MARINE ECOLOGY (MR-210)
HOMEQUIZ 7 (CH. 16)

NAME: _____
Due: Monday, April 24, 2017

TRUE OR FALSE (15 pts)

_____ The mesopelagic, which is characterized by dim sunlight, begins at about 200 m deep.

_____ The three zones of the deep sea in increasing depth are: Bathypelagic, Abyssopelagic, Hadalpelagic.

_____ The Deep Sea Benthos is always below the hadalpelagic zone.

_____ *Nautilus* achieves neutral buoyancy through removing ions from chambers in its shell.

_____ The most common fish species of the mesopelagic is characterized by a small size, many sharp teeth, and a row of ventral (belly) photophores.

_____ Vertically migrating mesopelagic animals encounter large changes in temperature.

_____ Bioluminescence can have a role in orienting to the surface during vertical migration

_____ In an experiment with a mesopelagic shrimp with blinders, the animal increased the light output of its ventral (underside) photophores when exposed to brighter light.

_____ Bathypelagic fishes usually have photophores on the head and sides of the body instead of on the ventral surface.

_____ Fishes of the deep pelagic, such as the anglerfish, cruise constantly in search of scarce food.

_____ To find a mate, a male deep-sea anglerfish uses a powerful sense of smell.

_____ The Oxygen Minimum Layer results from respiration and bacterial decay coupled with lack of photosynthesis.

_____ Among the most common large deep-sea benthic deposit feeders are ostracods.

_____ At cooler vents associated with trenches, one can find thick mats of archaea and bacteria.

_____ Primary producers at hydrothermal vents include cyanobacteria.

CHOOSE THE RIGHT ANSWER (40 pts)

1. The mesopelagic zone refers to the ocean depths in which there is:
   a) Enough light to support plant growth
   b) No light at all
   c) Dim light, but not enough for plant growth
   d) Enough light for primary production by bacteria
   e) Dim light, but enough to support only some hardy plants

2. In addition to food, deep-water animals depend on the surface for:
   a) Light
   b) Carbon dioxide
   c) Chlorophyll
   d) Oxygen
   e) All of the above choices are correct

3. The mesopelagic zone extends from about 200 m to about:
   a) 300 m
   b) 500 m
   c) 1,000 m
   d) 2,000 m
   e) 4,000 m

4. The main thermocline is located:
   a) In the mesopelagic
   b) Above the mesopelagic
   c) Below the mesopelagic
   d) It varies since the thermocline disappears in the tropics
   e) It varies since the thermocline moves up and down in the water column depending on the amount of oxygen

5. Photophores are:
   a) Specialized eyes
   b) Buoyancy-regulating organs
   c) Specialized jaws
   d) Light-sensitive organs that lack the lens of true eyes
   e) Light-producing organs

6. Which of the following is least likely to be seen in a vertical non-migrating mesopelagic fish?
   a) Weak bones
   b) Swim bladder
   c) Flabby muscles
   d) Small size
   e) Large eyes

7. Which of these groups of planktonic organisms would be least likely to be living in the mesopelagic?
   a) Arrow worms
   b) Ostracods
   c) Copepods
   d) Diatoms
   e) Pteropods

8. Which of the following is not true regarding the deep-scattering layer (DSL)?
   a) Position rises at night and moves down during the day
   b) Comprise of fish, shrimp, squids and jellyfish
   c) Found at depths of 300-500 meters
   d) Discovered by sonar
   e) Position is deeper on nights with a new moon

9. The tubular eyes of some mid-water animals are adapted for:
   a) Increasing the field of vision
   b) Producing light
   c) Seeing in the complete absence of light
   d) Sensing changes in depth
   e) Sensing changes in salinity

10. The presence of bioluminescent organs on the underside of mid-water fishes is involved in:
   a) Countershading
   b) Enlargement of silhouette
   c) Creating a transparency effect
   d) Cryptic coloration
   e) Counterillumination

11. Bioluminescence is used by mid-water animals in all of these except in:
   a) Communication
   b) Warning coloration
   c) Attracting prey
   d) Counterillumination
   e) Escaping from predators

12. The deepest of ocean waters are classified as:
   a) Bathypelagic
   b) Hadal pelagic
   c) Abyssopelagic
   d) Mesopelagic
   e) Lower epipelagic

13. The zone immediately below the bathyal zone is called the:
   a) Abyssal
   b) Hadal
   c)) Subbathyal
   d) Mesopelagic

14. Deep-sea pelagic fishes are characterized by all of the following except:
    a) Small eyes
    b) Absent or reduced swim bladder
    c) Color spotted with red
    d) Flabby muscles
    e) Large mouth and teeth

15. An important feeding adaptation among deep-sea fishes:
    a) Migration to shallower water to feed
    b) Feeding on males, hence the term "male parasitism"
    c) Ability to eat prey bigger than themselves
    d) Strong muscles that allow them to move fast to catch any available prey
    e) Absence of a stomach

16. Pheromones are special chemicals that are used to:
    a) Digest food
    b) Attract mates
    c) Catch prey
    d) Transport oxygen
    e) Produce bioluminescence

17. The deep-sea benthos consists mostly of:
    a) Deposit feeders
    b) Filter feeders
    c) Herbivores
    d) Omnivores
    e) Carnivores

18. The deep-sea scavengers include animals that feed on:
    a) Deep-sea plankton
    b) Bottom meiofauna
    c) Particulate organic matter
    d) Dead animals
    e) Bacteria

19. The "experimental lunch" that was left on the Alvin as it rested on the bottom revealed that deep-sea bacteria:
    a) Do not exist at all
    b) May cause diseases in humans exposed to them
    c) Break down organic matter faster than in shallow water as a result of high pressure
    d) Grow slower than shallow-water species
    e) Are identical to those found in shallow water

20. The energy source for the bacteria that thrive around deep-sea hydrothermal vents is:
    a) Hydrogen sulfide
    b) Light
    c) Heat from the hydrothermal vents
    d) Detritus
    e) Tube-worm tissues

21. Bacteria thriving around deep-sea hydrothermal vents are:
    a) Photosynthethic
    b) Photoautotrophic
    c) Heterotrophic
    d) Parasitic
    e) Chemosynthetic

22. The giant deep-sea hydrothermal vent tubeworm feeds on:
    a) Plankton
    b) Detritus
    c) Small bottom animals such as brittle stars
    d) Deep-sea bottom fishes
    e) None of the above choices are correct: the worm does not have a mouth

23. The major advantage that deep-sea benthic animals have over pelagic ones is that their food:
    a) Is easier to digest
    b) Falls to the bottom and stays in one place, thus being available for a longer time
    c) Gets to be eaten before it gets to pelagic animals
    d) Gets less decayed by bacteria
    e) Produces less detritus

24. A shrimp that occurs in large numbers around deep-sea hydrothermal vents does not have eyes. Light-sensitive cells on the top of the body, however, appear to be used to detect faint light from:
    a) Bioluminescent predators
    b) The surface
    c) Faint glow around vents
    d) Bioluminescent prey
    e) Mates

25. The most common fish in the mesopelagic are:
    a) Lanternfishes
    b) Bristlemouths
    c) Lancetfishes
    d) Cutlassfishes
    e) Hatchetfishes

26. Bioluminescence in mesopelagic organisms is produced by:
    a) Photophores
    b) Specialized cells
    c) Secretions
    d) All of the above
    e) A and B only

27. The condition that creates the largest problem in the deep sea:
    a) Salinity changes
    b) Temperature changes
    c) Pressure changes
    d) Food availability

28. Hermaphroditism and male parasitism is most common in:
    a) Fishes
    b) Tube worms
    c) Clams
    d) Crabs
    e) Shrimp

29. The most numerous organisms associated to the deep sea floor are:
    a) Macrofauna
    b) Epifauna
    c) Endofauna
    d) Meiofauna
    e) Infauna

30. Deep sea gigantism is most common in:
    a) Crustaceans
    b) Polychaetes
    c) Brittle stars
    d) Sea stars
    e) Sea spiders

31. The reason for deep sea gigantism is:
    a) Predation
    b) Related to reproduction
    c) Competition for food
    d) Competition for space
    e) Not known

32. An unknown fish has been brought to you to examine. This fish is black, relatively small with small eyes and weak, flabby muscles. This fish is most likely from the:
    a) Mesopelagic (vertical migratory)
    b) Mesopelagic (vertical non-migrator)
    c) Epipelagic
    d) Deep- sea pelagic
    e) Deep-sea benthic

33. Mesopelagic organisms are dominated by:
    a) Cnidarians, chaetognaths, crustaceans, fishes, and squids
    b) Diatoms, copepods, chaetognaths, and fishes
    c) Copepods, cephalopods, and large fishes
    d) Medusae, ctenophores, copepods, and squids

34. A biologist takes a surface plankton tow at night. Which of these animals caught in the tow surely is a vertically migrating mesopelagic animal?
    a) A chaetognath
    b) A squid with photophores
    c) A filter-feeding fish colored dark above and light below
    d) The larval stage of a barnacle

35. A whalefish is a mesopelagic fish with no scales, weak bones, and flabby flesh. What can you conclude about its lifestyle?
    a) It migrates vertically
    b) It must be an active swimmer
    c) It eats detritus
    d) It is a sit-and-wait predator

36. Unlike epipelagic fishes, some midwater fishes with tubular eyes have
    a) Two tiny eyes
    b) A retina only at the back of the eye
    c) Good vision in dim light
    d) Poor vision in any direction

37. The sonar echoes of the Deep Sea Layer (DSL) are due to
    a) Exoskeletons of shrimp
    b) Bones in fishes
    c) Shells of pteropods
    d) Gas-filled swim bladders

38. *Notostomus* is a shrimp with tiny eyes, huge gills, a soft exoskeleton, and a bright red color. Where might it live?
    a) In the mesopelagic zone
    b) At or near the oxygen minimum zone
    c) On the sea floor
    d) By hydrothermal vents

39. Even if it can tolerate low food concentration and cold water, a fish from the epipelagic realm would die at extreme depths because of the effects of
    a) Low oxygen
    b) Pressure
    c) Salinity changes
    d) Stratification

40. In fishes, bioluminescence is produced by
    a) Special glands
    b) Ink sacs
    c) Photophores
    d) Chromatophores

FILL IN THE BLANKS (45 pts)

1. The water below the photic zone can be divided into the _____ and the deep sea. The deep sea pelagic is often divided into the _____, the _____, and _____ zones. The distinction between the mesopelagic and deep sea pelagic is based on the penetration of _____ whereas the division of the deep sea pelagic into different zones due mainly to _____ and/or _____, and the availability of food.

2. As ocean depth increases, both the amount of food and the abundance of life _____.

3. Most midwater fishes have adapted to the lack of food by developing _____ mouths and _____ jaws equipped with formidable teeth. They also have very _____ feeding habits.

4. Midwater fishes that make vertical migrations differ from non-migrators in the degree of development of their _____ , bones, and _____ .

5. Sensory adaptations in midwater animals include _____ and, in fishes, a well-developed _____ , which may explain the long bodies of many fishes.

6. The _____ refers to the concentration of vertically migrating midwater animals that show up on sonar. It consists mainly of _____ , _____, and _____ .

7. _____ refers to the use of bioluminescence to mask the silhouette. Other possible uses of bioluminescence include (i) _____ , (ii) _____ , (iii) _____ , and (iv) _____.

8. The oxygen minimum layer results from _____ in the mesopelagic.

9. Physical characteristics of the deep sea include a lack of light, constant salinity, low _____ , and great _____.

10. The most common deep-sea pelagic fishes are _____ and _____.

11. Common adaptations in the deep pelagic realm include _____ size, _____ mouth, _____ stomachs, _____ coloration, _____ muscles, and the lack of a _____ .

12. Solutions to the problem of finding males in the deep sea include the use of _____ , and _____ as signals, _____ , _____ in which the male attaches to the female.

13. The two main factors that probably control the depth ranges of deep-sea organisms are _____ and _____ .

14. _____ feeding is the main mode of feeding in the deep-sea benthos.

15. Deep-sea hydrothermal vents support rich biological communities. The primary producers in these communities are not plants but _____ bacteria that use _____ instead of light to produce organic matter.

16. Among the most common large deep-sea benthic deposit feeders are _____.