

Study guide for exam III

Biology, Spring 2011, Winslow

Evolution

Lamarck, Lyell, Malthus, Darwin, Wallace

Darwin

Voyage on HMS Beagle, Galapagos

Natural selection & adaptation

Population growth & limits to growth

Competition & heritable variation

Differential fitness (survival & reproduction)

Gradual adaptation

Reproductive barriers & speciation

Evidence for evolution

Fossil record, evolutionary trends

Carbon dating

Homologous & vestigial structures

"Ontogeny recapitulates phylogeny." --Haeckel

Genetics

Experiments (such as lizards introduced to a new island)

Microevolution

Population genetics

Gene pool

Hardy-Weinberg equilibrium

Forces that change allele frequencies

Mutation, genetic drift, nonrandom mating, migration, selection (natural, sexual)

Measuring genetic variation

Macroevolution

Allopatric & sympatric speciation

Hybridization & extinction

Adaptive radiation (diversification)

Gradualism, punctuated equilibrium

Mass extinction

Levels of selection--genic, individual, kin, group, species

Biological diversity

Taxonomy--domain, kingdom, phylum, class, order, family, genus, species

Noncellular quasi-organisms--Viruses, viroids, prions, plasmids

Prokaryotes

Unicellular, no nucleus or membrane-bound organelles

Binary fission, conjugation, plasmids, recombination

Aerobic or anaerobic, heterotrophic or autotrophic

Autotrophic prokaryotes--photoautotrophs, chemoautotrophs

Symbiosis--Mutualistic, commensalistic, or parasitic

Domain Bacteria--Gram-staining, shell shape, biochemical characteristics

Domain Archaea

Biochemical characteristics distinguish Domains Bacteria, Archaea, & Eukarya.

Extremophiles

Eukaryotes--nucleus & membrane bound organelles, endosymbiosis

Protists, Fungi, Plants, Animals

Kingdom Protista--Unicellular or multicellular, classification by mode of nutrition

Algae--chlorophyll a, photosynthesis

Diatoms--unicellular, with cell wall

Phylum Rhodophyta (red algae)

Phylum Chlorophyta (green algae)

Flagellates

Diatoms & dinoflagellates are important marine producers

Protists with pseudopods

Ciliates

Slime molds

Phylum Oomycota (water molds)

Kingdom Plantae

Evolution and diversity

Relationship with green algae

Alternation of generations, spores, gametes, zygote

Forests of the Carboniferous Era, fossil fuels

Human uses of plants

Bryophytes (non-vascular plants)

Gametophyte and sporophyte

Phylum Anthocerophyta (hornworts)

Phylum Hepatophyta (liverworts)

Phylum Bryophyta (mosses)

Moss life cycle, antheridia and archegonia

Vascular plants

Xylem and phloem

Stomata--gas exchange, guard cells, photosynthesis, transpiration

Dominant sporophyte

Seedless vascular plants

Phylum Lycophyta (club mosses)

Phylum Sphenophyta (horsetails)

Phylum Psilotophyta (whisk ferns)

Phylum Pterophyta (ferns)

Fern life cycle, fronds

Seed plants

Pollen grain and female gametophyte, pollination, seed

Dioecy and monoecy

Gymnosperms

Phylum Coniferophyta (cone-bearing plants)

Phylum Cycadophyta (cycads)

Phylum Ginkgophyta (ginkgo tree)

Phylum Gnetophyta

Angiosperms (flowering plants)

Phylum Anthophyta

Monocots and dicots, cotyledons

Flower parts

Pollinators, pollen tube

Structure and organization (roots, shoots, meristem); Nutrition & transportation; Hormones

Kingdom Fungi--Multicellular or unicellular

Saprophytic decomposers, hyphae, nutrient cycling

Spores, sexual and asexual reproduction

Phylum Zygomycota

Phylum Ascomycota

Phylum Basidiomycota

Fungal symbioses--lichens, mycorrhizae

Kingdom Animalia--Multicellular, invertebrate vs vertebrate, protostome vs deuterostome

Phylum Porifera--sponges

Mostly marine, radially symmetrical or asymmetrical, sessile adults

Maintain internal water currents to obtain food, ostia & osculum

No nervous system or sensory organs, spongocoel

Phylum Cnidaria--jellyfish, corals, sea anemones, etc.

Radially symmetrical

Tissue level of organization, saclike body plan, tentacles, nerve net, mouth

Aquatic, mostly marine, muscles for locomotion, polyp & medusa

Phylum Platyhelminthes--flatworms

Bilateral symmetry, head, organ-system level of organization, free-living or parasitic

Anterior ganglia for "brain", sensory organs

Planarian--free-living

Sac-like digestive system, ventral mouth, pharynx, intestine, eyespots & auricles

Class Cestoda (tapeworms)--endoparasitic

Phylum Nematoda--roundworms

Found everywhere--aquatic, terrestrial, parasitic

Tube-within-a-tube (complete) digestive system: mouth, pharynx, intestine, rectum, anus

Phylum Annelida--segmented worms (marine worms, earthworms, leeches, etc.)

Segmentation, somites, cerebral ganglia for brain, complete digestive system

Nephridia (kidneys) in each segment remove waste from blood

Phylum Mollusca--snails, slugs, clams, mussels, squid, octopi, etc.

Spiral cleavage, unsegmented, organ systems, shell, foot

Phylum Arthropoda

Diversity & abundance, somites, jointed appendages, metamorphosis

Horseshoe crabs, spiders, scorpions, crustaceans, insects, centipedes, millipedes, etc.

Beneficial (pollinators) & harmful insects

Phylum Echinodermata--sea stars, brittle stars, sand dollars, sea urchins, etc.

Radial cleavage, spiny skin, water vascular system, bilateral larvae, radial adults

Phylum Chordata

Notochord, dorsal hollow nerve cord, pharyngeal gill slits, postanal tail

Tunicates, lancelets, vertebrates

Subphylum Vertebrata--vertebrates

Fishes--hagfishes, lampreys, cartilaginous fishes, bony fishes

Tetrapods--early tetrapods, colonization of land, fins become legs, lung

Amphibians--water for reproduction, ectothermic, gills as larvae

Reptiles--amniotic eggs, ectothermic, lungs, direct development

Birds--amniotic eggs, endothermic, 2-cycle lungs, dinosaurs & feathers

Mammals--Hair, endothermic, glands in skin, placentals are viviparous

Opossums, moles, bats, humans, rabbits, rodents, dogs, deer, etc.