WFSC 448 Exam 2

1. Suction feeding
2. Filter feeding
3. Encrusting/biofilm food
4. Wood eating
5. Durophagy
6. Quick terminal jaw velocity
7. Prey entrapment
8. Flesh carving
9. Long pincer-like jaws (needlefish, gar)
10. Protrusible jaws
11. Large bucchal area
12. Internal crushing plates/molariform teach
13. Platyrhyne (Short snouts
14. Beak-like mouths or spatulate teeth
15. Long thin narrowly spaced gill rakers
16. Long stout gill rakers
17. Raspy lips
18. Sharp knife or chisel-lie teeth
19. What type of drag is created by fish displacing water ahead of its movement and filling in of water behind its movement?
    1. alimentary
    2. locomotion
    3. friction
    4. pressure
    5. parasitic
20. What drag is reduced by minimizing surface area? (responses as above)
21. What is a good fish body shape for maneuvering around riprap or reef?
    1. elongate (pike, needlefish)
    2. disciform (bluegill, damselfish)
    3. fusiform (trout, shark)
    4. round (pufferfish)
    5. ventrally flattened (sucker, goby)
22. Thunniform fishes like tuna are efficient swimming cruisers because they:
23. they mainly use their median fins for swimming
24. maintain warmed red muscle near their vertebral column
25. have a low-friction tail
26. waste little energy through angular acceleration by wagging their tail
27. they have a very large caudal/posterior region with which they can push againt water
28. all of the above
29. b-d above
30. c-e above
31. Which of the following characteristics implies greater friction drag
    1. more mass
    2. more skin
    3. more lipid
    4. more spherical shape
    5. smooth scales
32. Which of the following are ways a shark generates lift
    1. fins acting as ailerons/rudders
    2. oil in their heads
    3. high aspect ratio tail with lagging bottom lobe
    4. massive downturned snout
    5. bony skeleton
    6. all of the above
    7. a-c
    8. c-e
33. Kinematic optimization in fish would best be illustrated by which of the following
    1. getting behind a current brake
    2. changing tailbeat frequency to save energy
    3. moving to the river substrate to reduce current
    4. suppress metabolism to save energy
    5. all of the above
    6. c and d
34. How does fish muscle conformation create the body curvatures used in swimming?
    1. initial slow use of muscles warms them to optimally efficient temperature
    2. axial muscles run from the skull directly to tail and creates a ‘C’ bend to one side then the other
    3. sideways W-shaped myomeres attach to the vertabra and spines aft and skin/integument rear and opposing propulsive waves running out of sync left and right create carrangiform motion of the peduncle
    4. hypaxial muscles create an initial ‘C’ shape and the caudal peduncularis straightens it generating thrust
    5. all fins are interconnected by muscles that flap them in timed patterns to work together for forward thrust

Label each of the following as relevant to red, white, both, or neither type of muscle tissue (R, W, B, N)

1. profuse with red blood cells
2. profuce with white blood cells
3. requires many mitochondria and much oxygen for use
4. good for sudden bursts of excess power
5. good for efficient swimming
6. predominant muscle type in tuna, sharks
7. predominant muscle type in flounder, bluegill
8. contains localized stores of fish oil
9. produces lactic acid
10. Webb’s triangle diagrams principles applicable to comparisons among
    1. fish species typical to alternative habitats
    2. fish shapes adapted to alternative habitats
    3. populations within a species but with different habitat conditions
    4. individuals in populations who developed in different conditions
    5. all of the above
11. An example of transitive inference in fishes is
    1. tit-for-tat predator inspection
    2. recognizing from a chain connected events A-beats-B, B-beats C, C beats D, D beats E. So a fish observing then given a choice between B or D (who the observer both saw win one and lose one encounter, but never observed them to intereact with each other), chooses to be near D
    3. he decline in agression between known rivals due to having settled rank
    4. the prisoner’s dilemma
    5. the dear enemy effect
12. According to the prisoner’s dilemma, if you are a fish in a single interaction of predator inspection with a stranger, you should:
    1. cooperate by offering the first inspection foray
    2. cheat by holding back while the other inspects the predator
    3. sucker punch the stranger immediately to make him vulnerable to the predator
    4. wait for predator attack and sucker punch the stranger before fleeing
    5. deceive the stranger with swagger suggesting you are not fearful
13. Male cleaner fish appear self aware in that they
    1. know their cleaning station has a reputation
    2. punish partner females who cheat by picking flesh from clients
    3. are more likely to cheat if there are many clients to spare
    4. clean twice as hard when females are observing
    5. all of the above
14. Swordtail fish are more likely to attack which of the following:
    1. strangers who lost a fight the focal swordtail did not witness
    2. strangers who won a fight the focal swordtail did not witness
    3. fish who lost a fight the focal swordtail witnessed
    4. fish who won a fight the focal swordtail witnessed
    5. strangers who are larger than the focal swordtail
15. A male fish who lost a fight in front of a female observer will
    1. court her more agressively in compensation
    2. court her less agressively as if he knows his effort has reduced value
    3. court her agressively in the presence of a new stranger male
    4. go to a corner and court himself in consolation
    5. start another fight in front of her to redeem himself
16. Female guppies observing another female choose a given male will also tend to choose that male.

Male fish observing a female choose a given male will

* 1. avoid being with that male in front of her
  2. attempt to be with that male in front of her
  3. precisely copy the behaviors of the preferred male
  4. change color to more closely resemble the preferred male
  5. attempt to dominate the male in front of her

True or False (T,F)

1. Fish are known to communicate across species lines
2. Fish are known to decieve members of other species
3. Fish are known to decieve members of their own species
4. Fish are known to punish those who did them wrong
5. Fish are known to copy the choices made by other fish.
6. Fish are known to use the fact they will be copied to trick observers.

BTW, Dr. D noted that fish were not yet known to pass the mirror test. As it turns out they recently found fishes who can pass the test (try Google Scholar for more)

1. Guppies evolved millenia ago the optimal solution to the iterated prisoner’s dilemma, which is to play:
   1. ‘hawk’ (cheat only) strategy
   2. tit for tat
   3. tit for tat with a specific propensity for forgiveness
   4. tit for larger partners, tat for smaller
   5. tit when partners are watching, else tat
   6. random strategies to not be predictable
2. Electric fishes show what body elements convergently evolved
   1. long straight bodies
   2. large brains
   3. preference for ion-free water
   4. small size
   5. all of the above
   6. a and b
   7. a and c
3. Weakly electric (sensing) fishes can detect what about conductive objects in their environment
   1. size
   2. shape
   3. position
   4. all of the above
   5. a and c
4. Electrogenic fishes use their charge to
   1. signal conspecifics
   2. shock predators
   3. shock prey
   4. detect other organisms
   5. potentially all of the above
5. Eectroreceptors evolved from what existing sensory structure?
   1. barbels
   2. nasal chemoreceptors
   3. taste buds
   4. lateral line pores
   5. hair cells
   6. optical pigments
   7. heat sensors
6. Electrogenic cells in torpedo rays served as the design inspiration (biomimicry) for which human invention
   1. voltmeter
   2. electric wires
   3. light bulb
   4. battery
   5. radio
   6. microwave
7. How are objects detected using electric fields? Relatively conductive or nonconductive objects in an electric field…
   1. change the field’s geometric conformation
   2. generate magnetism
   3. resonate due to the stimulation and the pressure waves are sensed
   4. emit beta particles
   5. create heat

Joanna Kelley and Michi Tobler studied about a dozen species of fish under normal and heightened sulfur dioxide conditions. They tested for gene expression changes at 35,000 loci. What did they find? (T or F):

1. About two dozen genes were significantly altered in expression
2. No genes appeared to be impacted in terms of expression levels
3. Mutations were induced in about half of the genes
4. Of the responsive loci, generally different genes were responsive by species
5. Upregulated loci often were for special proteins that break down the toxic substance
6. Downregulated loci were predominantly related to intrinsic growth rate
7. Upregulated loci often were for enzymes used in anaerobic metabolism

Expression array analysis involves which of the following: (T,F)

1. translation
2. transcription
3. reverse transcription
4. DNA hybridization (DNA sticking to like sequences)
5. microsatellite DNA
6. fluorescent markers
7. tissue-specific results

Which of the following are adaptations to drying habitat in fishes? (Y, N)

1. aestivation
2. metabolism suppression
3. physoclistous gas bladders
4. dessication resistant eggs
5. ability to move over land
6. Why do cave fish have reduced or absent eyes
   1. genes for eyes mutate over time and selection does not weed them out, leading eventually to eye loss by random processes.
   2. eyes and the brain matter to process visual cues are metabolically expensive tissue so selection actively eliminates genes for vision.
   3. the material normally devoted to eye production modifies to new functions.
   4. disease associated with bat guano selects for eye loss
7. Why do freshwater fish lack antifreeze proteins?
   1. most exist at the equator
   2. the arctic and antarctic are surrounded by salt waters
   3. freshwater does not typically get below 4 C except for the icy crust
   4. it just hasn’t evolved
   5. these proteins are toxic in freshwater
8. Approximately what % of deep sea animals are bioluminescent?
   1. under 3
   2. 10
   3. 50
   4. 75
   5. over 95
9. What is the neat ‘trick’ gill epithelia conduct to keep ammonia flowing out of the fish?
   1. ammonia is converted to ammonium sulfide which is highly soluble in water
   2. exporting ammonia (ions) is coupled with proton export and the proton converts ammonia to a form that cannot diffuse back into the fish
   3. constant flow of water over gills draws out the ammonia
   4. carbon dioxide being liberated by the gills at the same time renders the ammonia inert
   5. the ammonium is kept in the boundary layer attached to the surface of the gills where it crystalizes and flakes away