

Jan. 19th. **What is Systematic Biology? Philosophy**

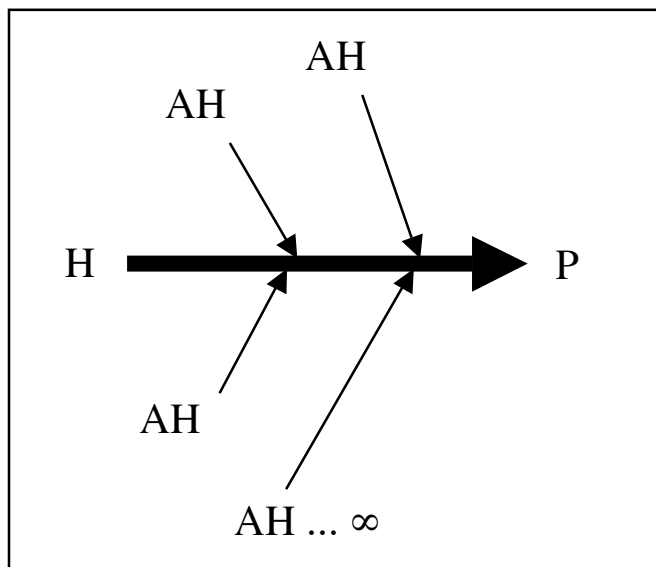
Philosophy

-- Some might think philosophy has nothing to do with biology (the traditionalists view), but that couldn't be more wrong. There are many important philosophical issues in systematics, the most important of which, for our purposes, being:

1. *Ontology* -- Background theories stating what kinds of entities exists, what are their fundamental meanings and relationships. [e.g., homologies, phylogenies, species, etc.]

2. *Epistemology* -- Background theories stating what kinds of empirical operations and methods can be used to discover the underlying ontological entities and relationships. [e.g., characters, statistics, cladistic analysis, etc.]

The reigning epistemology of science, its connection with ontology, and some variants:



Concepts to discuss:

Hypothesis & Prediction

Main hypothesis

Auxiliary hypotheses

Null hypothesis

Falsification (the boundary between science and non-science?)

Experiment

Control

Replication

Observation versus experiment

Historical versus experimental science

Cause

Model

Confidence

3. *Sociology of science* -- Motivations; patterns of teaching, cooperating, fighting; "progress" in science (Kuhn, 1970 is the classic; see Hull 1988, *Science as a Process*, for major treatment of subject in systematics).

Natural selection explained:

replicator -- any entity that passes its structure on with high fidelity

lineage -- a sequence of ancestor/descendent replicators

interactor -- an entity that interacts with other entities such that replication is differential

evolution by natural selection:

1. heritable variation in a trait causing...
2. differential reproductive success of one replicator lineage over others...
3. due to competition among interactors within a common environment.

To what extent does the process of science follow the model of natural selection? What are the analogies and non-analogies? What does it matter? *Plenty* -- the better you understand the process of science, the better you'll do at it!