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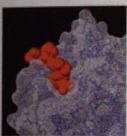
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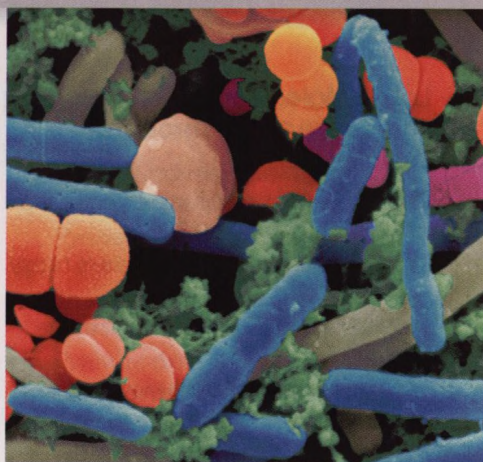
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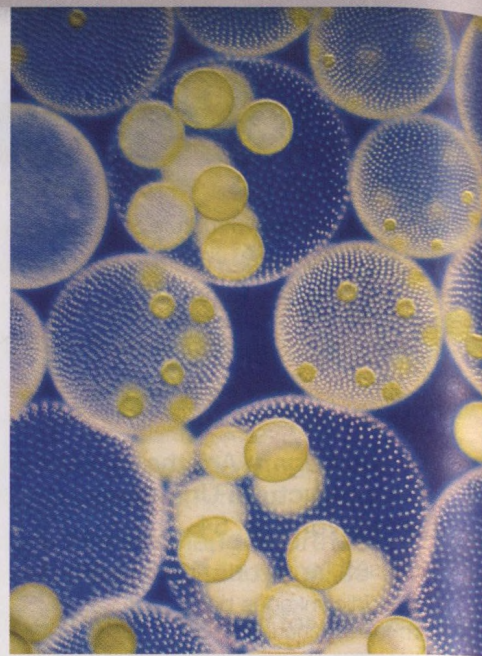
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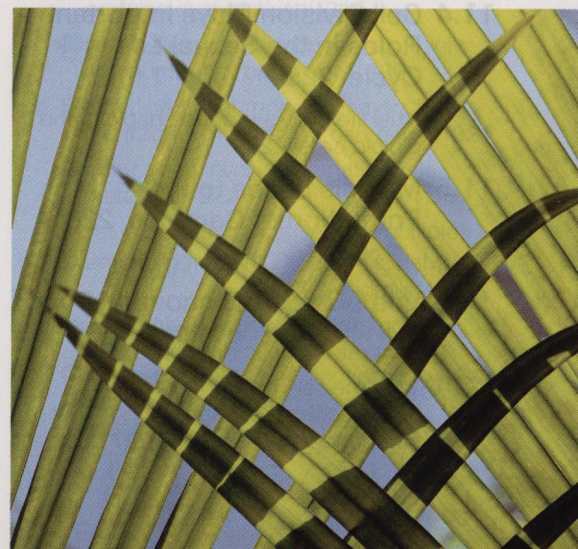
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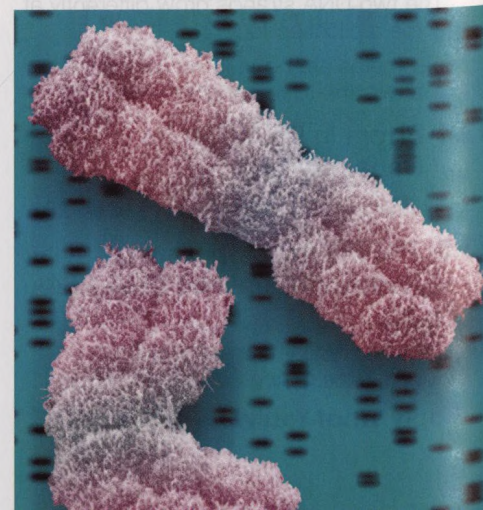
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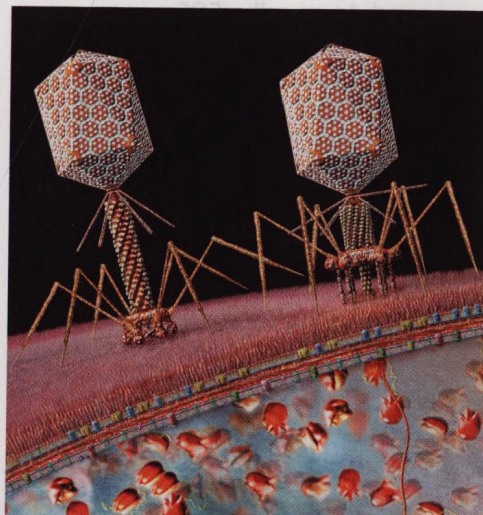
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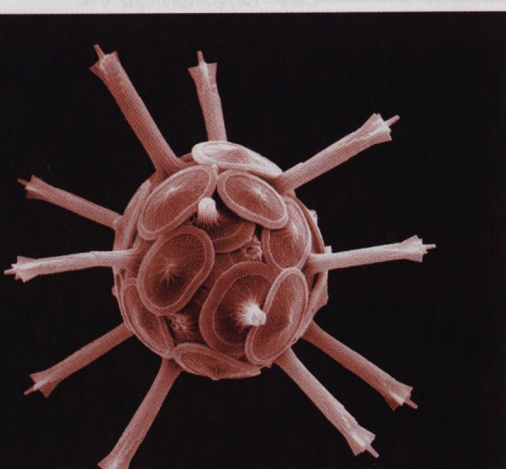
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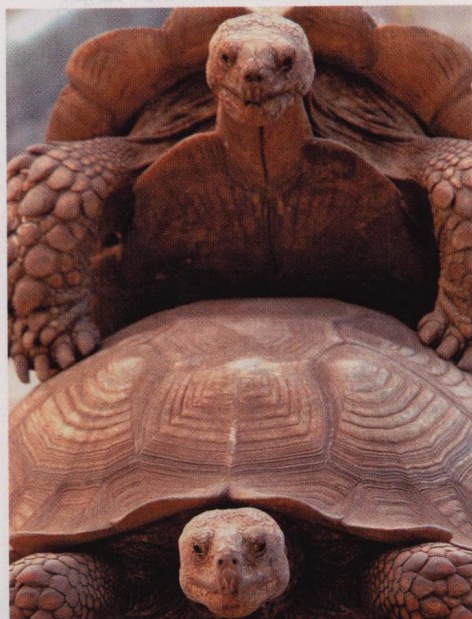
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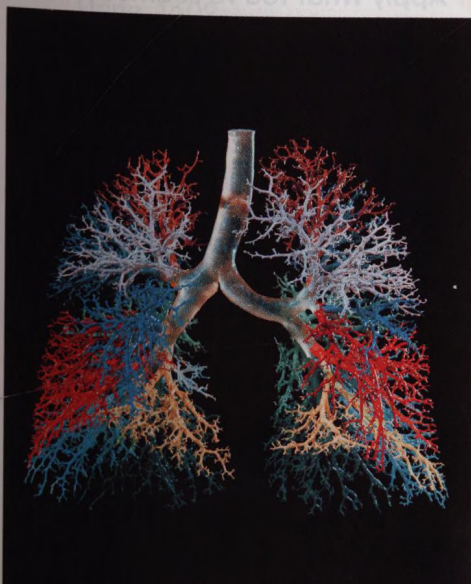
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56.3 Communities Are Complex Networks of Species Interactions That Vary in Strength and Direction 1212

Indirect interactions are important to community structure 1212

Strongly interacting species often regulate community structure 1214

Species with similar effects on one another may coexist by chance 1215

56.4 Communities Are Always Changing 1216

Change in communities can be caused by abiotic and biotic factors 1217

Succession is a process of change in communities over time 1217

Both facilitation and inhibition influence succession 1219

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Alternative successional pathways result in variations in community composition 1220

56.5 Relationships between Species Diversity and Community Function Are Often Positive 1222

Species diversity is associated with productivity and stability 1222

Diversity, productivity, and stability differ between natural and managed communities 1223

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57 Ecosystems 1227

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57.1 Ecosystem Science Considers How Energy and Nutrients Flow through Biotic and Abiotic Environments 1228

Energy flowing through ecosystems originates with sunlight and inorganic and organic compounds 1228

Nutrients cycling through ecosystems originate in soil, water, and the atmosphere 1229

57.2 Energy and Nutrients in Ecosystems Are First Captured by Primary Producers 1229

Net primary production is the amount of carbon remaining in plants after respiration 1229

Patterns of primary production vary with latitude and ecosystem type 1229



Rainfall and temperature largely control terrestrial primary production 1231

Light and nutrients combine to control aquatic primary production 1232

57.3 Food Webs Transfer Energy and Nutrients from Primary Producers to Consumers 1233

The amount of energy transferred within food webs depends on trophic efficiency 1234

Food webs are controlled by bottom-up and top-down forces 1235

The number of trophic levels can control the flow of energy through food webs 1236

57.4 Nutrient Cycling in Ecosystems Involves Chemical and Biological Transformations 1236

Water cycles rapidly around the globe 1237

The carbon cycle is being altered by human activities, resulting in climate change 1238

The nitrogen cycle is dominated by biotic processes 1240

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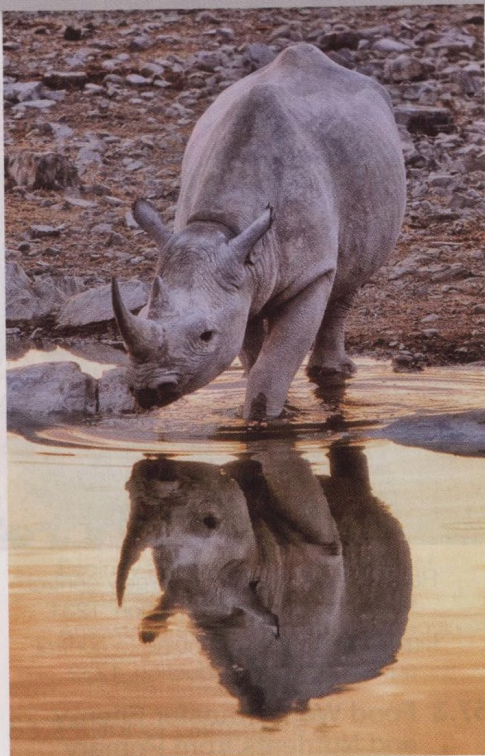
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- Biodiversity has great value to human society 1250
- Diversity loss at one scale affects diversity loss at other scales 1250
- Species diversity is being lost at unprecedented rates 1251

We can predict the effects of human activities on biodiversity 1253

58.2 Most Biodiversity Loss Is Caused by Habitat Loss and Degradation 1253

- Habitat loss and degradation endanger species 1253
- Overharvesting has driven many species to extinction and changed food webs 1254
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Species and ecosystems are already being affected by climate change 1260

58.3 Protecting Biodiversity Requires Conservation and Management Strategies 1262

- Protected areas preserve habitat and curtail biodiversity loss 1262
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- Captive breeding programs can maintain a few species 1264
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- Species invasions must be controlled or prevented 1265
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