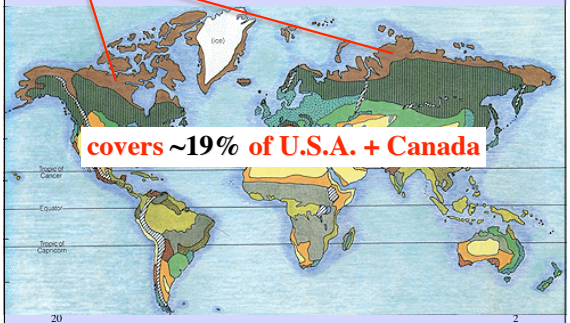
TUNDRA

almost all >60°N
~none in s. hemisphere



covers ~19% of U.S.A. + Canada

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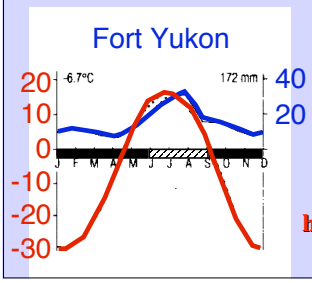
Tundra Climate



- **arctic air mass**
- **intensely cold + dry**
- **6-10 mo. <0°C**
- **mean 0° to -19°C**
- **permafrost**
- **<400mm. precip'n unpredictable**
- **high winds**
- **long summer days**
- **long winter nights**
- **low sun angle - high reflection + scatter**

3

tundra found where temperature & precipitation are too low, and growing season too short for TREES

tundras are thus found north of, or above, **TREE LINE**

high latitudes *and altitudes* - arctic and alpine tundras

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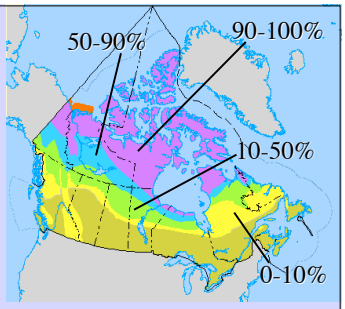
soils young, shallow, poorly developed, acidic & nutrient-poor; often waterlogged/poorly-drained;

much is underlain by permafrost



Distribution of permafrost

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freeze-thaw effects over hundreds of years produce many curious features:
ice-wedges, soil polygons, pingos

pingos - ice-cored hills

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soil polygons & ice-wedges

low temp. & precip., + high, enduring, winds favour low-growing plants

short season favours perennials (98%); many evergreen; pre-formed buds

vegetation dominated by hemicryptophytes poor flora - lichens, mosses, grasses

20 9

it is warmer near the gound, so: cushions; tussocks; rosettes; turfs: dead material accumulates giving insulation from low temps., wind, drying & ice-scouring

much reproduction is vegetative, but some pollination - mainly by wind & flies flowers often enclosed in papery "greenhouses" or form solar dishes

20 10

lichen

sedge

cotton"grass"

prostrate willow

Azalea - cushion plant

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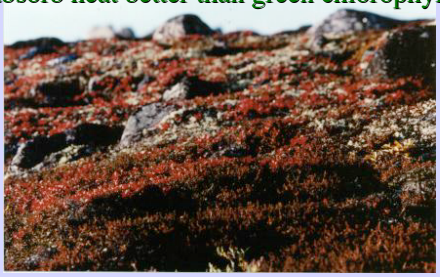
many species enhance production by using red or purple photosynthesising pigments- absorb heat better than green chlorophyll



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most land animals are migratory, using the summer burst of high productivity

resident taxa must be active most of year: soil too shallow, temps. too low & cold season too long for hibernation; but often +10°C under snow cover

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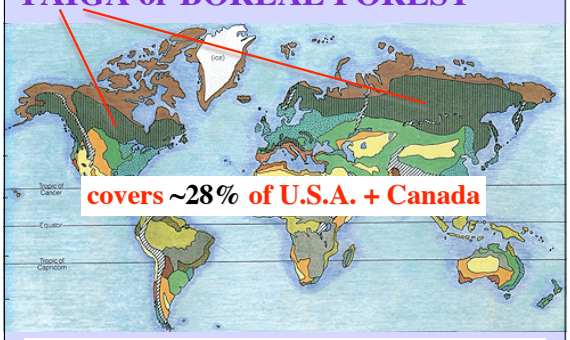
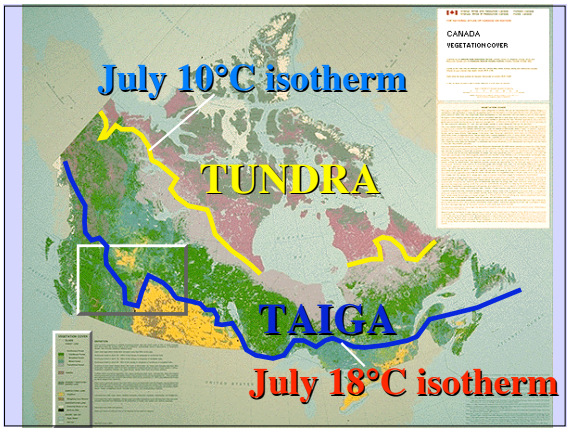
TAIGA or BOREAL FOREST



one of largest systems; water/gas exchange



short cool summer & **long harsh winter**
but with **substantial precipitation**

- slow decomposition → accumulation of organic debris; often waterlogged
- **low** pH upper soil layers - low nutrient availability
- great importance of **mycorrhizae**

larger soil animals rare - little mixing

20 22

low diversity vegetation *(but very young)*
often pure stands of single species
closed forest dominated by conical form

short growing season → evergreen
+ preformed buds for rapid start

but frozen in long winter = drought:
rolled needles, thick cuticle,
sunken stomata, gel-forming cell-contents

adaptive virtues of conical form

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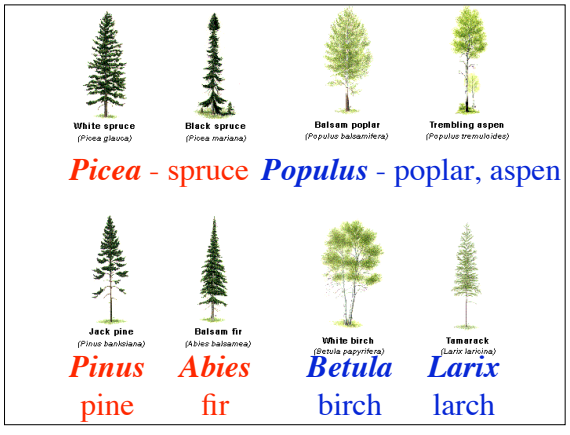

1. Spruce - acid soil - nutrient leaching -
2. Spruce die & fall - - forest gaps
3. Aspen invade - - N_2 fixing bacteria
4. N_2 accumulates - - canopy closes - - spruce invades...

spruce-aspen cycle ~200yrs

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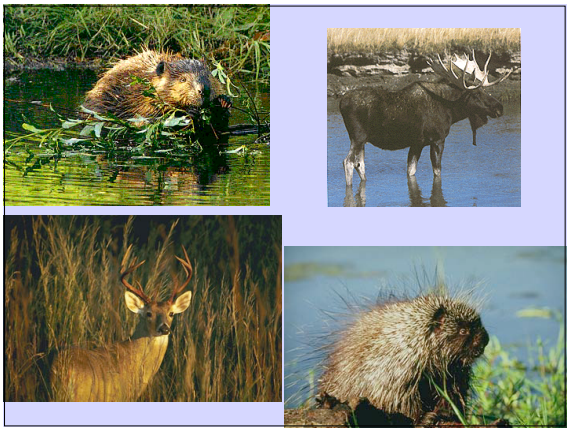

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