



BIOMES



Complete your Biomes research:

- I have used **red, bold font** to guide your research. There will be information to record on your organizer or in your notebook when you see red, bold print.
- Anything in blue underline is a link that will open in a new window that you may explore for further information.

LEVELS OF BIOLOGICAL ORGANIZATION

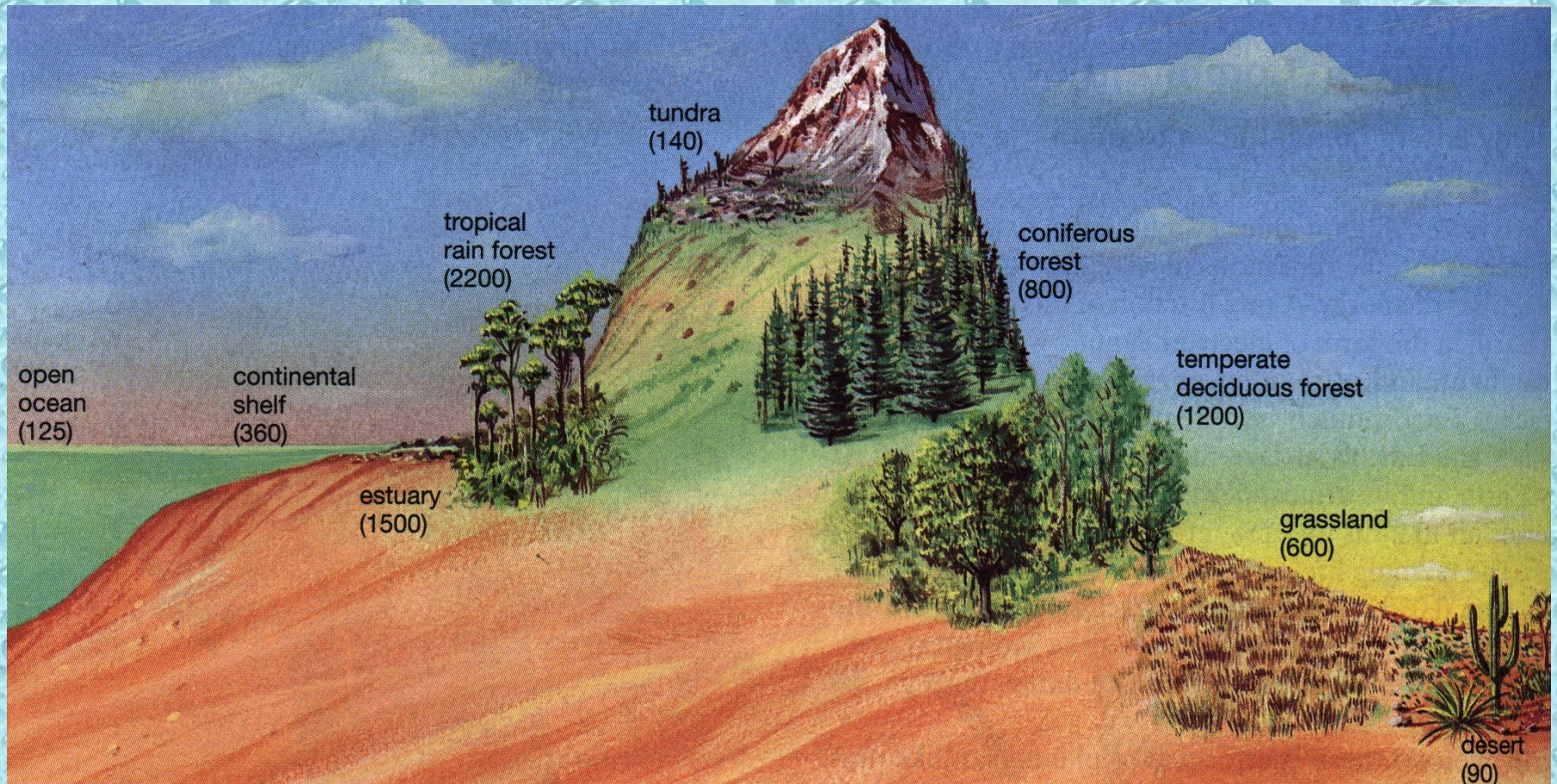
(FROM SMALLEST TO LARGEST)

- **SPECIES**-An individual belonging to a group of organisms (or the entire group itself) having common characteristics and (usually) are capable of mating with one another to produce **fertile** offspring.
- **POPULATION**-A group of organisms of one species that interbreed and live in the same place at the same time (e.g. deer population).
- **COMMUNITY**-An ecological unit composed of a group of organisms or a population of different species occupying a particular area, usually interacting with each other and their environment.
- **ECOSYSTEM**-A system that includes all living organisms (biotic factors) in an area as well as its physical environment (abiotic factors) functioning together as a unit. An ecosystem is made up of plants, animals, microorganisms, soil, rocks, minerals, water sources and the local atmosphere interacting with one another.

*****add the following to pg. 28 in your notebook*****

- **BIOME**-A major ecological community of organisms adapted to a particular climatic or environmental condition on a large geographic area in which they occur.
- **BIOSPHERE**- The part of the earth where living things exist. The part of the earth (or planet) that is capable of supporting life. The living things and their environment. All of the ecosystems of the earth.

Energy productivity in different Ecosystems



Biome Characteristics

- Composed of large regions.
- Plants & animals.
- Have specific climate with similar plants and animal adaptations.

*****Species composition is not the same in different areas. (Example deserts of Africa and the deserts of the U.S.)**

Categories of Biome

Primary Biomes

- Deserts
- Grasslands (Chaparral, Savannas, Steppes, Prairies)
- Tundra
- Taiga (Coniferous Forest)
- Temperate Deciduous Forests
- Rainforests (Tropical & Temperate)
- Mountain

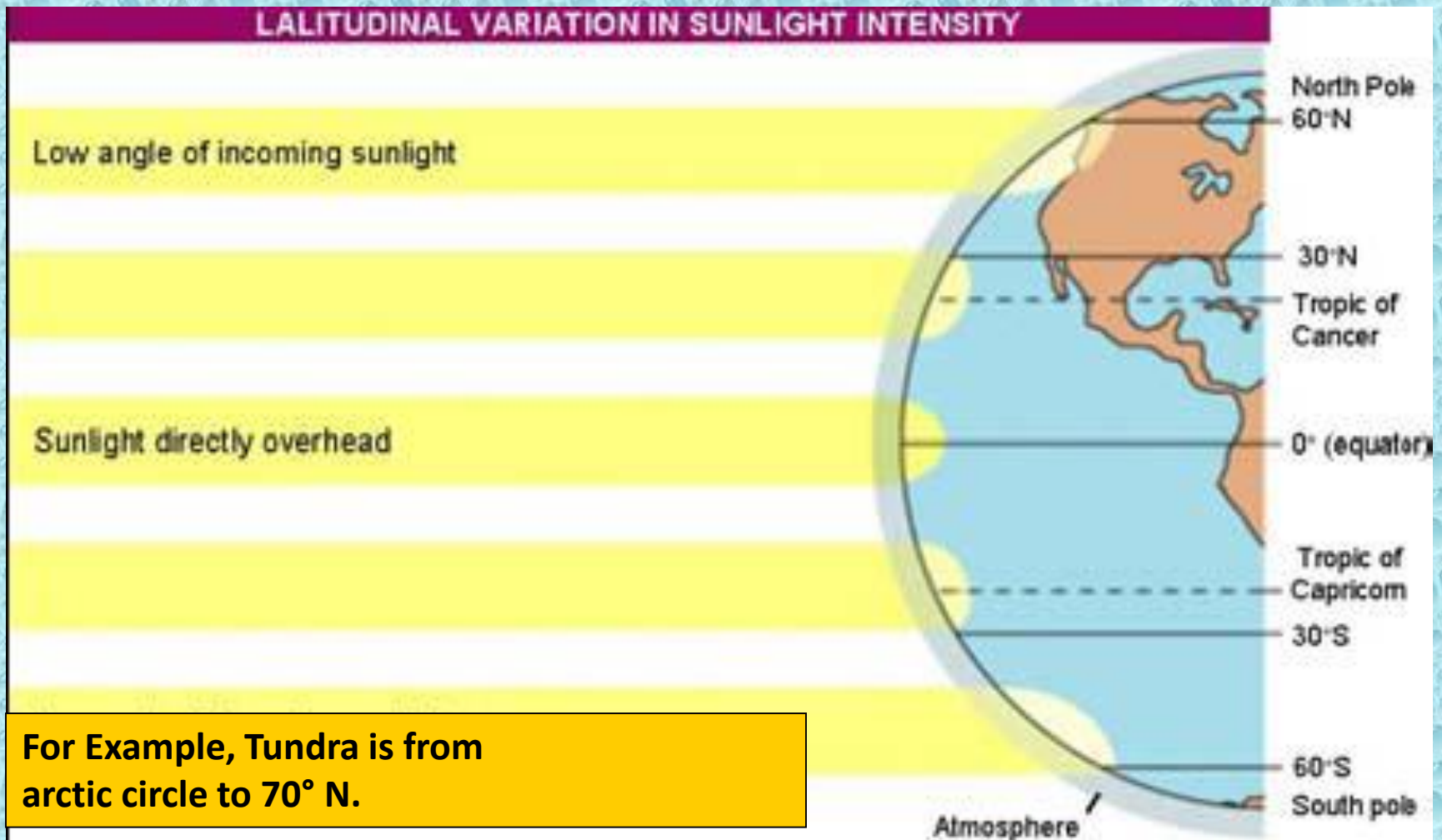
Other Biomes:

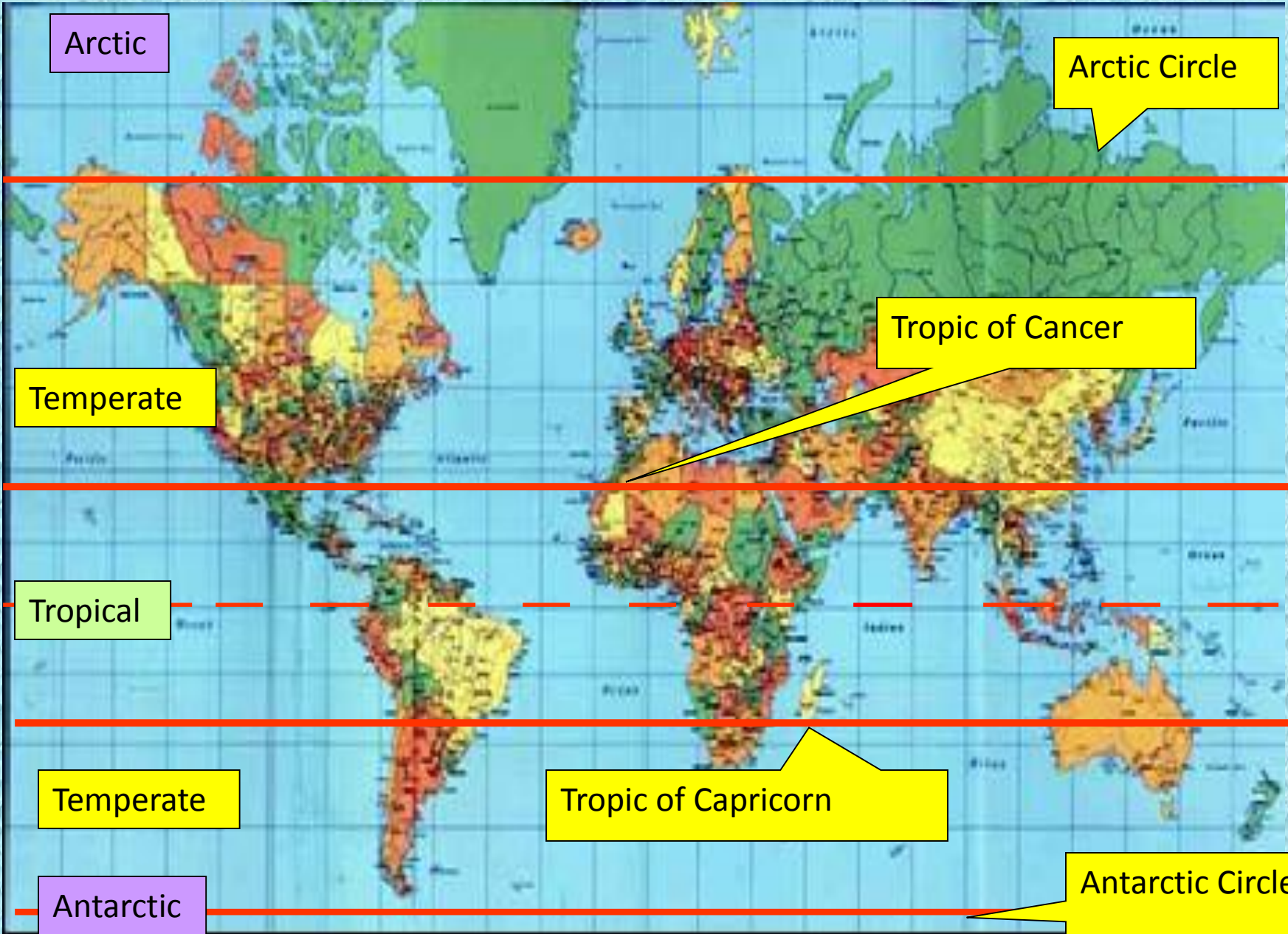
AQUATIC:

- Marine Biome (oceans, seas, estuaries, marsh)
- Freshwater Biomes (lakes, ponds, rivers, streams, swamps, wetlands)

Latitudes Define Some Biomes

Latitude refers to the distance from the equator. The closer an area is to the equator, the more solar energy and rainfall it receives.





Arctic

Arctic Circle

Temperate

Tropic of Cancer

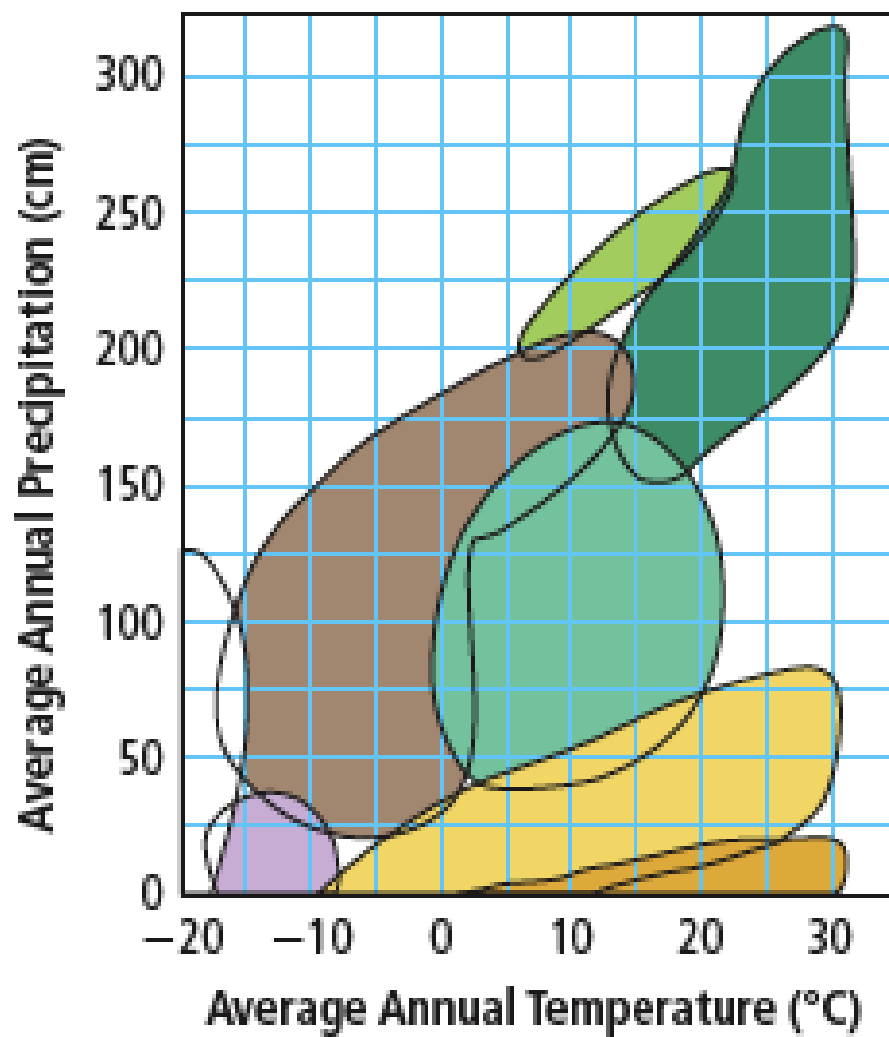
Tropical

Temperate

Tropic of Capricorn

Antarctic

Antarctic Circle



Boreal forest

Desert

Grassland

Permanent ice

Temperate deciduous forest

Temperate rainforest

Tropical rainforest

Tundra

DESERTS



Australia



California

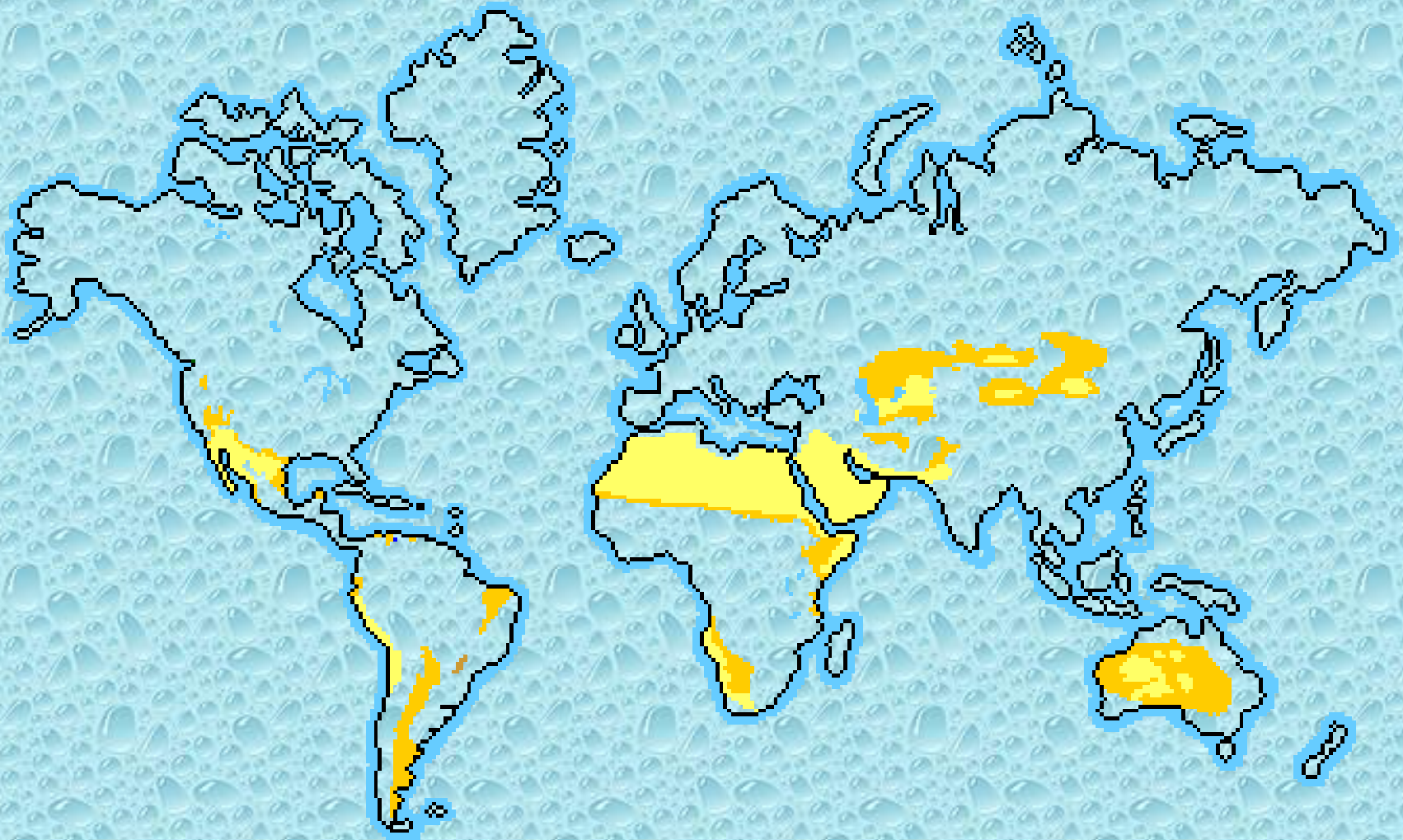


Morocco



Tunisia

Desert Biome



TYPES OF DESERTS

- Hot and dry
- Semiarid
- Coastal
- Cold

CLIMATE OF DRY DESERT

- **Precipitation:** less than 25 cm (less than 10 inches) a year. (Rain)
- Hot During the Day, Cool at Night
- Maximum **temperatures** 43.5-49° C (110 °F +)
- Minimum **temperatures** sometimes drop to -18° (-5 °F)

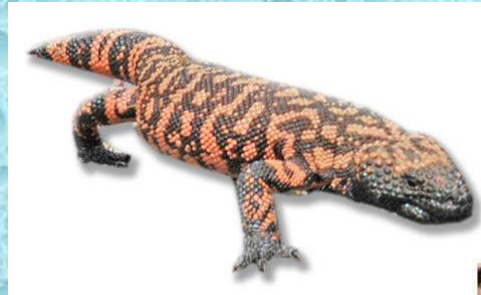
Typical **Animals**

- Black footed ferret



- Red tailed Hawk

- Gila monster



- Diamond back rattlesnake





Typical **Plants**

- Spiny and succulents plants.
- Barrel Cactus
- Saguaro
- Joshua tree





Plant and Animal Adaptations

- Desert plants adaptations:
 - Ability to collect and store water
 - Wax features that reduce water loss
 - They usually are widely spaced plants.
- Animal Adaptations
 - Get water from seeds/plant parts(fruit); insects
 - Large ears to release heat
 - Nocturnal-coming out at night to eat and hunt.
 - Burrow underground to live

Latitudes

- **20-30° north and south of the Equator**, along the Tropics of Cancer and Capricorn.
- (Low/Mid Latitudes) Desert areas develop under the influence of high-pressure areas.

GRASSLANDS



GRASSLANDS

****know the other names for grasslands- write on pg. 29-30 of your notebook#****

Also known as: Steppe, prairie, savanna, plain, etc.

- Two types: Temperate & tropics similar
- **Precipitation** in Temperate grasslands: 25 -75 cm (10 to 30 inches) of rain per year. Rain/Snow
- Precipitation in Tropical/Subtropical grasslands: 60-150 cm (24-59 inches) of rain per year. Rain
- Maximum **Temperature**: as high 21⁰ C (70° F
- Minimum **Temperature**: as low as -4⁰ C (24.8° F There are two real seasons: a growing season and a dormant season.

ANIMALS



Typical **Animals**

- Prairie Dogs
- Buffalo
- Elephants
- Giraffes
- Lions
- Cheetahs
- Vultures

PLANTS

Bluestem grass, Buffalo grass, Indian grass, Stinging nettle, Coneflowers, Elephant grass, Umbrella Thorn Acacia tree



Plant and Animal Adaptations

- **Plants**

- Extensive root webs (so grazing animals don't pull up the entire root, or damaged by fires)
- Thin, needle-like shaped leaves that expose little of the plant to the sun (grass leaves are needle shape)

- **Animals**

- Predators need to be quick, powerful, smart, and sneaky to bring down fast and alert animals
- Hunt in groups
- Camouflage

- **Where Found:**
 - **Grasslands are found almost everywhere; in Africa, Europe, South America, Australia, U.S.**
- **Latitudes:**
 - **tropics and in the middle latitudes (areas 30 to 60 degrees north and south of the Equator).**

TUNDRA



Characteristics of **Tundra** Biome

- Tundra is only known as Tundra
- **Precipitation:** 15-25 cm (6- 10 inches)
 - Types (rain, snow, sleet)
- Maximum high **temperature:** **10° C** (50 ° F),
- Minimum low **Temperatures** **-34°C**, (-30 °F)
(having at least nine months below freezing)

TUNDRA **ANIMALS**

- Some animals in the Tundra
- **Lemmings**
- **Arctic Fox**
- **Snowy Owl**
- **Caribou**
- **Muskoxen**

Animals of Tundra



TUNDRA **PLANTS**

- **Typical Plant names:**
 - Arctic moss
 - Caribou moss
 - Lichens (fungi and protist that lives together)
 - Pasque flower



Plant and Animal Adaptations

- **Plant Adaptations:**

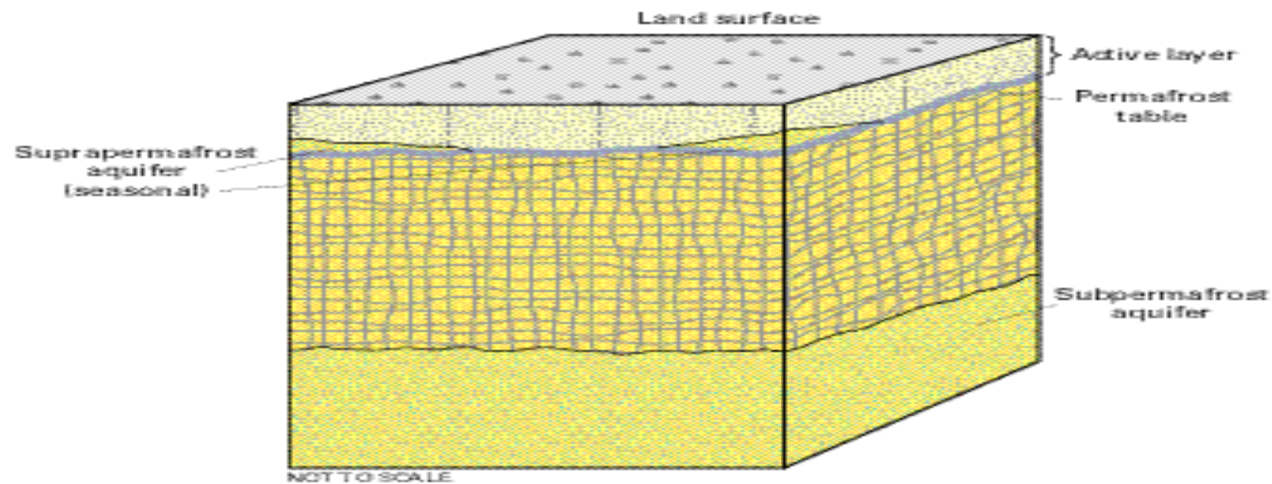
- Permafrost (See next slide) restricts root growth; short roots.
- Small sized plants
- Very short growing season.
- Plants are dark and hairy (absorb solar heat and trap heat)
- Some grow in clumps for warmth
- Dish-like flowers that rack the sun

- **Animal Adaptations:**




- **Fur/heavy coats** (insulated under fur)
- **Heat-efficient body shape:** short limbs, ears, tails
- **Camouflage** (winter color and summer color coat)
- **Hibernation**(state of deep dormancy where heartbeat and respiration slows down)

Characteristics of Tundra Biome

Figure 9. Water can be obtained from suprapermafrost aquifers only seasonally, during the summer. In contrast, aquifers beneath the permafrost will yield water throughout the year, but the water might be highly mineralized in some areas of Alaska.



EXPLANATION

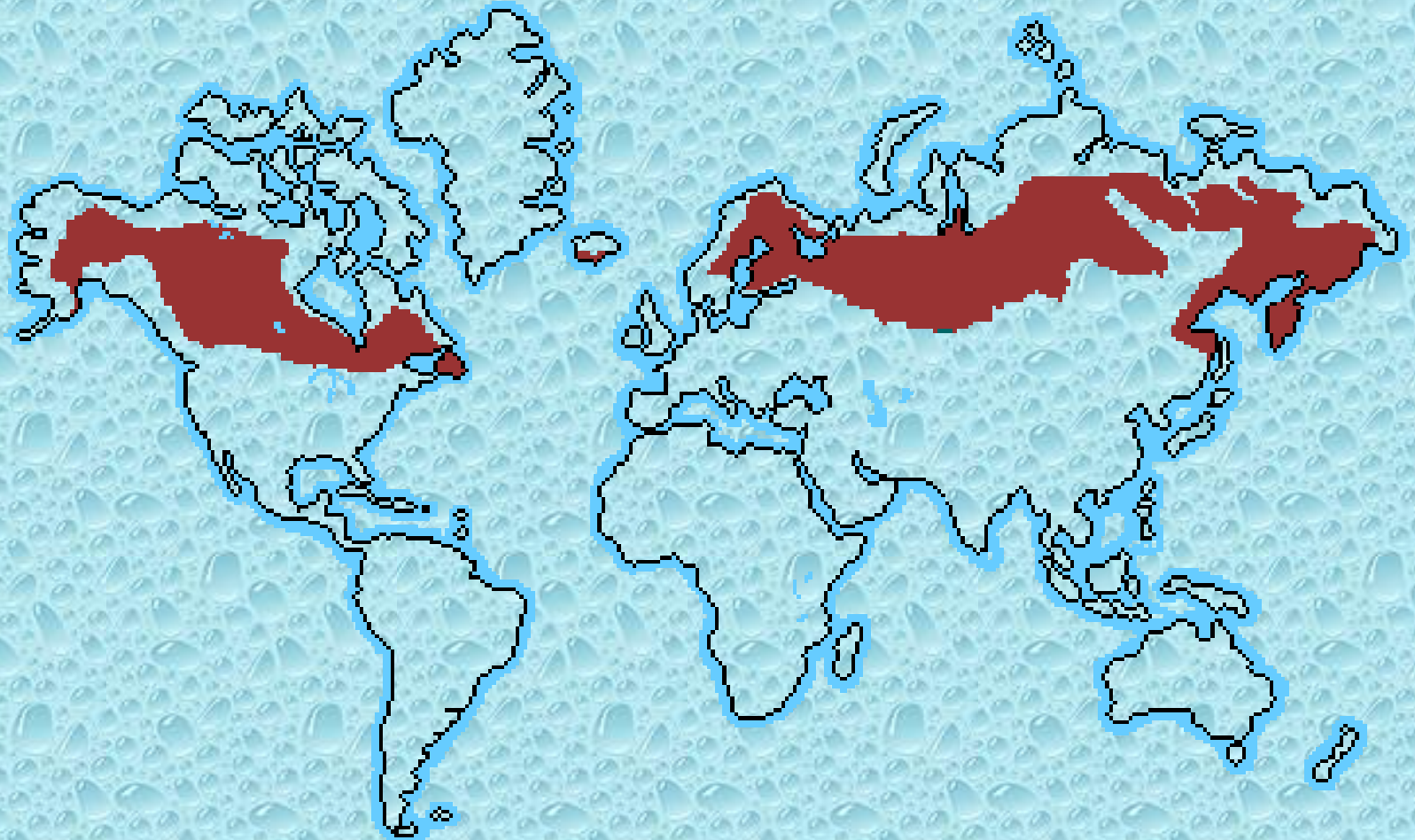
-  Unsaturated unconsolidated deposits
-  Saturated unconsolidated deposits
-  Permafrost

Modified from Ferrians, O.J., Jr., Kachadoorian, Rueben, and Greene, G.W., 1969, Permafrost and related engineering problems in Alaska: U.S. Geological Survey Professional Paper 678, 37 p.

Latitudes and Locations

- **Locations:** The tundra climate spans from most of **Greenland** to parts of **Alaska**, northern **Canada**, and northern **Russia**.
- **Latitudes:** The latitudinal range is **75° N to 60° N**.
- **Sometimes** Antarctic is called a frozen tundra or frozen desert.

TAIGA BIOME



Characteristics of Taiga Biome

- Locations: Alaska, Canada, Scandinavia, Russia and China

****add in notebook pg. 29-20****

- **Known as Boreal Forest or Coniferous Forest**
- **Evergreen conifers**
- **Seasonal cycle: migrations**
- **Abundant, open water**
- **Nutrient rich soils**

Taiga **Climate**

Precipitation: 17-56 cm (7-22 inches) a year (rain, sleet, snow)

Temperatures

Maximum highs-Summer 16⁰C (60 ° F)

Minimum lows –Winter -16⁰ C (3° F)

Typical **Animals**: moose, lynx, hares/rabbits, eagles, bears

Harrison, Pam. charge.jpg. Summer 2001. Pics4Learning





Typical **plant** names:

Groups of trees are called evergreen trees because they stay green year round and they are called conifers because they have seeds in cones

Frasier Fir, Balsam Fir, Douglas fir,
Jack Pine, white poplar, white
Spruce, Red cedar



Plant and Animal Adaptations:

Plant adaptations

- narrow needle-like structures limits water loss
- chemical that repels animals who would eat the needles
- dark green color of the needles absorbs the sunlight
- conical shape of the evergreens allows the snow to slide off the branches rather than pile up
- They are always green so don't have to regrow
- migrate to warmer climates once the cold weather begins

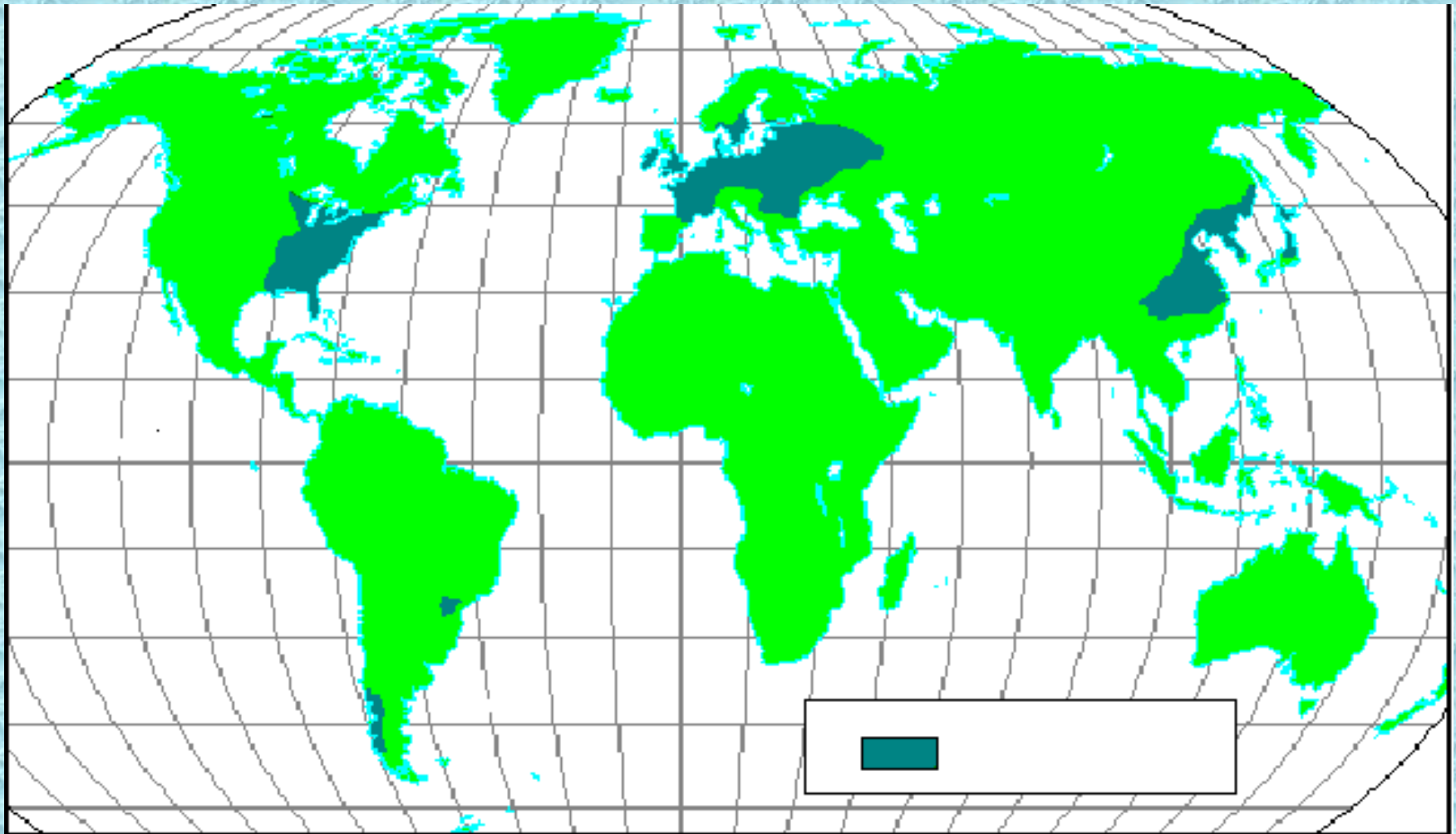
Animal adaptations

- Some animals hibernate
- Some have a layer of insulating feathers or fur
- Seasonal change in color of feathers or fur protects the animal from its predators



Latitudes: 50 degrees north
to the Arctic circle

TEMPERATE DECIDUOUS FOREST



TEMPERATE DECIDUOUS FOREST

- Good canopy & understory.
- Fairly rich soils; productive.
- Early settlers used land for
- agriculture, but abandoned

- Moderate climate

Precipitation:

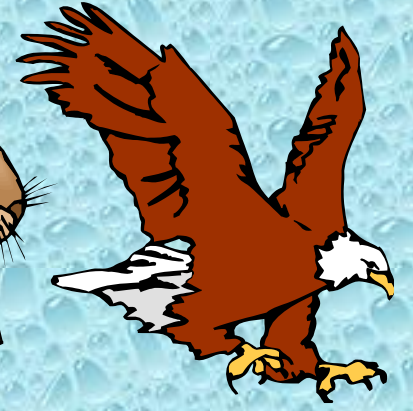
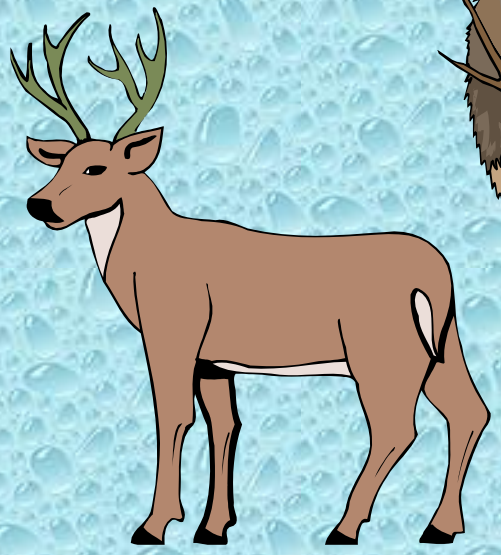
75 to 150 cm (30-60 inches)(rain, sleet, snow)

Temperatures

- Maximum High 40° C
- Lows –30°C

Forest **Animals**

Deer, Raccoon, beaver, woodpecker, Eagles, squirrels, bears, rabbits







Deciduous **Trees**



- Some common deciduous trees, also known as Broadleaf trees, are oaks, maples, beeches, hickory, and chestnut.







Plant and Animal Adaptations

- **Plants:**

- **Deciduous Trees** are notable for going through **four seasons**. Loose their leaves.
- **Trees go into a period of dormancy or sleep.**
- **Thick bark to protect them from the cold weather.**

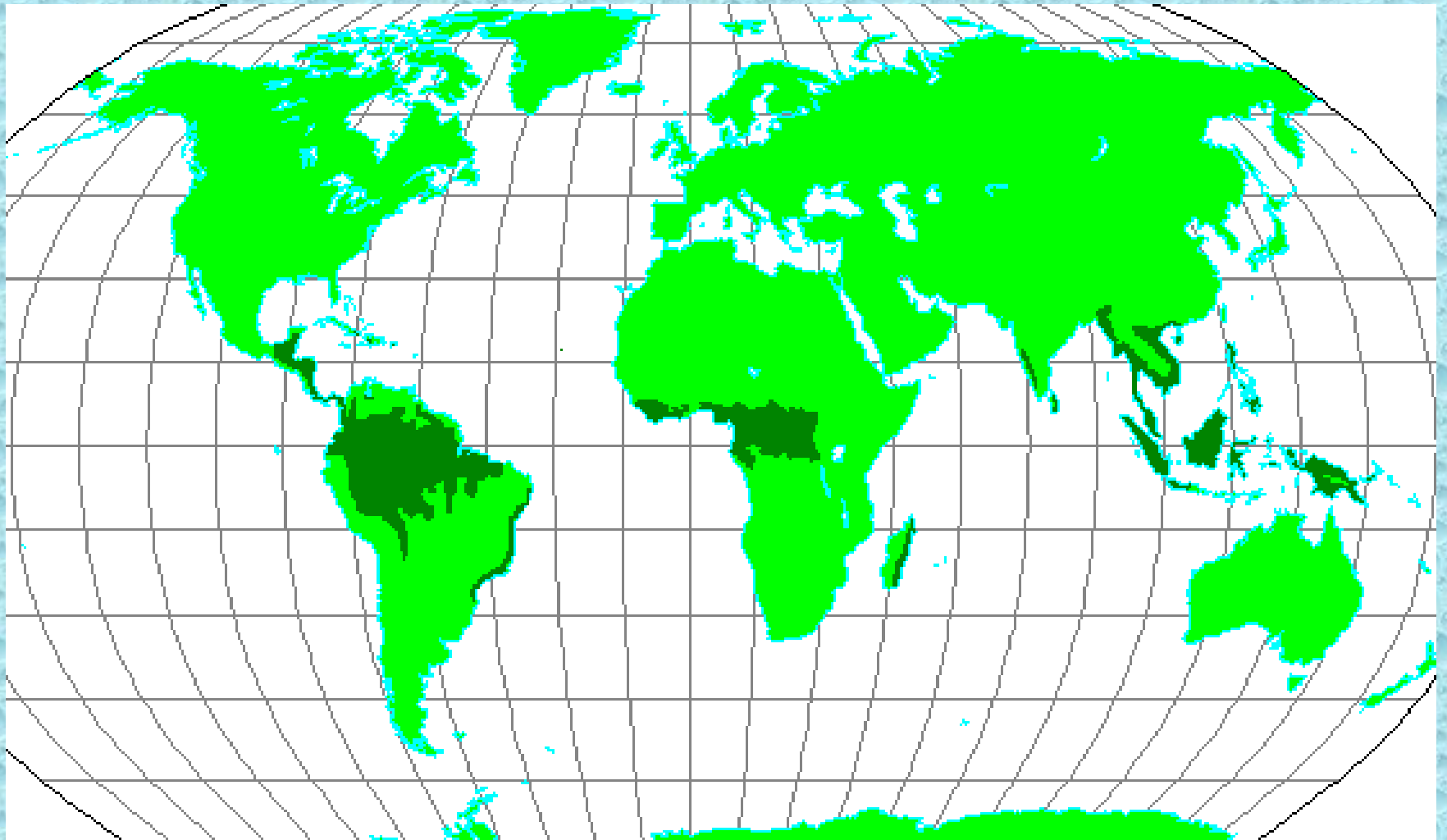
- **Animals:**

- **-Hibernation**
- **-Migration**
- **-Stockpiles of food (nuts, seeds)**
- **-Camouflaged to look like the ground**

Locations: eastern half of North America, and the middle of **Europe, Asia**; southwest **Russia, Japan**, and eastern **China, South America, New Zealand**, and southeastern **Australia**

Latitudes: 23° north to 38° South

TROPICAL RAIN FOREST



Tropical Rainforest Biome

- Large number of species.
- Tall, stratified tree canopy = dark on forest floor
- Good drainage.
- Rapid decomposition = nutrients in plants.

- **Tropical Rainforest Climate**

- **Precipitation**

- **Receives more than 200 cm (100 inches)
(rain)**

- **Temperatures**

Maximum: 26.6°C

Minimum: 20°C



Typical **Animals**

- Leafcutter ants
- Snakes
- Jaguar
- Monkeys
- Bats
- Three toed sloths
- Aye aye
- Anteater
- Parrots
- Toucans
- Tapir





Many rainforest animals use camouflage to disappear in the rainforest.





three-toed sloth uses camouflage and amazing slowness to escape predators. Green algae grows in the sloth's fur, which helps camouflage it in the forest canopy. Sloths are among the slowest moving animals of all (inside too, as it takes about a month to digest food). They hang from branches in the canopy, and are so still that predators such as jaguars don't see them.





Giant bats flying at dusk.





parrots and **toucans** eat nuts, and developed big strong beaks to crack open the tough shells.





There are several species of brightly colored **poison arrow frogs**.

Rainforest Plants

- Liana vines
- Kapok tree
- Strangler Figs
- Banana Tree
- Bougainville
- Bamboo
- Coconut tree

Plant and Animal Adaptations

- Plants

- Thin smooth bark so vines have trouble growing on them
- Vine like to reach sun from below
- Buttress roots provide extra stability, roots are not deep



RAINFOREST ANIMAL ADAPTATIONS

- Animals are very specialized and adapted for eating a specific plant or animal(different types of beaks etc.
- Some are poisonous, and use bright colors to warn predators
- Camouflage
- Live in different levels of the rainforest



LEVEL LAYERS OF THE RAINFOREST

Emergent layer

Canopy layer

Under story

Forest floor



Locations

The world's largest tropical rainforests are in South America, Africa, and Southeast Asia

Latitudes

Typically found near the equator -10° North to 10° South

If you have any portions of your organizer left blank, use your textbook pgs. 728-735 to find further information.



(Russia)
ASIA

Arctic Ocean

Greenland
(Denmark)

ARCTIC CIRCLE

Beaufort Sea

Baffin Bay

Alaska

Gulf of Alaska

Canada

Hudson Bay

60° N

Labrador Sea

45° W

Bering Sea

James Bay

Great Lakes

150° W

45° N

Pacific Ocean

United States of America

Atlantic Ocean

600 mi

600 km

Bermuda (UK)



30° N

Gulf of California

Mexico

Gulf of Mexico

75° W

Bahamas

60° W

TROPIC OF CANCER

23.5° N

NORTH AMERICA

Cuba
Jamaica

CARIBBEAN

Dominican Rep.
Puerto Rico

Belize

Honduras

Nicaragua

Trinidad

Guatemala

El Salvador

Costa Rica

Panama

Venezuela

Colombia

SOUTH AMERICA

Pacific Ocean

CENTRAL AMERICA

worldatlas

135° W

120° W

105° W

90° W

- Use your organizer, textbook, and map of North America in your basket to complete the map activity and answer the questions.
- Your **map activity is due** on Thursday, 8/25 at the end of class.

AQUATIC Water:

- About 70% of the earth's surface is covered with water.
 - Salt water on earth -97%.
 - Salt water is filled with salt and other minerals, and humans cannot drink this water. Although the salt can be removed, it is a difficult and expensive process.
- 2% of the water on earth is glacier ice at the North and South Poles. however, it is too far away from where people live to be usable.
- Less than 1% of all the water on earth is fresh water that we can actually use.

FRESHWATER BIOME

- Freshwater is defined as having a low salt concentration
— usually less than 1%.
- Types of Freshwater
 - Ponds and lakes
 - Streams and rivers
 - Wetlands
- **Problems with Freshwater biomes- Algae bloom**: When large amounts are produced quickly, the decomposition may cause oxygen depletion in the deeper waters which result in fish kills or even chemical changes in the mud on the bottom, which could release chemicals or toxic gases that can kill organisms.
- Factors affecting freshwater- Abiotic Factors: temperature, PH levels, nutrients, oxygen levels; Biotic Factor: humans who change the abiotic factors with industry and dumping waste into freshwater

Living Things Found in Freshwater

- Plants:
 - Water lily
 - Cape Pondweed
 - Cattails
 - Elodea
- Bacteria
 - Cyanobacteria
- Fungi
- Protist
 - Euglena
 - Amoeba
 - Paramecium
- Animals
 - Salamanders
 - Frogs/tadpoles
 - Catfish
 - Karp
 - Trout
 - River otter
 - Turtles

ZONES

- The topmost zone near the shore of a lake or pond is the *littoral zone*. This zone is the warmest since it is shallow and can absorb more of the Sun's heat.
 - algae (like diatoms), rooted and floating aquatic plants, grazing snails, clams, insects, crustaceans, fishes, and amphibians.
- The near-surface open water surrounded is the *limnetic zone*. The limnetic zone is well-lighted (like the littoral zone)
 - dominated by plankton, both phytoplankton and zooplankton. A variety of freshwater fish also occupy this zone.
- The deep-water part of the lake/pond, is the *profundal zone*. This zone is much colder and denser than the other two. Little light penetrates the profundal zone.

Important Bodies of Freshwater

- Rivers: Colorado, Rio Grande, Yellow, Indus, Ganges, Amu Darya, Murray, and Nile
- Lakes: Lake Superior, Lake Huron, Lake Michigan, Lake Victoria(just a few)

MARINE WATER BIOME

- $\frac{3}{4}$ of the Earth's surface and include oceans, coral reefs, and estuaries. Marine algae supply much of the world's oxygen supply and take in a huge amount of atmospheric carbon dioxide. The evaporation of the seawater provides rainwater for the land.
- [Types of Marine biomes](#)
- [Oceans](#)
- [Coral reefs](#) –Most diverse
- [Estuaries](#)- contains both fresh and salt water
- Factors affecting marine water: Abiotic Factors: temperature, salinity, nutrients, oxygen level, wind, water current; Biotic factor: humans who can change abiotic factors

Plants

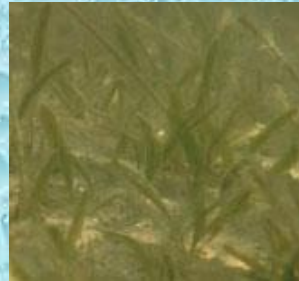
- Eelgrass



- Maerl



- Johnson's Sea Grass



- Marsh Grass
- Sea Pickles

Marine

- Octopus



- Coral



- Sea anemone



- Dolphin



- Fish

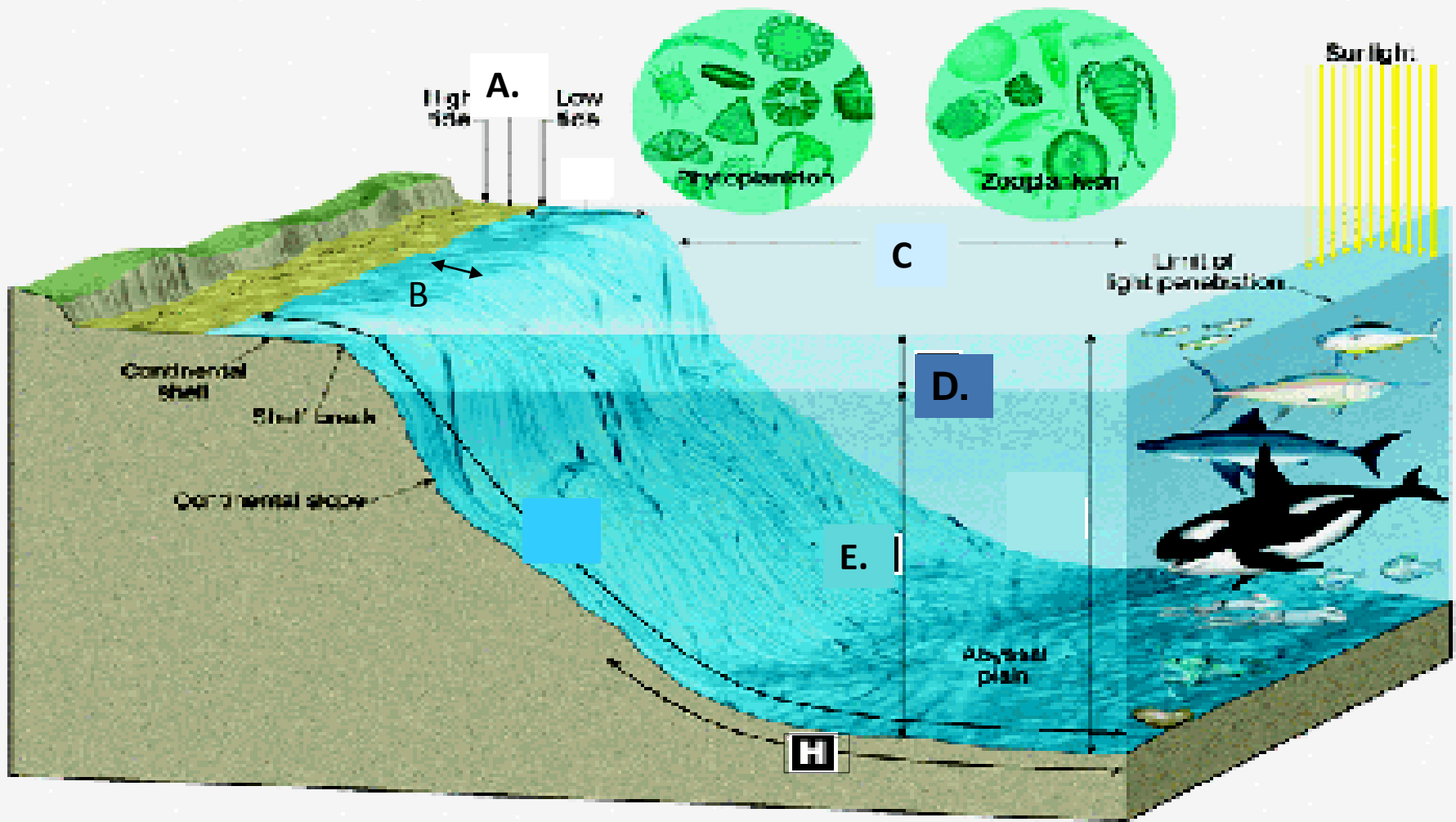
Other Living Things

- Protists
 - Diatoms
 - Kelp
 - Seaweed
 - Phytoplankton
 - Zooplankton
- Bacteria
 - Cyanobacteria
- Fungi
 - Marine fungi
(Basidiomycota)
- Extreme weather conditions or possible problems:
 - Hurricanes
 - Dinoflagellate -Red algae Blooms (similar to algae bloom in freshwater. (Red Flags at a beach can mean this is happening))

ZONES

- The **intertidal zone** is where the ocean meets the land — sometimes submerged/other times exposed, (waves and tides come in and out).
 - the communities are constantly changing. Find algae and small animals, such as herbivorous snails, crabs, sea stars, and small fishes.
 - **Neritic zone** is the region of shallow water from low tide line to continental shelf
- The **pelagic zone** includes those waters further from the land, basically the open ocean.
 - Usually cold but has a constant mixing of warm and cold ocean currents.
 - Flora -surface seaweeds.
 - Fauna include many species of fish and some mammals, such as whales and dolphins. Many feed on the abundant plankton.

- The **benthic zone** is the area below the pelagic zone, but does not include the very deepest parts of the ocean.
 - The bottom of the zone consists of sand, silt, and/or dead organisms.
 - Here temperature decreases as depth increases
 - Flora are represented primarily by seaweed
 - Fauna include all sorts of bacteria, fungi, sponges, sea anemones, worms, sea stars, and fishes.
- The deep ocean is the **abyssal zone**.
 - The water in this region is very cold (around 3° C), highly pressured, high in oxygen content, but low in nutritional content.
 - Fauna many species of invertebrates and fishes.
 - Due to hydrothermal vents along the ocean floors, chemosynthetic bacteria These bacteria are thus the start of the food web as they are eaten by invertebrates and fishes.



A. Intertidal zone

B. Neritic zone

C. Pelagic zone

D. Benthic zone

E. Abyssal zone

- Atlantic Ocean; Pacific Ocean; Indian Ocean; Southern Ocean; Arctic Ocean; Mediterranean Sea; Caribbean Sea; South China Sea; Bering Sea; North Sea; Baltic Sea; Red Sea; Gulf of Mexico; East China Sea; Japan Sea; Okhotsk Sea; Hudson Bay; Andaman Sea



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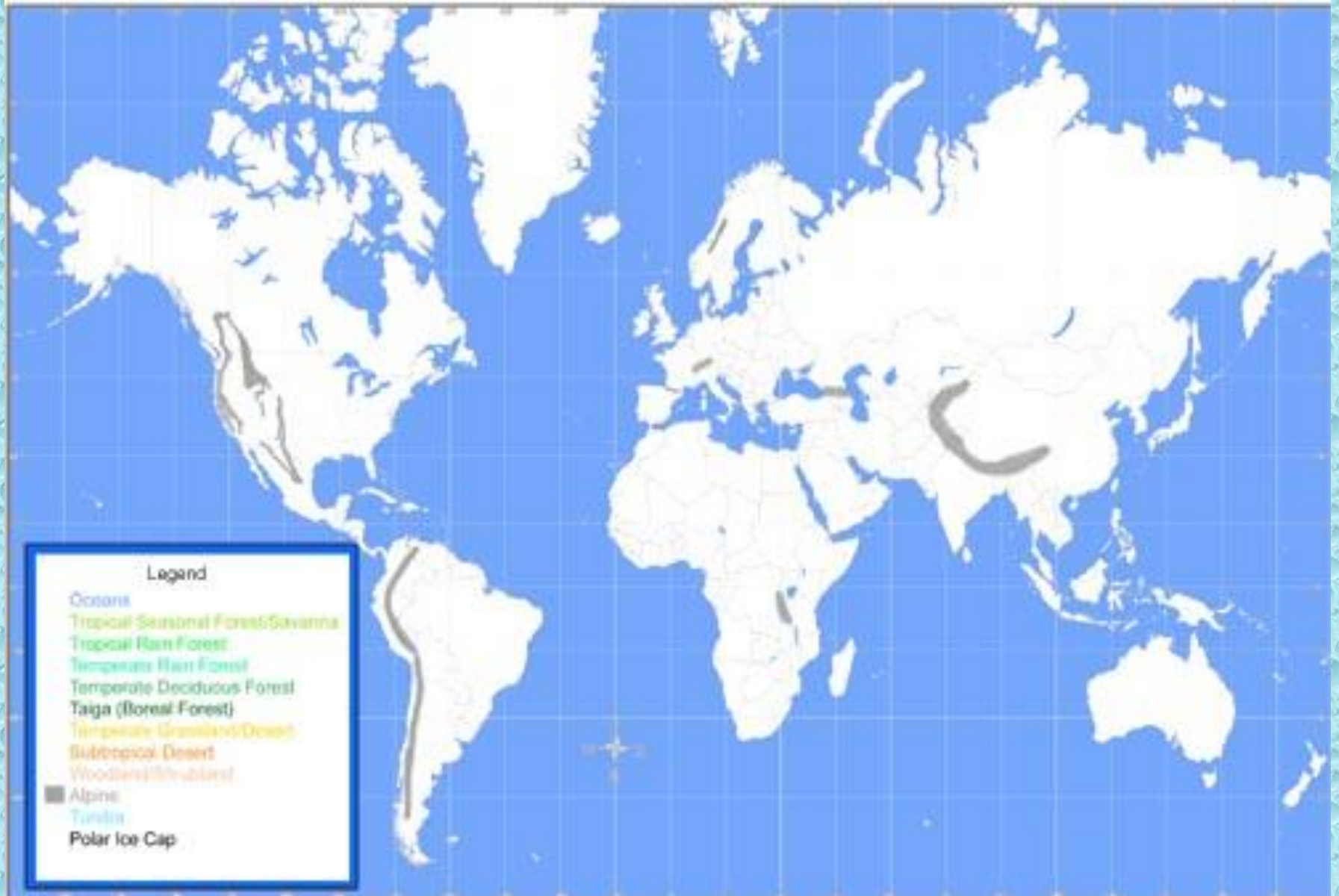
Alpine biomes by their nature do not fit into a simple climatic scheme.

In general, as one **ascends** a mountain, **temperature** drops by about **10 degrees C** for every **1000 meters** in altitude gained (a suspiciously round number!).

Rainfall also varies considerably; as the rising air cools it loses the ability to retain moisture and clouds form, with the result of increasing precipitation on the side of a mountain exposed to winds.

On the other side, the descending air (already dried by its trip over the mountains) warms and removes moisture from the ground - this is one of the driving forces behind the deserts in the American Southwest.

World Distribution:



As one moves up a mountain, the first indication one has that you are entering an alpine area is the appearance of **coniferous** trees. Able to shed snow easily, and retaining photosynthetic needles that are able to start photosynthesis quickly as soon as the temperature exceeds the freezing point, **conifers** such as **firs** and **pin**es (right) are ideally adapted for cool environments. Further up the mountain a tree line occurs; above this point climactic conditions are too harsh for trees to grow, and a tundra-like plant community develops. Plants here include various **wildflowers** (below) , **mosses**, **succulents** (adapted to the harsh dry conditions that often prevail), and other low-growing plants (below right). **Lichens** can also be important.



Oxygen levels get thinner as you go up the mountain; animals have to adapt to this.

Mountain goats, below, have a host of adaptations that allow them to live on the most precarious of cliffs. Chief among those adaptations are special pads on their hooves which are both cushioned (to absorb the shock of jumping from rock to rock) and slip resistant.



Alpine (Mountain) biomes are found in the mountain regions all around the world. They are usually at an altitude of about 10,000 feet or more. The Alpine biome lies just below the snow line of a mountain. As you go up a mountain, you will travel through many biomes. In the North American Rocky Mountains you begin in a desert biome. As you climb you go through a deciduous forest biome, grassland biome, steppe biome, and taiga biome before you reach the cold Tundra /Alpine biome.

In the summer average temperatures range from 10 to 15° C. In the winter the temperatures are below freezing. The winter season can last from October to May. The summer season may last from June to September. The temperatures in the Alpine biome can also change from warm to freezing in one day.

Average precipitation is 30 cm a year and mostly snow.

Because the severe climate of the Alpine biome, plants and animals have developed adaptations to those conditions. There are only about 200 species of Alpine plants. At high altitudes there is very little CO₂, which plants need to carry on photosynthesis. Because of the cold and wind, most plants are small perennial groundcover plants which grow and reproduce slowly. They protect themselves from the cold and wind by hugging the ground. Taller plants or trees would soon get blown over and freeze. When plants die they don't decompose very quickly because of the cold. This makes for poor soil conditions. Most Alpine plants can grow in sandy and rocky soil. Plants have also adapted to the dry conditions of the Alpine biome. Plant books and catalogs warn you about over watering Alpine plants.

Alpine
Phacelia



Polylepis
Forest



Bristlecone
pine

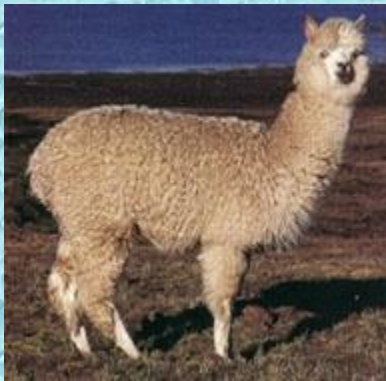


Bear
Grass



Alpine animals have to deal with two types of problems: the **cold and too much high UV wavelengths**. This is because there is less atmosphere to filter UV rays from the sun. There are **only warm blooded animals** in the Alpine biome, although there are insects. Alpine animals adapt to the cold **by hibernating, migrating to lower, warmer areas, or insulating their bodies with layers of fat.** Animals will also tend to have **shorter legs, tails, and ears, in order to reduce heat loss**. Alpine animals also have larger lungs, more blood cells and hemoglobin because of the increase of pressure and lack of oxygen at higher altitudes. This is also true for people who have lived on mountains for a long time, like the Indians of the Andes Mountains in South America and the Sherpas of the Himalayas in Asia.

Alpaca



Mountain
Goat



Chinchilla



Andean
Condor

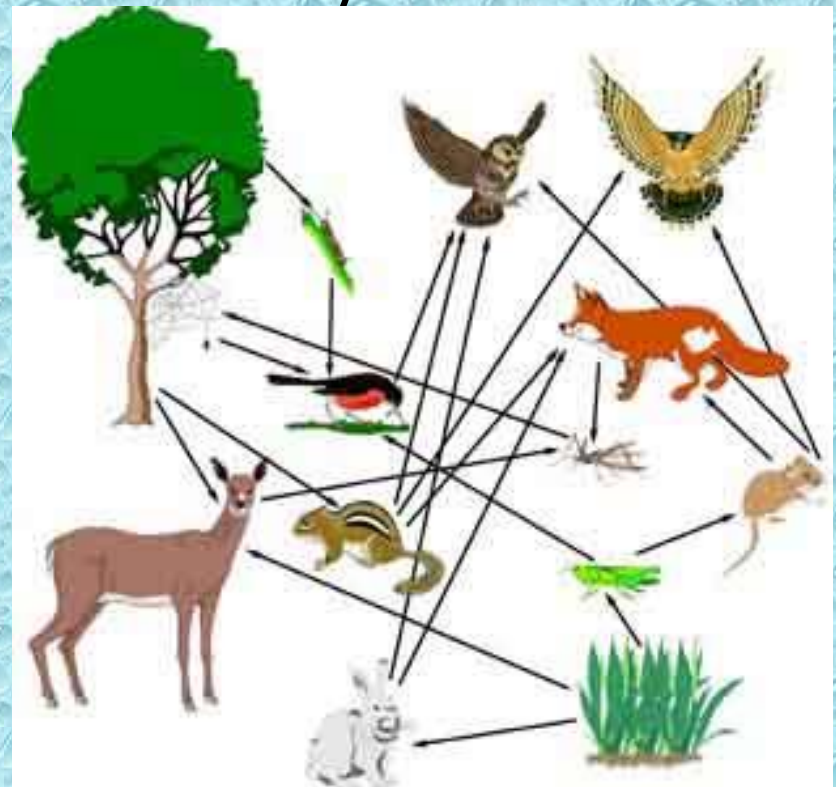


Feeding Relationships

- **Food Chain** – steps of organisms transferring energy by eating & being eaten



- **Food Web** – network of all the food chains in an ecosystem



Energy Transfer in Biomes

Trees and plants provide food, oxygen and shelter for animals.

The animals in return eventually die, rot and fertilize the soil so that trees and plants get their food. They also help with starting new tree and plant growth.

Both plants and animals help control the land's climate.

