Physiological Dynamics in Animals & Plants – Lectures 1 & 2 – Plant Form and Function

I. Higher land plants probably evolved from the green algae (Charophytes).

   A. The geological time scale – a review

II. A variety of physiological adaptations allowed plants to colonize land.

   A. Plants had to develop adaptations to survive in the soil-plant-atmosphere continuum.

   B. Some adaptations were structural, some were chemical, most affected reproductive function.

III. Ontogeny recapitulates phylogeny in plants as well as animals – in plants, adaptation was accomplished by the evolution of structures that opened new opportunities for plants to live on dry land.

   A. Subterranean organs – e.g. roots

   B. Aerial organs – e.g. stems, leaves, flowers

   C. Vasculature and the siphonous body plan

   D. A cuticle and stomata

IV. Chemical adaptations – secondary plant products

   A. Waxes of the cuticle

   B. Herbivory deterrents, e.g. cardiac glycosides like ouabain

   C. Lignin in woody plants

   D. Sporopollenin

V. Reproductive adaptations

A. Spores, gametangia, embryos, and alternation of generations

B. Heterosporosity

C. Seeds – embryos packaged in a store of food with a protective covering to prevent them from drying out.

1. Gymnosperms = naked seeds – seeds are not enclosed in specialized chambers

2. Angiosperms (flowering plants) – seeds develop in protective chambers called ovaries

VI. Four most important reproductive adaptations in development of land plants

A. Reduction of the gametophyte so that it is contained within the sporophyte

B. Seeds as resistant means of dispersing embryos

C. Pollen for dispersing gametes

D. Flowers of angiosperms

VII. Animals and plants have shaped each others' evolution

A. Coevolution of angiosperms and their pollinators

B. Agriculture: food, fiber, medications, perfumes, decoration

C. Transformation of the atmosphere and the climate by plants

VIII. Plant biodiversity is threatened as 50,000,000 acres of rain forest are cleared each year.