

1 What caused the extinction of the dinosaurs?

2 What major mountain range was formed at this time and what continental collisions caused it?

3 What was the speed of plate tectonics (sea floor spreading) at the end of the Cretaceous? How did this affect the type of subduction?

4 What are some major granite exposures near Tucson of latest Cretaceous, early Tertiary age?

5 What is the Eocene erosion surface? What sedimentary evidence is there for this in Arizona?

6 What is the Early Tertiary paleogeography? Where was the ocean? Where were there lakes?

7 Describe the Gulf Coast sedimentary sequence – thin or thick and why?

8 What environment does the Badlands and White River formation and what is its age and what types of mammal fossils occur in it?

9 Where were the Cenozoic basins and what are some of the mineral resources in them?

10 Describe the difference between the Paleogene and Neogene in terms of the temperature, animals and plants.

11 What industrial mineral resource is found in the eastern Tucson area of early Tertiary age and how did the Indians use it?

12 How did the San Andreas fault get started? And What type of plate boundary is it? How are the plates moving along it? And how did this affect the country to the east of it?

13 Explain how and where the Basin and Range province developed and what does the topography look like?

14 What type of plate motion do the East African rift valleys represent?

15 What plate tectonic event of mountain building caused a major reorganization of plate motions and what climates resulted all over the world?

16 What major plant group became most abundant during the Cenozoic? How does this benefit us?

17 A large volume of the mountains around Tucson (the Galiuros, White Mountains, Chiricahuas, Superstitions, N. Tucson Mts, etc..) resulted from what types of volcanic eruptions and when?

Pleistocene – Ice Ages

18 When did the glaciers become very prominent?\

19 How far into the North American and European continents did the maximum extent of the glaciers go? When was this? When did the last major melting begin?

20 How many advances and retreats of the glaciers have occurred within the last half million years?

21 About how long do the glacial states last? The interglacial (warm) stages last?

22 Where has the most recent volcanic activity occurred in Arizona? Washington?

23 Where are the end moraines in the U.S.

24 Where were the large pluvial lakes? Name some, including the one east of Tucson along Interstate 10.

25 What is glacial till and how does it differ from glacial outwash?

26 What happened to the vegetation zones/climate zones during the glacial advances compared to the present?

27 When have the major periods of glaciation occurred in the last 2.5 billion years?and what plate tectonic/orogenic events are common to these occurrences?

28 How has the amount of carbon dioxide in the atmosphere changed since 100 million years ago? What was the climate like then?

29 During the last 2 million years in the U.S. there were 4 major advances and retreats of glaciers. What is the name of the last glacial stage? What type of stage are we in now?

30 How has the temperature varied during the last 10,000 years and what effect has this had on civilizations?

31 What are the 3 major causes of glacial advances according to Milankovitch?

32 What are the pluvial lakes of the west and why did they occur?

33 Why do terraces form?

34 What is one of the major results of glaciers retreating?