

Introduction – Comparative Physiology: Table of Contents (1 lectures)

Introduction: Defining Comparative Physiology

(20:48 min:sec)

0:00	Introduction
00:10	Definitions
00:24	Organism as a Black Box: Studying the organism out of context with the environment: Physiology (how things work) and Development (how things come to be).
01:15	Physiology: Energy in/out; O ₂ in / CO ₂ out; waste removal (NH ₃ , toxins); water / salt balance / circulation / regulation (hormones, nervous system – behavior)
02:43	Physiological levels: molecular, cellular, organism = physiology, add environmental level = comparative physiology (adaptations to specific environmental situations).
04:01	Many organisms/environments, diverse life histories: evolution of adaptive modifications.
05:01	Number of species on planet; number of adaptations; number of different "experiments" (1.5-30 million!!!)
06:01	Phylogeny: relationship of organisms – assumes common ancestors Bacteria, Archaea, Eukarya – Bacteria / Archaea: metabolic processes evolve Eukarya – compartmentalization, specialization (nucleus, organelles) advanced complexity
07:35	Phylogeny: Eukarya Story of increased complexity – emergence of Fungi, Plants, Animals – multicellularity occurred independently in each lineage – Animal multicellularity independent of Plant multicellularity (regulation between cells different, but based on common principals). Regardless; at onset of animals, cells enormously complex and poised for enormous experimentation (different lineages).
08:57	Phylogeny: Animals explosion of different body plans Radiation perhaps 1 billion years ago (earth 4.5 billion years old) Premise: basic mechanisms of how cells work ; communication; regulation became established first, then radiation occurred (species explosion)
11:09	General Physiology: bacteria or human Black Box: basic functions: energy, gas exchange, waste removal, circulation / communication / delivery of nutrients; regulation / COORDINATION!!! Studying these features is Basic Physiology but not Comparative Physiology
12:41	Comparative Physiology – Studying Diversity Driven by curiosity; how do all these species do things differently. This is comparative physiology based on each organism being different.
13:42	Comparative Physiology – Studying commonality August Krogh: For any important biological problem, given the diversity of organisms, there is an ideal organism for that study. This is Comparative Physiology where it is assumed that different organisms have

	<p>general and common features and that different organisms/species represent experimental resources for understanding those general and common features. Diverse knowledge empowers us to solve important problems.</p>
15:12	<p>Model Organism Dichotomy View #1: <i>E.coli</i>, yeast, <i>Arabidopsis</i>, <i>Drosophila</i>, Mouse (Driven by politics) View #2: Any organism from which general principals can be resolved (Driven by intellect)</p>
16:16	Knowing diversity empowers us to know similarity /common & general principals
16:45	National Science Foundation list of model organisms
17:23	What is course about: "Blood and Guts Physiology" physiology excluding nervous system (but will include electrical excitability of cells, synapses, and responses to neurotransmitters – all the core stuff of how neurons work).
18:19	Course Evaluation; ignore this information for what is written in web site – there will be no quizzes (exams will be 100% of grade, final is optional; note extra credit essay options).
19:59	First assignment!!! Read background material, look at digestion lectures. There will be no quiz (this pannel was produced before rest of videos).
20:41	Welcome!