

Passage V

Some oceanic shrimp are vertical migrators. For vertically migrating species, most of the population is found at the bottom of their depth range during the day and at the top of their depth range at night. Table 1 shows the depth ranges and water, protein, lipid, and carbohydrate content of 3 vertically migrating (vm) species of shrimp and 3 non-migrating (nm) species of deep-sea shrimp. Figure 1 shows water temperature and oxygen partial pressure at various ocean depths.

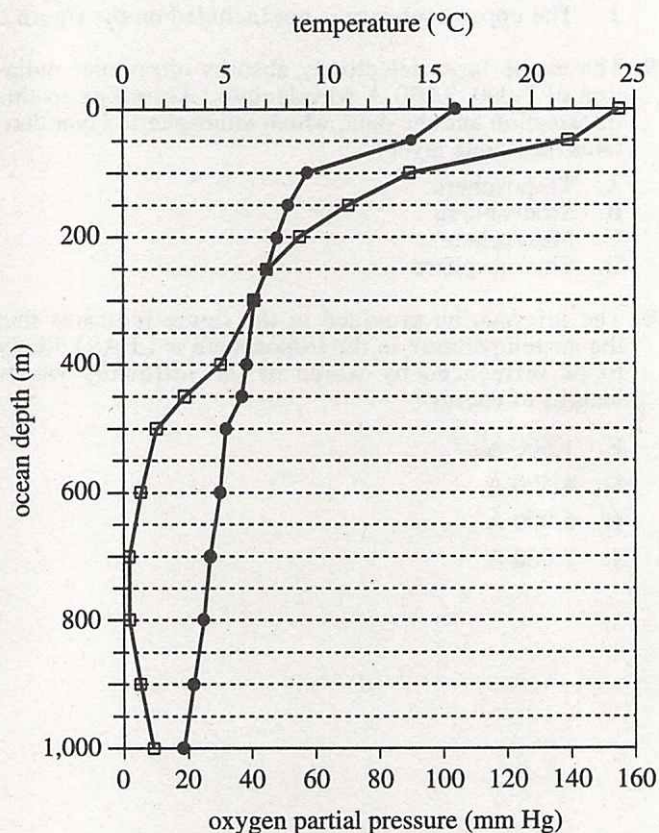
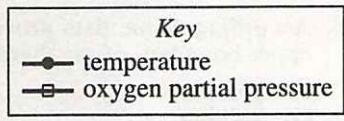


Figure 1

Species	Depth range (m)	Water content (% wet weight)	% ash-free dry weight		
			protein	lipid	carbohydrate
vm 1	300– 600	77.5	62.8	23.8	0.7
vm 2	10– 400	76.6	53.4	16.4	0.8
vm 3	75– 400	79.5	60.5	14.7	0.7
nm 1	500–1,100	75.9	36.9	36.1	0.5
nm 2	500–1,000	76.7	41.5	31.5	0.8
nm 3	650–1,100	72.8	35.8	49.0	0.5

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23. Based on the information in Table 1, one would conclude that vertically migrating shrimp have a higher percent content of:
- A. protein than lipid.
 - B. lipid than protein.
 - C. carbohydrate than lipid.
 - D. carbohydrate than protein.
24. On the basis of the information given, one would expect that, compared to the vertically migrating shrimp species, the nonmigrating shrimp species:
- F. have a greater water content.
 - G. have a lower percent lipid content.
 - H. can tolerate higher water temperatures.
 - J. can tolerate lower oxygen partial pressures.
25. Assume that shrimp of a newly discovered species of vertically migrating shrimp were captured at night at a minimum depth of 200 m. Assume that only temperature limits the range of this species. Based on the information in Figure 1, one would predict that the maximum water temperature these shrimp could survive in would be:
- A. 3.5°C.
 - B. 7.5°C.
 - C. 12.5°C.
 - D. 15.5°C.
26. Protein is a major component of muscle. Assume that shrimp that are strong swimmers tend to have a higher protein:lipid ratio than do shrimp that are weaker swimmers. On the basis of Table 1, one would conclude that which of the following shrimp species is the strongest swimmer?
- F. vm 2
 - G. vm 3
 - H. nm 1
 - J. nm 3
27. Assume that only oxygen partial pressure limits the range of the shrimp species shown in Table 1. Accordingly, which of the following pieces of information supports the hypothesis that vm 2 and vm 3 cannot tolerate oxygen partial pressures below 25 mm Hg ?
- A. They are not able to tolerate temperatures above 10°C.
 - B. They have unusually high water contents.
 - C. They are not found below a depth of 400 m.
 - D. They are not found above a depth of 100 m.