Bio-G10-Q3W4-Echinodermata and invertebrate chordata -Qs. Bank

Multiple Choice

Identify the choice that best completes the statement or answers the question.

 1.	What are the long, tapering arms of echinoderms	s ca	alled?
	b Tube feet	d.	Ravs
 2.	What is the endoskeleton of echinoderms compo a. Chitin	u. Dseo	d of?
	b. Calcium carbonatec. Cellulosed. Echinoderms do not have endoskeletons		
 3.	What are the structures used by echinoderms to p a. Ampullas	pry c.	open the shells of bivalves called? Pedicellariae
	b. Tube feet	d.	Rays
 4.	Which of the following structures allows water i a. Pedicellariae	into c.	and out of the water vascular system? Madreporite
	b. Ampulla	d.	Anus
 5.	Which of the following nutritional lifestyles are	fou	ind in populations of echinoderms?
	a. Herbivorous	C.	Decomposers
~	D. Carmivorous	u.	
 6.	which of the following echinoderms has a sessil		Brittle stor
	a. Sea my b. Sea cucumber	c. d	Sea urchin
7	Which of the following characteristics can be fo	u.	in the development of invertebrate chordates?
 /.	a Gill slits	c und	Postanal tail
	b. Notochord	d.	All of the above
8.	Which of the following structures is the progenit	tor	of the central nervous system in chordates?
	a. Notochord	с.	Muscle blocks
	b. Dorsal hollow nerve cord	d.	None of the above
 9.	What is the tunic produced by adult sea squirts r	nac	le of?
	a. Chitin	c.	Cellulose
	b. Calcium carbonate	d.	None of the above
 10.	Tunicates and lancelets are filter feeders. In orde	er to	o trap food, they secrete mucus from the —
	a. pharynx.	c.	gill slits.
	b. ciliated groove.	d.	None of the above
 11.	The type of symmetry found in all adult echinod	lerr	ns is
	a. horizontal	С.	bilateral
10		a.	
 12.	An animal that retains its chordate features throu	igh	out life is the
	a. seastar b. sand dollar	c. d	sea squirt
12	A coopter can hold tightly to the surface it is torre	u.	and the
 13.	A seastar can note ugnity to the surface it is tout		suction in the tube feet
	h endoskeleton	e. d	evespots
		.	e jespou



- 14. Identify the notochord in Figure 29-3.
 - a. A b. B

c. C d. D

c. C

d. D

- 15. The notochord shown in Figure 29-3 is surrounded on two sides by what?
 - a. endoderm c. exoderm d. mesoderm
 - b. ectoderm
- 16. Which structure in Figure 29-4 is a characteristic only chordates have?



Figure 29-4

Α a. b. B



- Figure 29-5
- 17. Where is the dorsal nerve cord in Figure 29-5?
 - a. within the tunic

- c. along the heart and circulatory system
- b. surrounding the pharynx
- d. it disappeared after the larval stage
- 18. What structure shown in the adult sea squirt in Figure 29-5 indicates it's a chordate?
 - gill slits a.
 - b. anus

- c. heart
- d. ciliated grooves

True/False

Indicate whether the statement is true or false.

19. If a sea urchin population underwent a population explosion, you might expect to see a rapid decline in the amount of algal life in the area.

- _____ 20. Sea stars and brittle stars both eat suspended organic particles.
- _____ 21. Most echinoderms have highly developed sense organs.
- _____ 22. The fact that echinoderms have deuterostome development is strong evidence that they are most closely related to chordates.

Completion

Complete each statement.

- 23. Tube feet are part of an echinoderm's ______, which is involved not only in locomotion, but also in ______, ____, and food collecting.
- 24. In a sea star, water enters and exits the water vascular system through a structure called the ______, a sievelike, disc-shaped opening on the ______ side of the body.
- 25. At some time in their life, all chordates possess a ______, a dorsal hollow ______, and a postanal tail.
- 26. During your early development, your notochord became your ______, and your pharyngeal pouches disappeared.
- 27. The ______ is derived from the ______ portion of the dorsal nerve cord, whereas the ______ is derived from the anterior portion.
- 28. At some time during their lives, all chordates have a muscular ______.
- 29. Jawlike appendages called ______ are modified spines found on seastars.
- 30. In chordates, the ______ is a bundle of nerves housed in a fluid-filled canal that lies above the notochord.
- 31. The ______ is a semirigid, rodlike structure in chordates that becomes a backbone in vertebrates.
- 32. The ______ regulates locomotion, gas exchange, food capture, and excretion for an echinoderm.
- 33. The long, spine-covered, tapered arms of seastars are called ______
- 34. The ______ is a round, muscular structure that is located on the opposite end from the suction cup on the tube feet.
- 35. The ______, paired openings located in the pharynx behind the mouth, are present only during embryonic development in some chordates.
- 36. The sievelike, disc-shaped opening in an echinoderm's body through which water enters and leaves is called the ______.
- 37. Echinoderms have ______, which are hollow, thin-walled structures that each have a suction cup on the end.
- 38. Adult sea squirts retain only their ______ as indicators of their chordate relationship.
- 39. ______ are small, baglike filter feeders that are covered with a tough layer of tissue called a tunic.

- 40. _____ can swim freely in the water, but these filter feeders spend most of their time buried in the sand with only their heads sticking out.
- 41. The paired openings located in the throat behind the mouth in chordates are known as
- 42. The earliest echinoderms in the fossil record had ______ symmetry.
- 43. Some chordate adults are sessile, while all the larvae are ______.
- 44. Larval forms of tunicates have ______ symmetry.

Matching

Match each item with the correct statement below.

- a. brittle star d. sea lily
- b. sea star e. sea cucumber
- c. sand dollar
- _____ 45. Has a flattened, immovable endoskeleton made up of fused plates
- _____ 46. Has thin, flexible rays made up of small, overlapping, calcified plates
 - 47. Has a flexible endoskeleton divided into rather long, tapering rays
- 48. Has tiny, calcified plates embedded in fleshy skin
- 49. Has feathery, branching rays made up of tiny, calcified plates

Short Answer

- 50. Write the names of the structures that make up the water vascular system in the order in which water passes through them.
- 51. If you found a small animal on the beach and noted that it had gill slits, muscle blocks, and a dorsal nerve cord, what else would you need to know to distinguish whether it was an invertebrate chordate or a vertebrate?
- 52. How did biologists determine that sea squirts and lancelets are closely related?
- 53. How are sea squirts and lancelets alike? How are they different?
- 54. Describe the process whereby a seastar feeds on a clam.
- 55. Why are echinoderms thought to be related to chordates?
- 56. What are the functions of the water vascular system?
- 57. Researchers induced male sea urchins to spawn out of season by placing them in an isotonic solution of potassium chloride. They recorded the number of males induced to spawn at different lunar phases: half moon (H), full moon (F), and new moon (N). From Table 29-1, what can you conclude about the influence of the lunar cycle on spawning?

Number of males induced to spawn								
Lunar phase	Total No.	No. induced to spawn	% induced to spawn					
Н	15	12	80					

Н	8	8	100			
Н	7	4	57			
Н	15	14	93			
F	12	10	83			
F	22	15	68			
F	25	16	64			
F	18	16	88			
Ν	12	12	100			
Ν	22	10	45			
N	16	7	44			
Table 29-1						

- 58. Fertilization in echinoderms may occur in high-current areas or in calm tide pools. Hypothesize as to which of these areas would result in a higher rate of fertilization. Defend your hypothesis.
- 59. When a fossil sea urchin is found with a large number of tube feet specialized in gaseous exchange, a paleoecologist infers that the water temperature at which the sea urchin once lived was tropical. What would be the reasoning behind such an inference?

Problem

Sand dollars have a system of food grooves on their ventral surface. When a thin veneer of food-containing sediment passes over their dorsal surface, fine particles of food in the sediment drop between the spines on the surface and are carried to the ventral surface. Once on the ventral surface, the fine matter passes to the food grooves. There, choice bits of detritus are captured by the tube feet, which border the grooves, and are helped along to the mouth.

Suppose that you are a taxonomist confronted with the task of determining the relationship among several families of the order Clypeasteroida, to which the sand dollars belong. You have many fossil sand dollars and are studying the differences in the arrangement of their food grooves. Refer to the diagrams in Figure 29-2.



Figure 29-2

- 60. Which characteristic of the food grooves seems to have survived variations in the sand dollars' environment? Refer to Figure 29-2.
- 61. Why would taxonomists use food grooves to trace the evolution of sand dollars? See Figure 29-2.
- 62. Hypothesize about the advantage of food grooves on the ventral side of sand dollars. Refer to Figure 29-2.
- 63. Using Figure 29-2, explain which families were easiest to place in side branches that did not further evolve.
- 64. What characteristic did you use to establish where to place the Mellitidae? Use Figure 29-2.
- 65. Which families in Figure 29-2 were most difficult to place? Explain.

Bio-G10-Q3W4-Echinodermata and invertebrate chordata Answer Section

MULTIPLE CHOICE

1. ANS: D

The long, tapering arms of echinoderms are called rays. They are covered with spines in many echinoderms.

PTS: 1

2. ANS: B

The endoskeleton of echinoderms is composed of calcium carbonate.

PTS: 1

3. ANS: B

Tube feet can attach to the shell of a bivalve using their suction-like tips. They can be used to pull the shell apart and gain access to its prey.

PTS: 1

4. ANS: C

The madreporite is a sievelike, disk-shaped opening on the dorsal side of an echinoderm's body. It allows water into and out of the water vascular system.

PTS: 1

5. ANS: D

Echinoderms have many different nutritional lifestyles. Some are herbivorous, while others can be carnivorous. Some feed on dead and decaying matter on the ocean floor.

- PTS: 1
- 6. ANS: A

Sea lilies are the only sessile echinoderms. All others have mechanisms for locomotion.

PTS: 1

7. ANS: D

All chordates have a notochord, a dorsal hollow nerve cord, gill slits, and a postanal tail during development.

PTS: 1

8. ANS: B

The cells in the dorsal hollow nerve cord form the brain and spinal cord.

PTS: 1

9. ANS: C

Tunicates secrete a tough sac made of cellulose, called a tunic.

PTS: 1

10. ANS: B

The ciliated groove captures food during filter feeding. Mucus is secreted in order to trap food.

PTS: 1

11.	ANS: B	PTS:	1	DIF:	В	OBJ:	29-1
	NAT: A1 C5 C6						
12.	ANS: D	PTS:	1	DIF:	В	OBJ:	29-4
	NAT: C5 C6 G1						
13.	ANS: C	PTS:	1	DIF:	В	OBJ:	29-1
	NAT: A1 C5 C6						
14.	ANS: B	PTS:	1	DIF:	В	OBJ:	29-3
	NAT: C5 C6 G1						
15.	ANS: D	PTS:	1	DIF:	А	OBJ:	29-3
	NAT: C5 C6 G1						
16.	ANS: C	PTS:	1	DIF:	А	OBJ:	29-4
	NAT: C5 C6 G1						
17.	ANS: D	PTS:	1	DIF:	А	OBJ:	29-4
	NAT: C5 C6 G1						
18.	ANS: A	PTS:	1	DIF:	А	OBJ:	29-5
	NAT: C5 C6 G1						

TRUE/FALSE

19.	ANS:	Т	PTS:	1
20.	ANS:	F	PTS:	1
21.	ANS:	F	PTS:	1
22.	ANS:	Т	PTS:	1

COMPLETION

2	23.	ANS:	water vascular system, gas exchange, excretion
2	24.	PTS: ANS:	1 madreporite, dorsal
2	25.	PTS: ANS:	1 notochord, nerve cord, pharyngeal pouches
2	26.	PTS: ANS:	1 backbone
2	27.	PTS: ANS:	1 spinal cord, posterior, brain
2	28.	PTS: ANS:	1 tail
2	29.	PTS: ANS:	1 pedicellarias
	30.	PTS: ANS:	1DIF: BOBJ: 29-1NAT: A1 C5 C6dorsal hollow nerve cord

31.	PTS: ANS:	1 notochord	DIF:	В	OBJ:	29-3	NAT:	C5 C6 G1
32.	PTS: ANS:	1 water vascular	DIF: system	B	OBJ:	29-4	NAT:	C5 C6 G1
33.	PTS: ANS:	1 rays	DIF:	В	OBJ:	29-1	NAT:	A1 C5 C6
34.	PTS: ANS:	1 ampulla	DIF:	В	OBJ:	29-1	NAT:	A1 C5 C6
35.	PTS: ANS:	1 pharyngeal po	DIF: uches	В	OBJ:	29-1	NAT:	A1 C5 C6
36.	PTS: ANS:	1 madreporite	DIF:	В	OBJ:	29-3	NAT:	C5 C6 G1
37.	PTS: ANS:	1 tube feet	DIF:	В	OBJ:	29-1	NAT:	A1 C5 C6
38.	PTS: ANS:	1 gill slits	DIF:	В	OBJ:	29-1	NAT:	A1 C5 C6
39.	PTS: ANS: Sea sq Tunica	1 uirts ates	DIF:	В	OBJ:	29-5	NAT:	C5 C6 G1
40.	PTS: ANS:	1 Lancelets	DIF:	В	OBJ:	29-5	NAT:	C5 C6 G1
41.	PTS: ANS:	1 pharyngeal po	DIF: uches	В	OBJ:	29-5	NAT:	C5 C6 G1
42.	PTS: ANS:	1 bilateral	DIF:	В	OBJ:	29-3	NAT:	C5 C6 G1
43.	PTS: ANS:	1 free swimming	DIF:	В	OBJ:	29-2	NAT:	C3 C5 C6
44.	PTS: ANS:	1 bilateral	DIF:	В	OBJ:	29-2	NAT:	C3 C5 C6
	PTS:	1	DIF:	В	OBJ:	29-2	NAT:	C3 C5 C6

MATCHING

45.	ANS:	С	PTS:	1
46.	ANS:	А	PTS:	1
47.	ANS:	В	PTS:	1
48.	ANS:	E	PTS:	1
49.	ANS:	D	PTS:	1

SHORT ANSWER

50. ANS:

madreporite, ring canal, radial canal, lateral canal, tube feet

PTS: 1 DIF: B OBJ: 29-1 NAT: A1 | C5 | C6 51. ANS:

You would need to know whether it had a backbone. If it had a backbone, it would be a vertebrate. If it had a notochord, it would be an invertebrate chordate.

52.	PTS: 1 ANS: by examini	DIF: ng their larval sta	A	OBJ:	29-4	NAT: C5 C6 G1
53.	PTS: 1 ANS: Both are ch bag-shaped retains its c	DIF: nordates. The larv l filter feeder with chordate features	A val sea squirt loo n gill slits retain throughout life.	OBJ: oks like ied as a	29-5 a tadpole with chordate feature	NAT: C5 C6 G1 chordate features. As an adult, it is a re. The lancelet has a fishlike shape and
54.	PTS: 1 ANS: To eat a cla stomach ou break down starfish wo	DIF: am, a seastar wou at of its mouth and a the clam until it uld retract its stor	A ld first use its t d spread the sto became a soup mach.	OBJ: ube fee mach o y liquio	29-5 t to force open to ver the soft part that the starfis	NAT: C5 C6 G1 the clamshell. Then it would push its rts of the clam. Stomach enzymes would sh could absorb. When it finished eating, the
55.	PTS: 1 ANS: Like chord invertebrat	DIF: ates, echinoderms es.	A s have deuteros	OBJ: tome de	29-1 evelopment. Th	NAT: A1 C5 C6 hey are the only major group of deuterostome
56.	PTS: 1 ANS: The water	DIF: vascular system r	A egulates locom	OBJ: otion, g	29-2 as exchange, fo	NAT: C3 C5 C6 ood capture, and excretion.
57.	PTS: 1 ANS: Answers m high and lo	DIF: ay vary, but stud w percents during	A ents should con g each lunar ph	OBJ: clude thase.	29-1 hat lunar phase	NAT: A1 C5 C6 did not affect spawning because there were
58.	PTS: 1 ANS:	DIF:	А	OBJ:	29-1	NAT: A1 C5 C6

Answers will vary. Students may suggest that a higher rate of fertilization would occur in the tide pool, where there is a better chance that the sperm and the eggs would meet and unite.

- PTS: 1 DIF: A OBJ: 29-1 NAT: A1 | C5 | C6
- 59. ANS: Answers will vary. An invertebrate's metabolic rate generally increases with temperature. Therefore, if gas exchange is sufficiently high to provide the oxygen needed for metabolism, the temperature of the environment must be high. Thus, sea urchins with a large number of tube feet that are specialized for gas exchange show an adaptation for survival in a warm environment.
 - PTS: 1 DIF: A OBJ: 29-2 NAT: C3 | C5 | C6

PROBLEM

- 60. ANS: All the sand dollars have five main food grooves radiating from the center.
 - PTS: 1 DIF: A OBJ: 29-1 NAT: A1 | C5 | C6

61. ANS:

The food grooves were etched into the endoskeleton and could be observed in fossils. Also, food grooves would likely adapt to changes in the sand dollar's lifestyle, diet, or environment.

- PTS: 1 DIF: A OBJ: 29-1 NAT: A1 | C5 | C6
- 62. ANS:

Answers will vary but may include that food grooves on the ventral side are advantageous to the sand dollar because its mouth is on the ventral side. Food can thus be passed by the tube feet on the ventral side, in assembly-line fashion, to the mouth.

- PTS: 1 DIF: A OBJ: 29-1 NAT: A1 | C5 | C6
- 63. ANS: The Arachnoididae, the Rotulidae, and the Astriclypeidae all were end-of-the-line side branches because their food grooves were so intricate that further variations were more difficult to improve upon.

PTS: 1 DIF: A OBJ: 29-1 NAT: A1 | C5 | C6

64. ANS:

Answers will vary, but students may use the numerous Y-shaped branches at the ends of the radial branches to show that the Mellitidae branched from the Scutellidae.

PTS: 1 DIF: A OBJ: 29-1 NAT: A1 | C5 | C6

65. ANS:

Answers will vary but may include the Mellitidae, the Astriclypeidae, and the Rotulidae because of their complexity.

PTS: 1 DIF: A OBJ: 29-1 NAT: A1 | C5 | C6