

Figure 6-3 Diagrammatic representation of Raunkiaer's life forms. Unshaded parts of the plant die back during unfavorable seasons, while the solid black portions persist and give rise to the following year's growth. Proceeding from left to right, the buds are progressively better protected (after Raunkiaer 1937).

conditions (Raunkiaer 1934). He distinguished five principal life forms (Figure 6-3):

phanerophytes (from the Greek *phaneros*, visible) carry their buds on the tips of branches, exposed to extremes of climate. Most trees and large shrubs are phanerophytes. As one might expect, this plant form dominates in moist, warm environments where buds require little protection.

chamaephytes (from the Greek *chamai*, on the ground, dwarf) comprise small shrubs and herbs which grow close to the ground (prostrate life form). Proximity to the soil protects the bud. In regions of heavy snowfall, the buds are protected beneath the snow from extreme air temperatures. Chamaephytes are most frequent in cool, dry climates.

hemicryptophytes (from the Greek *kryptos*, hidden) persist through the extreme environmental conditions of the winter months by dying back to ground level where the regenerating bud is protected by soil and withered leaves. This growth form is characteristic of cold, moist zones.

cryptophytes are further protected from freezing and desiccation by having their buds completely buried beneath the soil. The bulbs of irises and

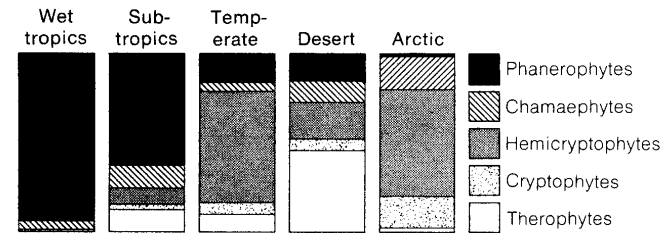


Figure 6-4 Proportion of plant life forms, classified according to Raunkiaer (1934, 1937), in various climatic regions (after compilations of Richards 1952, Dansereau 1957, Daubenmire 1968).

daffodils are representative of the regenerating buds of cryptophyte plants. Like hemicryptophytes, cryptophytes are also found in cold, moist climates.

therophytes (from the Greek *theros*, summer) die during the unfavorable season of the year and do not have persistent buds. Therophytes are regenerated solely by seeds, which resist extreme cold and drought. The therophyte form includes most annual plants and occurs most abundantly in deserts and grasslands.

The proportional occurrence of Raunkiaer's life forms in the floras of various climatic regions is summarized in Figure 6-4. Life form and climate go closely together. Phanerophytes dominate vegetation forms in warm, moist environments. They are progressively replaced by chamaephytes, hemicryptophytes, and cryptophytes in temperate and arctic regions. Deserts are distinctive in having a large proportion of therophytes.

TREE

broad leaves

needles

ASPEN
COTTONWOOD
WILLOW
POPLAR
BIRCH, ALDER

CONIFER

single needles

needles in bunches

SPRUCE/FIR/DOUGLAS FIR

PINES

sharp, square needles
needle on peg

flat, friendly needles
needle not on peg

needles in
groups of 2-3

needles in
groups of 4-5

SPRUCE

FIR/DOUGLAS FIR

YELLOW PINES

WHITE PINES

very sharp needles
blue color
lower elev./riparian

less sharp needles
green color
higher elev.

higher elev.
cones at top
cones fall apart

lower elev.
cones throughout tree
bracts in cones,
(mice tails)

2 short needles/bundle
straight trunk
small cones

2-3 longer needles/bundle
broad branching trunk
large cones

5 needles/bundle
flexible limbs
large cone w/o spines

5 needles/bundle
rigid limbs
large cone w/ spine

CO BLUE SPRUCE
(*Picea pungens*)

ENGELMANN SPRUCE
(*Picea engelmannii*)

SUBALPINE
FIR
(*Abies lasiocarpa*)

DOUGLAS
FIR
(*Pseudotsuga
menziesii*)

LOGPOLE PINE
(*Pinus contorta*)

PONDEROSA PINE
(*Pinus ponderosa*)

LIMBER PINE
(*Pinus flexilis*)

BRISTLEcone
PINE
(*Pinus aristata*)

A KEY TO CONIFERS OF THE COLORADO FRONT RANGE

Derek Sweeney
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Winter Ecology
University of Colorado - Mountain Research Station