

Chapter 9

1.a. Look at the two diagrams (a and b) on page 354 and decide which sample shows the greatest taxonomic diversity and give your reason. The individuals collected in each sample are shown by the filled boxes - assume that in each case only a single individual was found for each species.

Answer

b – its five individuals are derived from three genera rather than two genera as in *a*.

1.b. Calculate the average taxonomic distance for each sample, given that the phylogenetic links are weighted as follows:

two individuals from the same species = 0

two species belong to the same genus = 1

two species belong to different genera = 2

two species belong to different family = 3

Remember that the average is derived from the taxonomic distance between all possible combinations of the individuals collected.

Answer

a = 1.6 (total weighted links = 16, 10 possible combinations)

b = 1.7 (total weighted links = 17 due to third genera sampled)

2. Why should the seafloors of deep oceans have

- a) some of the oldest taxa;
- b) high species richness;
- c) few dominant (abundant) species?

Answer

a – because these environments have been highly consistent for many millions of years;

b - generally there are nutrient-poor but with a highly consistent nutrient source (the upper waters) - the consistency of supply allows for niche differentiation;

c - the low nutrients prevent domination by any one species

3. Which of the following statements best explains how hierarchy theory (Section 8.1) might explain the buffering role of compartments in complex communities?

- a) Energy stays within a compartment so disruption is not passed to the larger community.
- b) There are strong links between compartments that hold the community together.
- c) They are strong links within compartments so that the loss of one species only causes that compartment to collapse.
- d) There are weak links between species in different compartments and the loss of one species in a compartment is not transmitted to the larger community.

Answer

d. Hierarchy theory would group species into functional groups, so the loss of one species would imply that other members of that compartment would continue to perform the role, perhaps increasing their abundance or activity. Weak links between species in different compartments suggest that this functional redundancy buffers the larger community.

4. Coral reefs are thought to recover from disturbance more readily than tropical forests because (select the best answer)
- a) Coral reefs are long lived and readily colonized from surrounding reefs
 - b) Coral reefs have “incorporated” disturbance and are readily colonized from surrounding reefs
 - c) Corals are often endemic to an area and speciate rapidly
 - d) Corals use zooxanthellae as symbionts and that allows them to build the coral superstructure rapidly

Answer b.

5. The graph below (see page 355) show the change in nitrogen fixation in three different soil communities with bacterial species richness. Which has the greatest functional redundancy and which the least? Write a sentence justifying your choices.

Answer c – N-fixation is largely constant over most of the range of S and only declines when S is very small; *b* shows the same sort of pattern, but maximum N-fixation is only achieved with a larger S. This implies that many more species are important in maintaining the function. The linear rise in N-fixation with S in *a* suggests that maximum levels are only maintained if all species are present, indeed that they have complimentary roles.

6. Which island is likely to have (i) the highest equilibrium S (ii) the highest rate of colonization (iii) the highest rate of extinction
- a. Near and small
 - b. Near and large
 - c. Far and small
 - d. Far and large

Answers (i) *b*; (ii) *b*; (iii) *c*