BIOMES

DESERTS

DESERTS

- A desert is an area where evaporation exceeds precipitation. Less than 25 cm per year/scattered unevenly throughout the year.
- Deserts are generally found between the Tropic of Cancer and Tropic of Capricorn
- Deserts cover about 30% of Earth's land- mainly between tropical and subtropical regions.
- Largest areas are in the interiors of continents on downwind sides of mountain ranges because of the rain shadow effect.
- Heat by sun during the day radiates most of its heat into the atmosphere because there is little vegetation to hold it.

DESERT BIOME

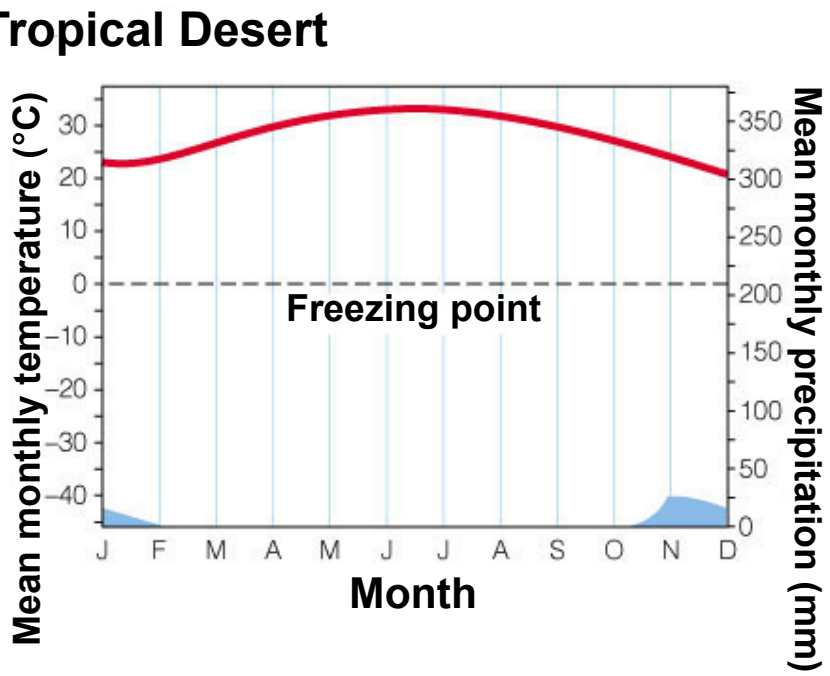
FLORA

- Wax coated leaves, deep roots to tap into groundwater, shallow roots to collect water, and drop leaves to survive in dormant state during dry spells.
- Store biomass in seeds and remain inactive during dry periods.
- Shortly after rain, seeds germinate, grow, bloom, produce new seed, and die.

FAUNA

- Hide in cool burrows or rocky crevices by day & come out at night
- Physical adaptations for conserving water. Insects and reptiles have thick outer coverings and dry feces, dry urine.
- Spiders get water from dew and the food they eat
- Become dormant during periods of heat

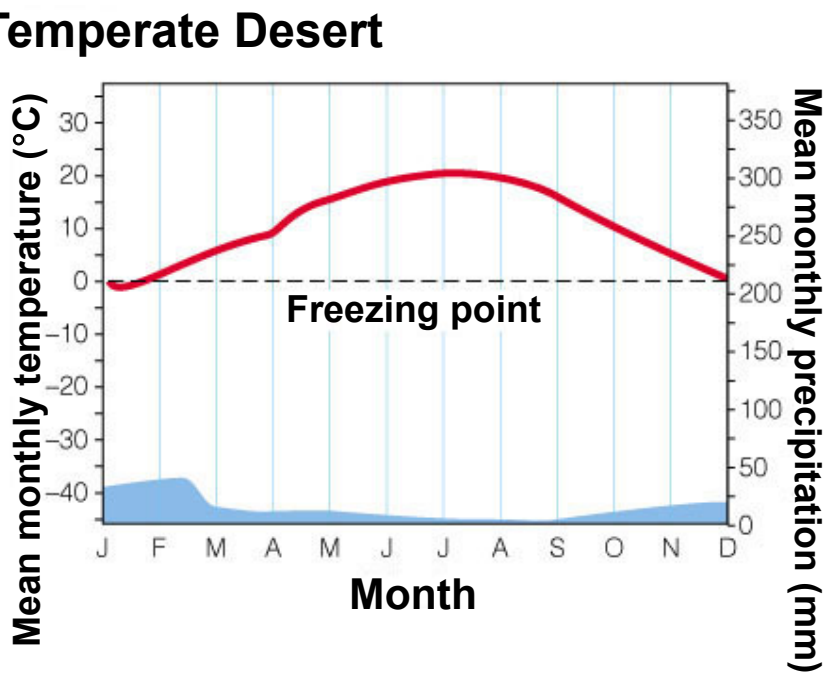
TROPICAL DESERT



- High temps all year & little rain (1 or 2 months per year.)
- Few plants with windblown surface sand.
- Example: Sahara in Africa

Fig. 5-12a, p. 109

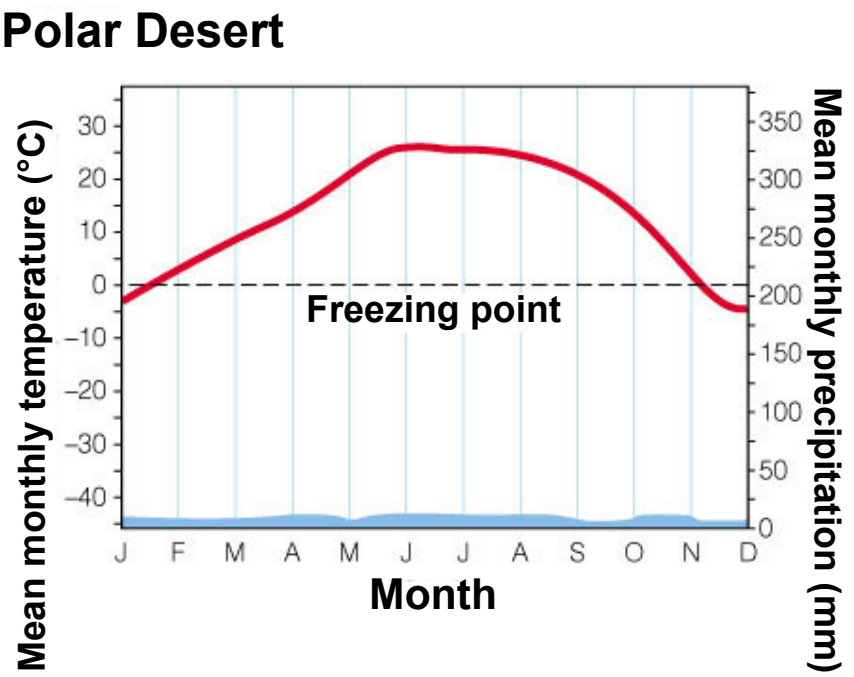
TEMPERATE DESERT



- Daytime temps high in summer and low in winter, more precip than tropical.
- Vegetation is sparse.
- Example: Mojave in S. Cal.

Fig. 5-12b, p. 109

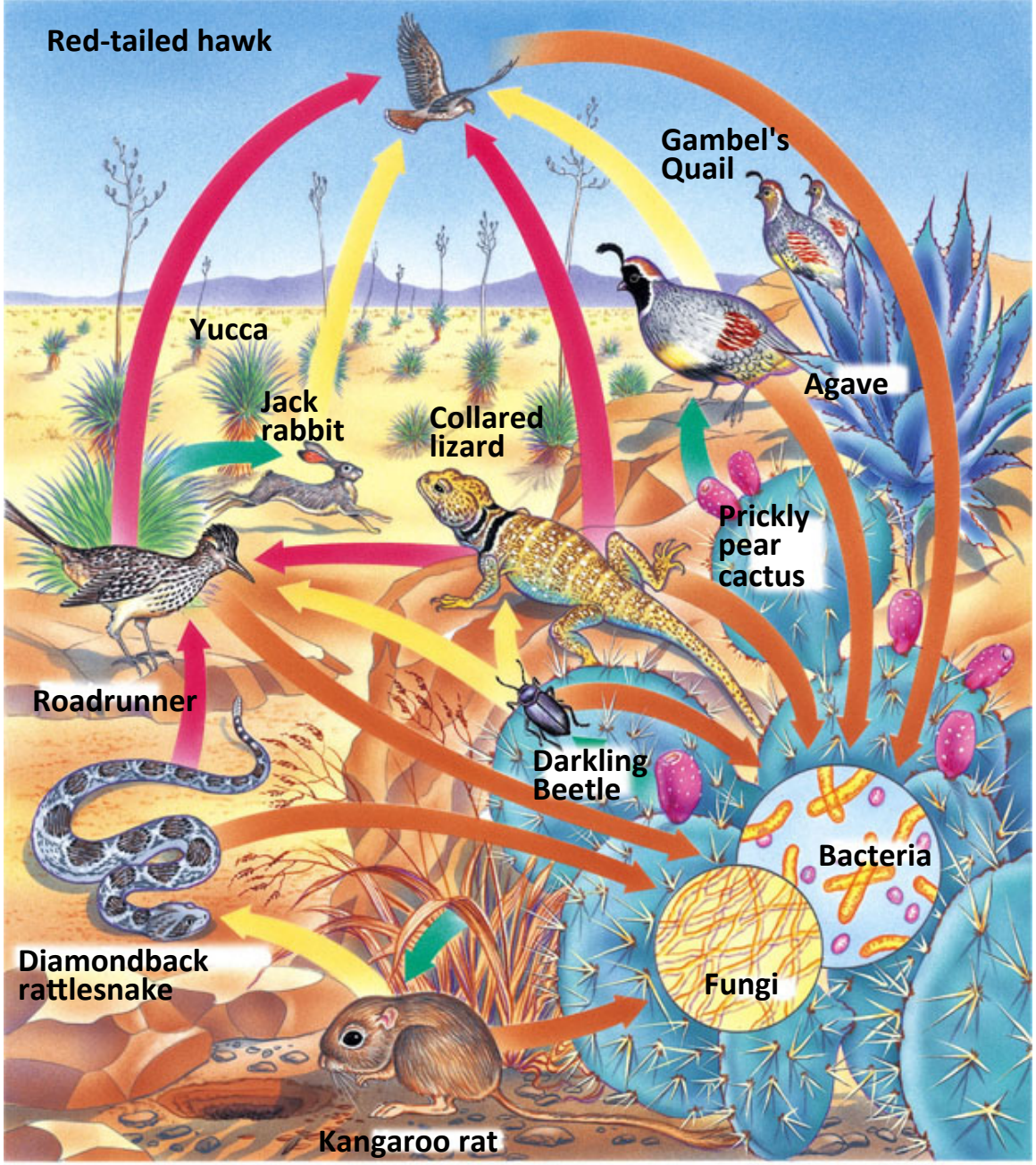
POLAR DESERT



- Winters are cold, summers hot.
- Precipitation low.
- Example: Gobi in China

Fig. 5-12c, p. 109

TEMPERATE DESERT FOOD WEB



Producer to primary consumer

Primary to secondary consumer

Secondary to higher-level consumer

All producers and consumers to decomposers

Fig. 5-13, p. 110

HUMAN IMPACT

- Deserts take a long time to recover from human disturbance because:
  - slow plant growth
  - low species diversity
  - slow nutrient cycling
  - water shortages
- Vegetation destroyed by livestock or off-road vehicles may take DECADES to grow back.

GRASSLANDS

GRASSLANDS AND CHAPARRAL BIOMES

- Located between 55 N and 30 S
- Grasslands are regions with enough average annual precipitation to allow grass to grow. Precipitation is erratic and fires prevent large stands of trees. Most found in interiors of continents.
- Grasslands (prairies) occur in areas too moist for desert and too dry for forests. The cold winters and hot dry summers have deep and fertile soil that make them ideal for growing crops and grazing cattle.
- Savannas are tropical grasslands with scattered tree and herds of hoofed animals.
- Chaparral has a moderate climate but its dense thickets of spiny shrubs are subject to periodic fires.
- The cold winters and hot dry summers have deep and fertile soil that make them ideal for growing crops and grazing cattle.

GRASSLANDS

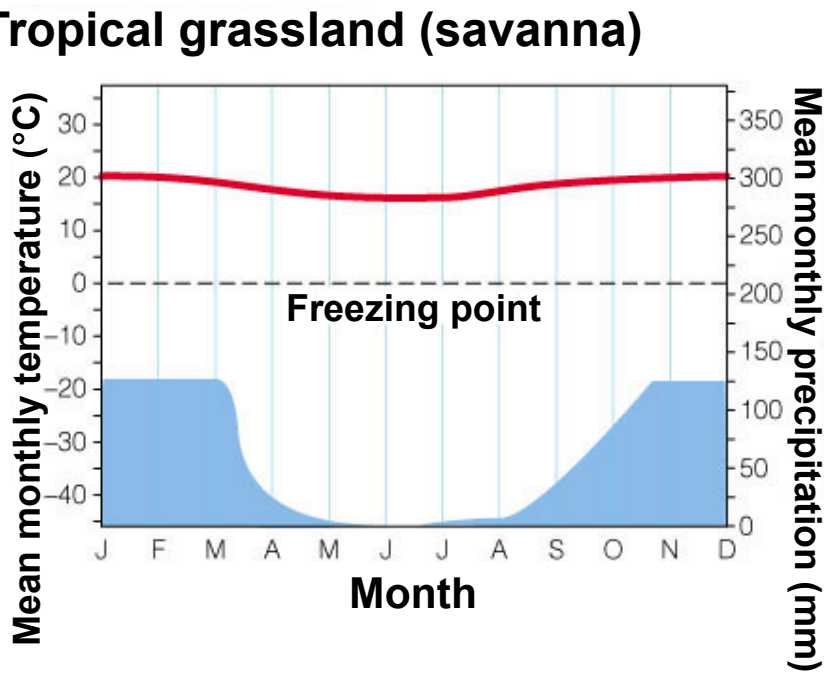
FLORA

- Grass is the dominant vegetation, but there are also many wild flowers like prairie rose, gumweed, gumbo primrose, spiderwort, golden rod, clover, wild indigo, and coneflower in the grasslands.

FAUNA

- Includes animals that burrow under the ground (crickets and beetles), those that graze and eat the grass (Bison and prairie chicken), and you will find lots of great hunters out there in the grassland biome. They include the coyote, bobcats, eagles and Gray Wolves. Small creatures do very well in the grassland biome. It is important to note that the terrain can be very different among the various grasslands, which why there is such diversity with animals and plants living in one grassland biome but not others.

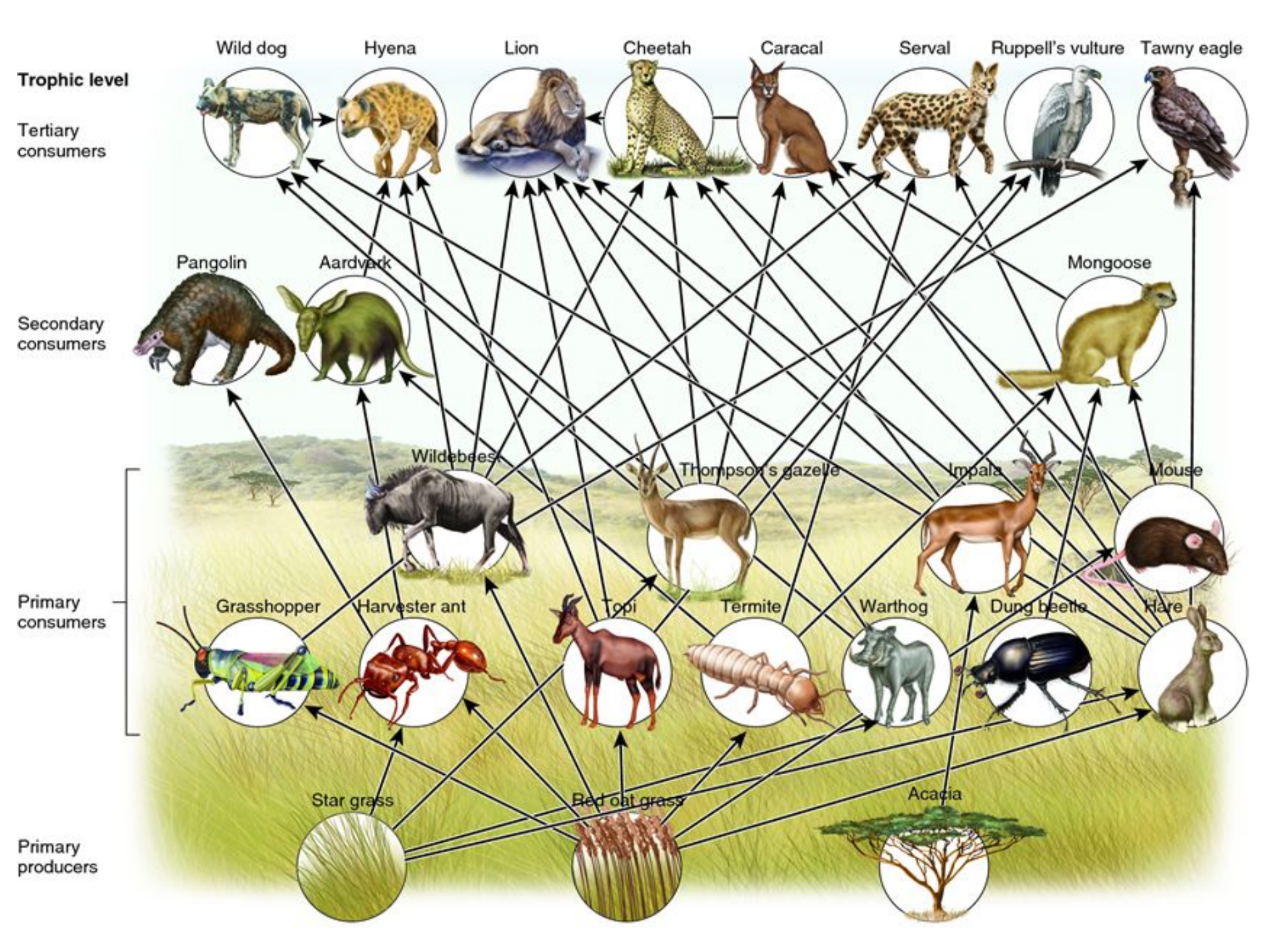
TROPICAL GRASSLAND



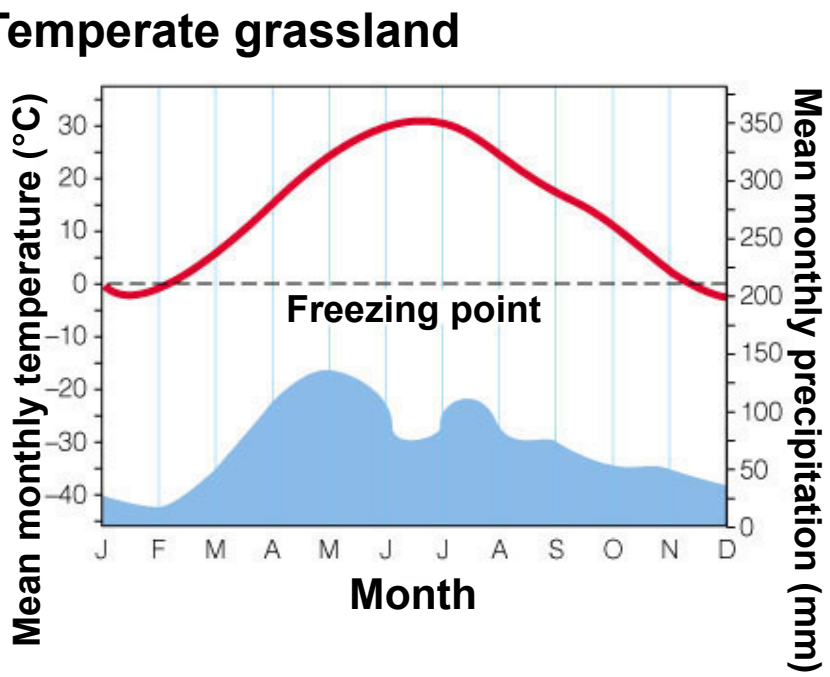
High temps, low to moderate precip, prolonged dry seasons. Occur on either side of the equator beyond borders of tropical rainforests.

Savanna: Warm temps year around, prolonged dry season, a lot of rain remainder of the year. Largest in Africa. Provide grazing and browsing for hoofed animals. Herbivores have evolved for eating habits that minimize competition between species for vegetation.

Fig. 5-14a, p. 112


Trophic level
Tertiary consumers
Secondary consumers
Primary consumers
Primary producers
Wild dog
Hyena
Lion
Cheetah
Caracal
Serval
Ruppell's vulture
Tawny eagle
Pangolin
Aardvark
Mongoose
Wildebeest
Thompson's gazelle
Impala
Mouse
Grasshopper
Harvester ant
Topi
Termite
Warthog
Dung beetle
Hare
Star grass
Red oat grass
Acacia

TEMPERATE GRASSLAND



Cover vast expanses of plains in the interiors of North and South America, Europe, an Asia. Winters are cold and summers are hot & dry. Annual precip is sparse and falls unevenly throughout the year. Grasses die and decompose, organic matter produces fertile soil. Because of fertile soil, most grasslands are plowed up for crops, however, plowing leaves vulnerable to erosion.

Fig. 5-14b, p. 112

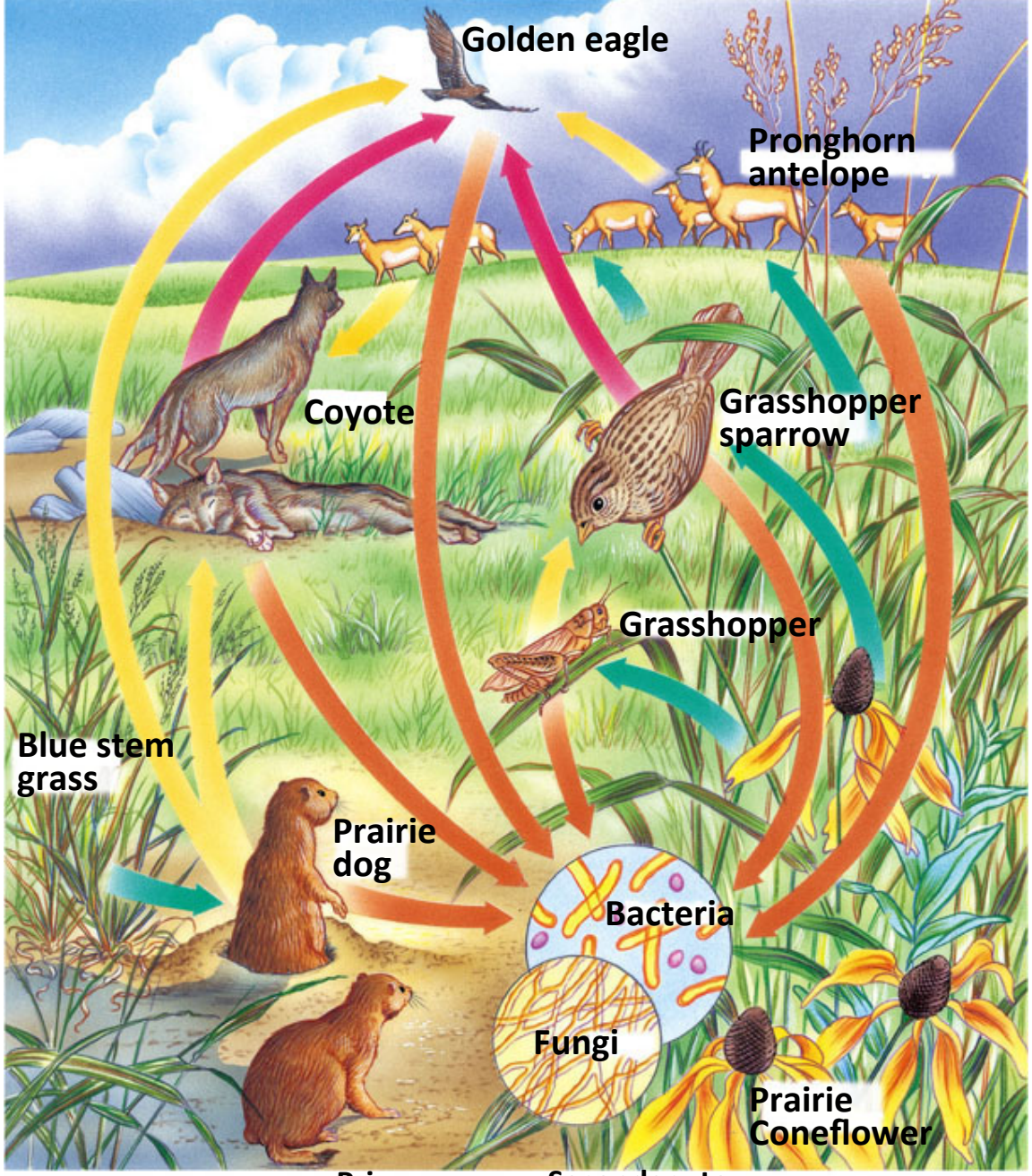
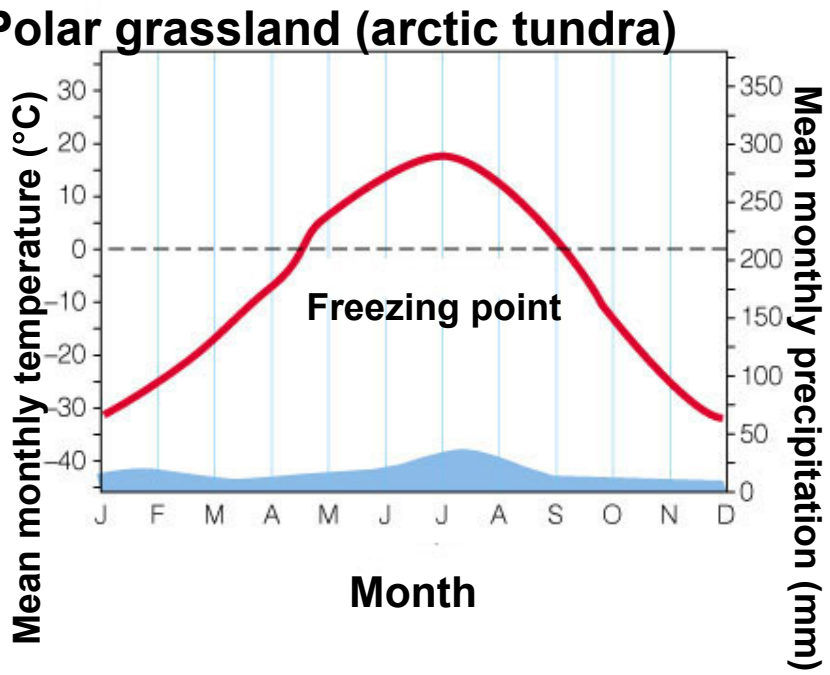


Fig. 5-15, p. 113

POLAR GRASSLAND



Polar grasslands or tundras occur south of the arctic polar ice cap. Cold, frigid winds, covered with ice and snow, winters are long and dark. Precip is rare and is mostly snow. One effect of extreme cold is permafrost: frozen layer of soil. Water near the surface thaws but permafrost soil layer stays frozen preventing liquid water at surface from seeping into the ground. Soil on upper level remains soggy and forms shallow lakes, marshes, and wetlands Due to slow cold decomposition, soil is low in organic matter.

Fig. 5-14c, p. 112

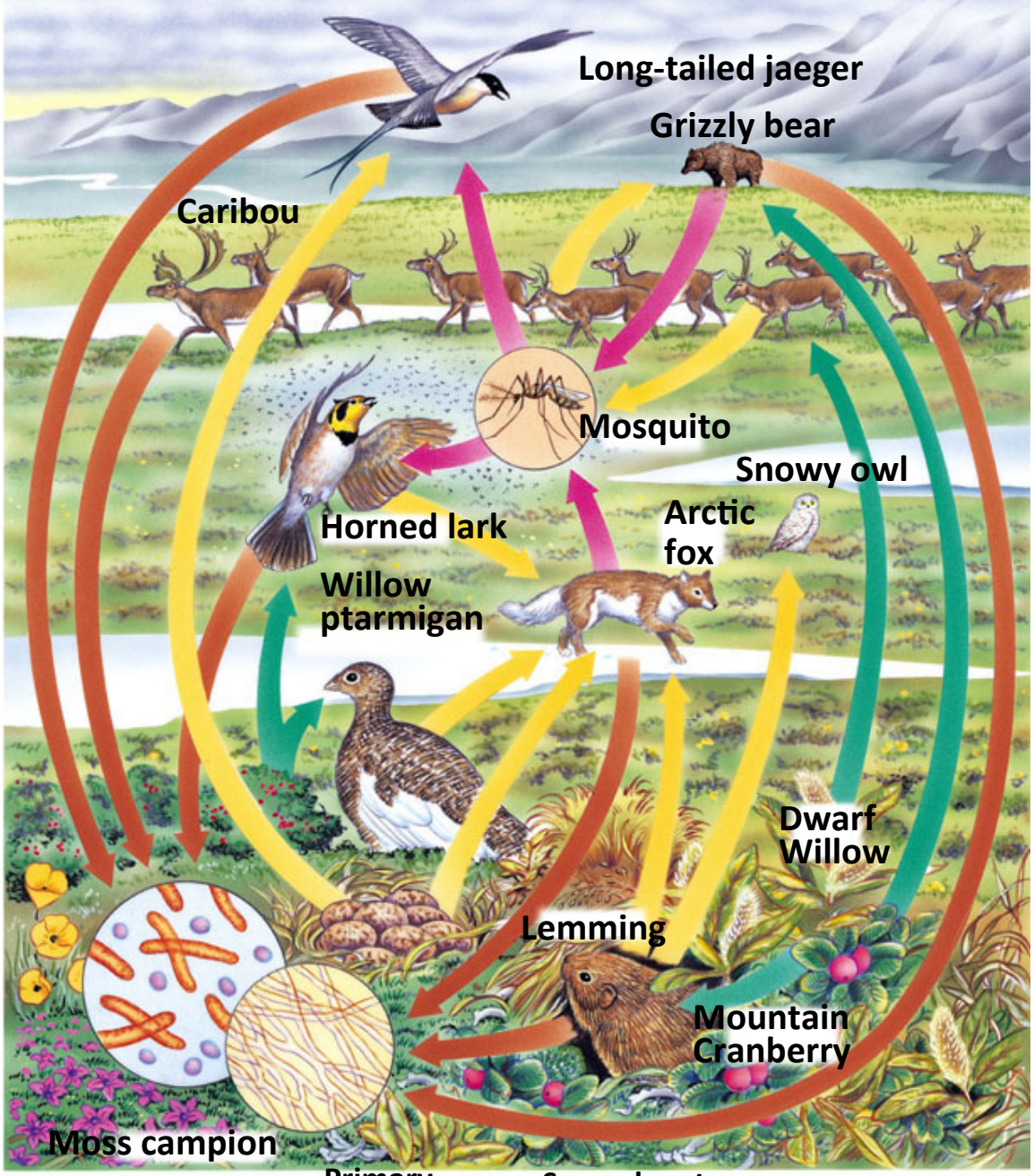


Fig. 5-17, p. 114

HUMAN IMACT

- Conversion of savanna and temperate grasslands to cropland
- Release of CO2 to atmosphere from burning and conversion to cropland
- Overgrazing of tropical and temperate grassland by livestock
- Damage to fragile arctic tundra by oil production, air and water pollution, and vehicles. – long time to recover.

Natural Capital Degradation

Grasslands

Conversion to cropland

Release of CO_2 to atmosphere from grassland burning

Overgrazing by livestock

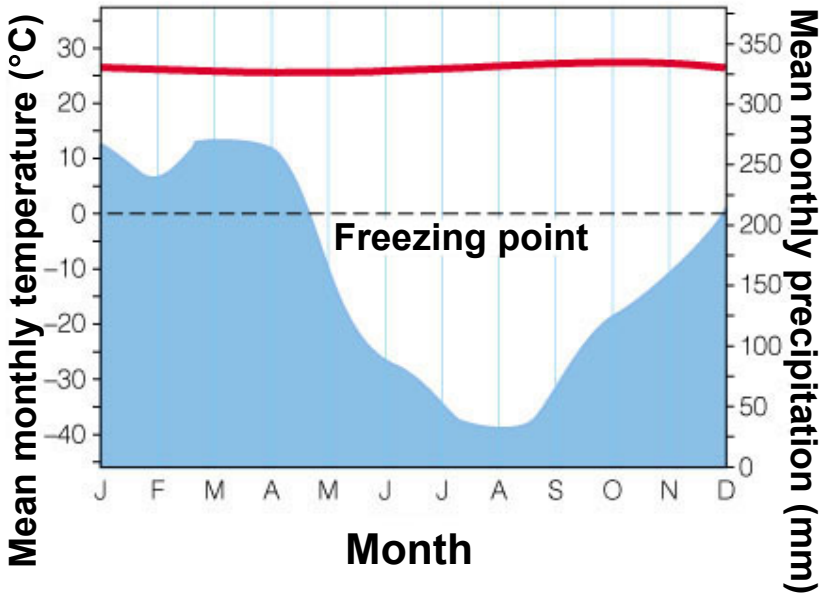
Oil production and off-road vehicles in arctic tundra

FORESTS

FOREST BIOMES

- Forests have enough precipitation to support stands of trees and are found in tropical, temperate, and polar regions.
- Tropical rain forests have heavy rainfall and a rich diversity of species.
  - Found near the equator.
  - Have year-round uniformity warm temperatures and high humidity.
- In a temperate deciduous forest, most of the trees survive winter by dropping their leaves, which decay and produce a nutrient-rich soil.
- Evergreen Coniferous Forests consist mostly of cone-bearing evergreen trees that keep their needles year-round to help the trees survive long and cold winters.

Tropical rain forest



- Tropical rain forests have heavy rainfall and a rich diversity of species. Makes up about 2% if Earth's land surface, 50-80% of terrestrial species.
- Found near the equator.
- Have year-round uniformity warm temperatures and high humidity.

Fig. 5-19a, p. 116

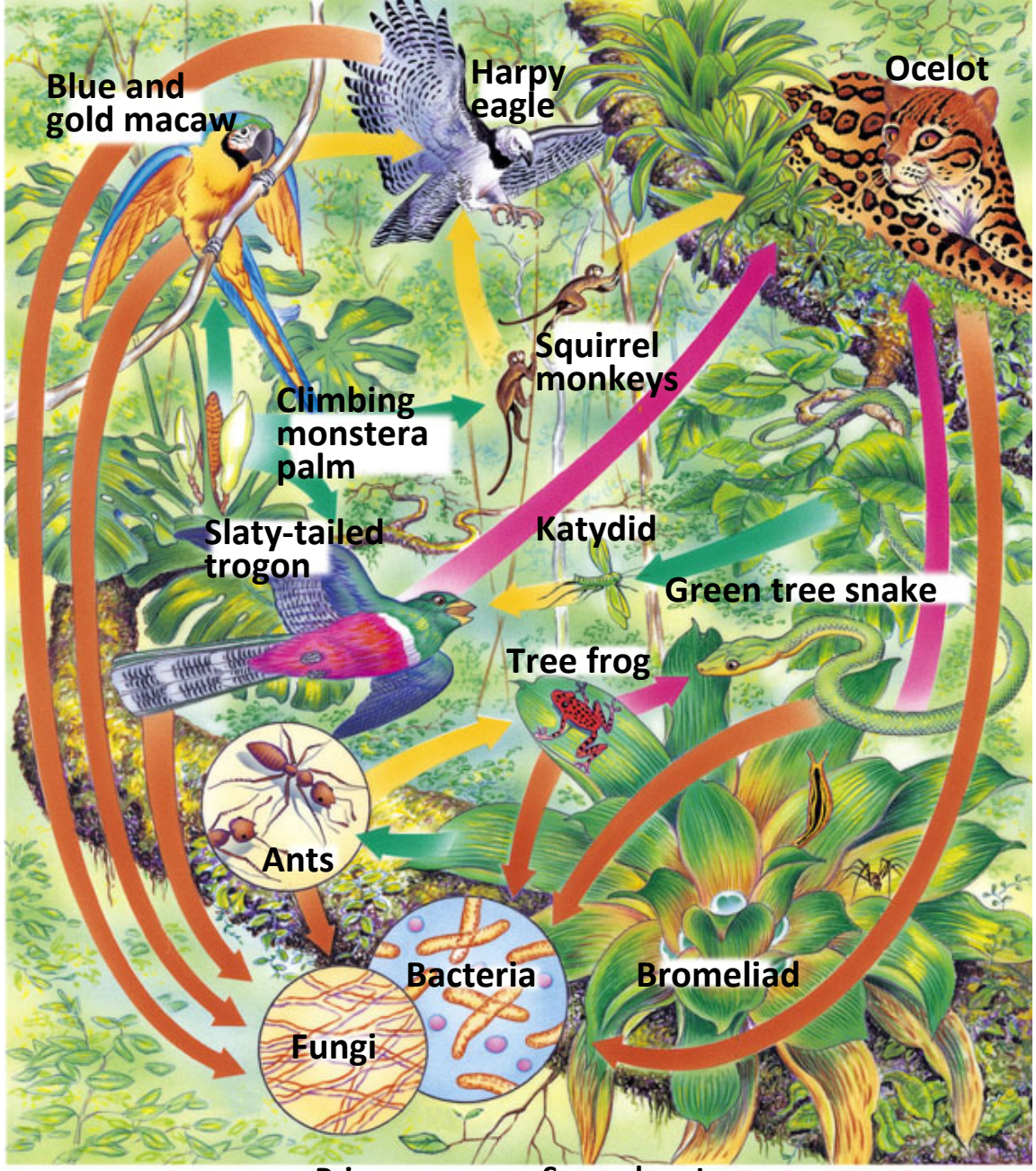


Fig. 5-20, p. 117

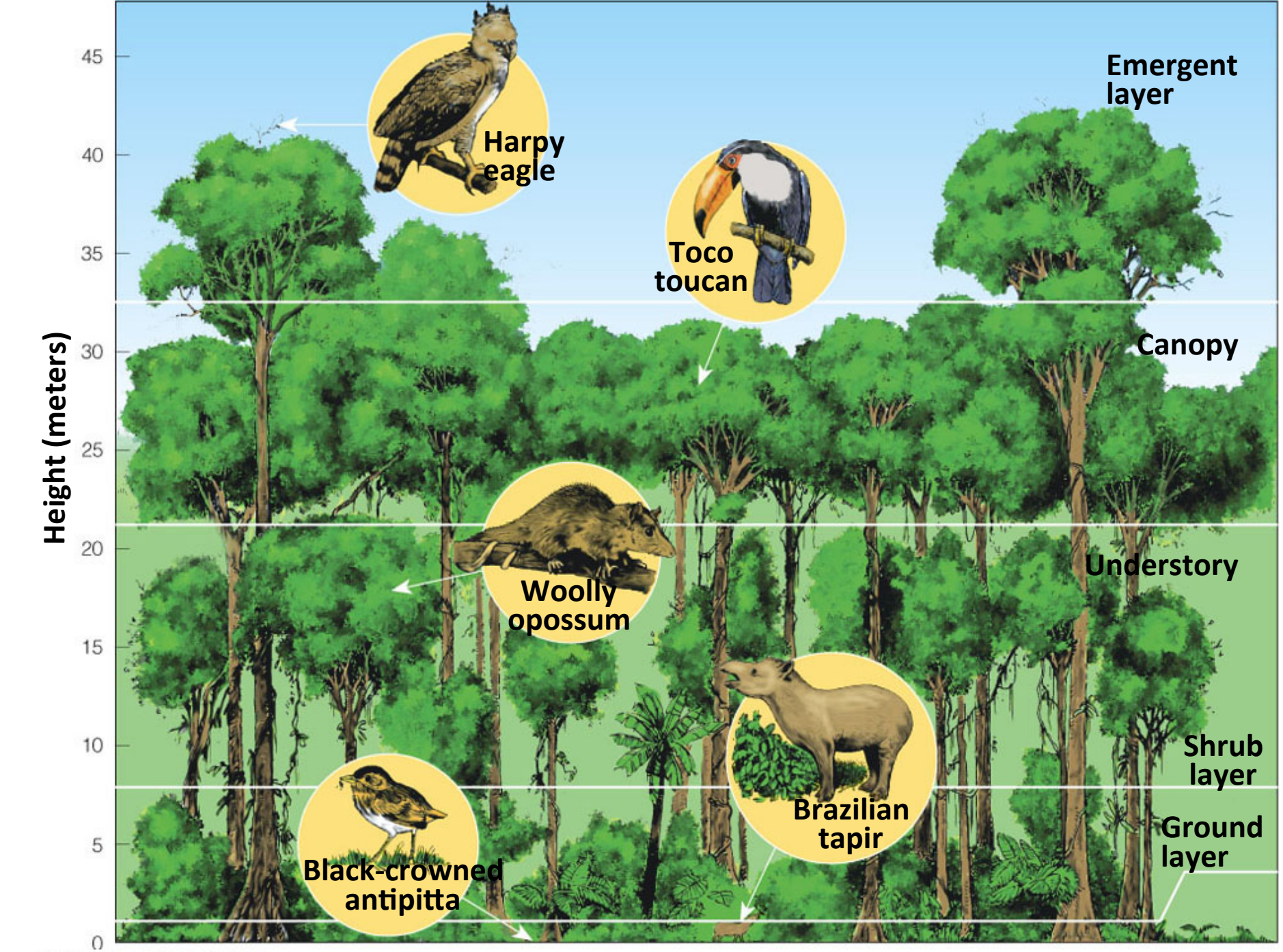
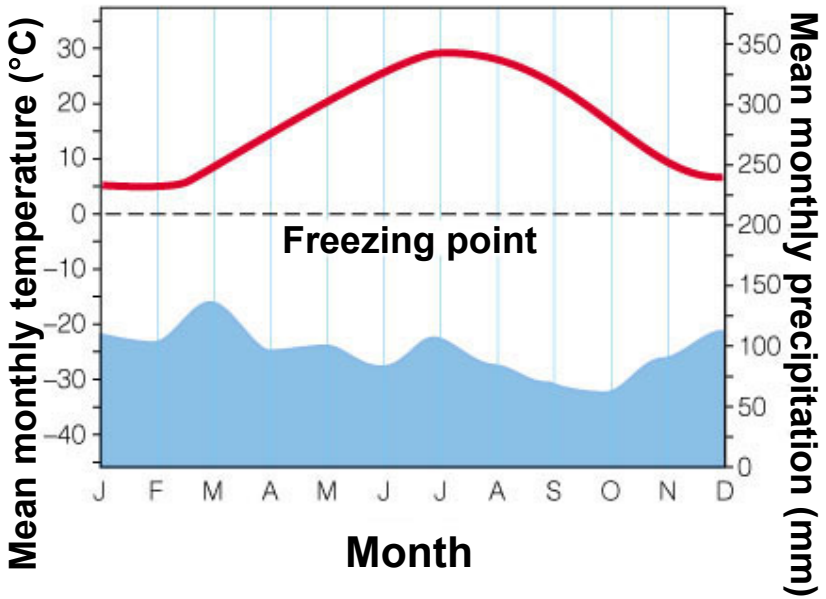


Fig. 5-21, p. 118

Temperate deciduous forest



- Moderate, average temps that change with season.
- Broadleaf deciduous trees such as oak & maple.
- Simpler structure and have fewer tree species.

Fig. 5-19b, p. 116

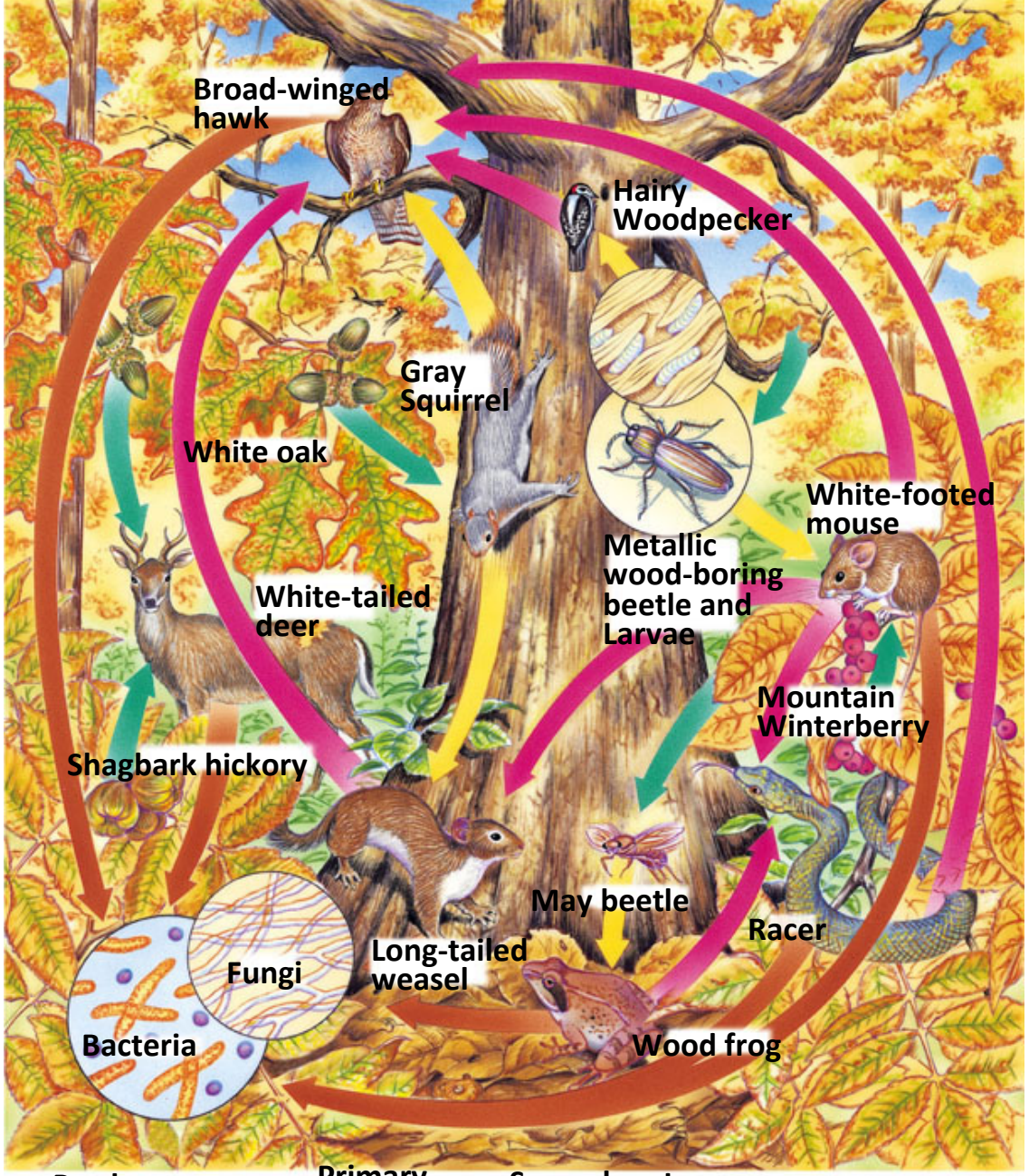
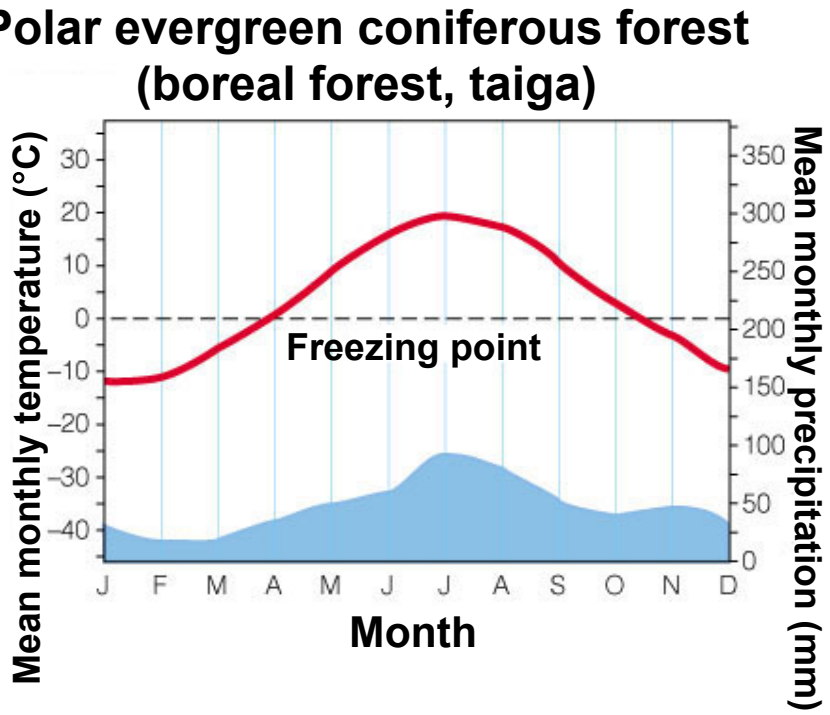


Fig. 5-22, p. 120

Evergreen Coniferous Forest



- Evergreen coniferous forests, south of the Arctic tundra.
- Winters are long, dry, and cold. Summers are short & warm.
- Evergreen trees can withstand intense cold and droughts of winter.
- Decomposition is slow because of low temps and high soil acidity.

Fig. 5-19c, p. 116

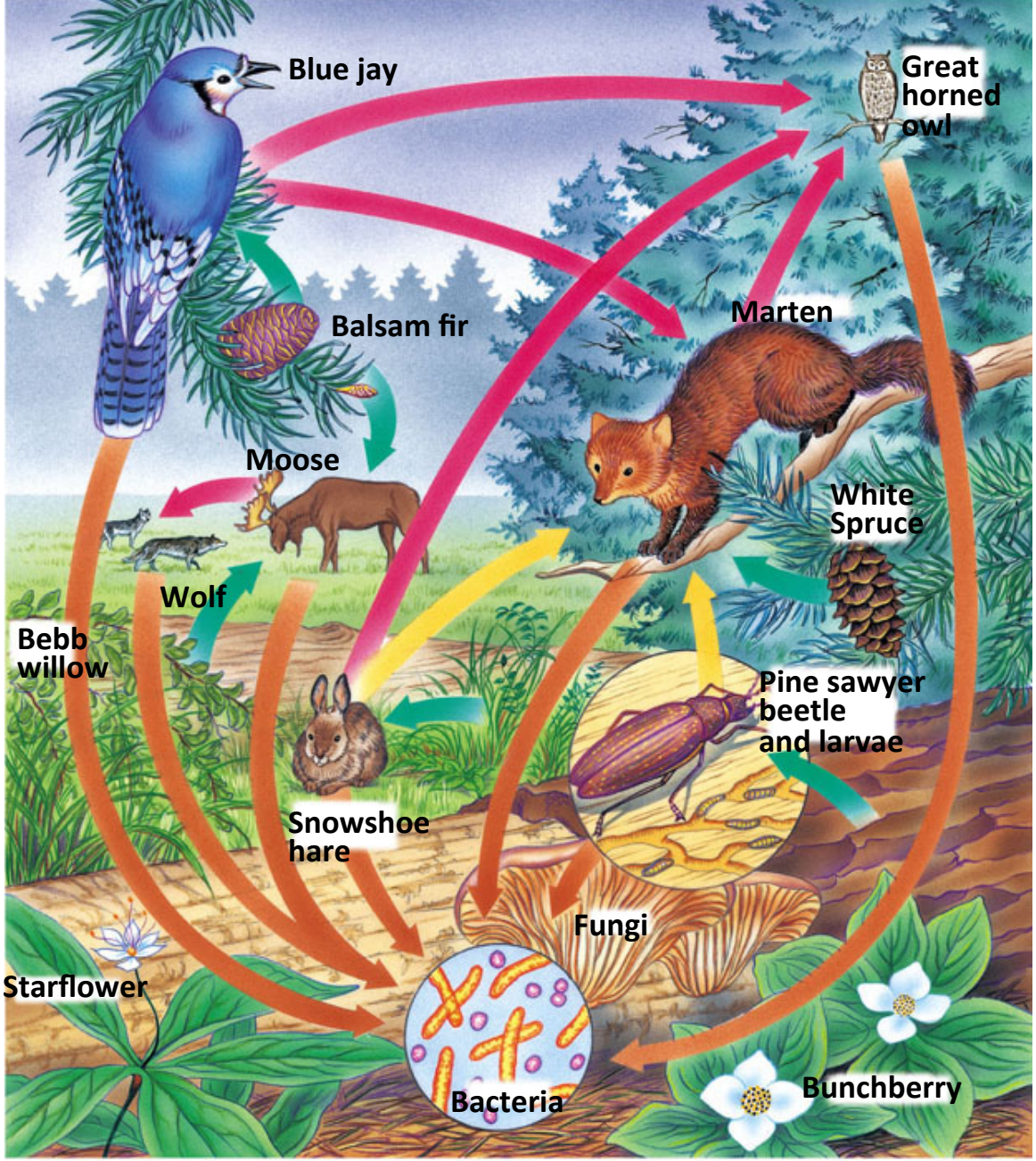


Fig. 5-23, p. 121

Human Impacts

1. Clearing and degradation of tropical forests for agriculture, livestock, grazing, and timber harvesting.

2. Clearing of the Temperate Deciduous forest in Europe, Asia, and North America for timber, agriculture and urban development.

3. Clearing of the evergreen coniferous forest in North America, Finland, Sweden, Canada, Siberia, Russia

4. Conversion of forest to tree farms

Natural Capital Degradation

Forests

Clearing for agriculture, livestock grazing, timber, and urban development

Conversion of diverse forests to tree plantations

Damage from off-road vehicles

Pollution of forest streams

MOUNTAINS

MOUNTAIN BIOMES

- High-elevation islands of biodiversity
- Often have snow-covered peaks that reflect solar radiation and gradually release water to lower-elevation streams and ecosystems.

Figure 5-25

MOUNTAIN BIOME

- Make up 20% of Earth's land.
- Climate, soil, and vegetation change with altitude.
- Prone to erosion.
- Important ecological roles:
  - contain majority of world's forests
  - contains endemic species found nowhere else
  - sanctuaries for animal species driven from lowlands
  - help radiate Earth's climate: snow reflects solar radiation back to space
  - affects sea level with increasing/decreasing glacial ice
  - major role in hydrological cycle-melting ice

HUMAN IMPACTS

- Landless poor migrating uphill to survive
- Tiber extraction
- Mineral resource extraction
- Increasing tourism
- Hydroelectric electric dams
- Air pollution from industry
- Increased exposure to UV radiation- O3 depletion

Natural Capital Degradation

Mountains

Agriculture

Timber extraction

Mineral extraction

Hydroelectric dams and reservoirs

Increasing tourism

Urban air pollution

Increased ultraviolet radiation from ozone depletion

Soil damage from off-road vehicles