

**William Blake**  
From **Auguries of Innocence**

To see a world in a grain of sand,  
And a heaven in a wild flower,  
Hold infinity in the palm of your hand,  
And eternity in an hour.

A robin redbreast in a cage  
Puts all heaven in a rage.

A dove-house fill'd with doves and pigeons  
Shudders hell thro' all its regions.  
A dog starv'd at his master's gate  
Predicts the ruin of the state.

A horse misused upon the road  
Calls to heaven for human blood.  
Each outcry of the hunted hare  
A fibre from the brain does tear.

## The Species Problem

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## Why classify?

- ... in life generally?
- ... in science?
- Why classify species?
  - Taxonomy
  - Evolution
  - Policy

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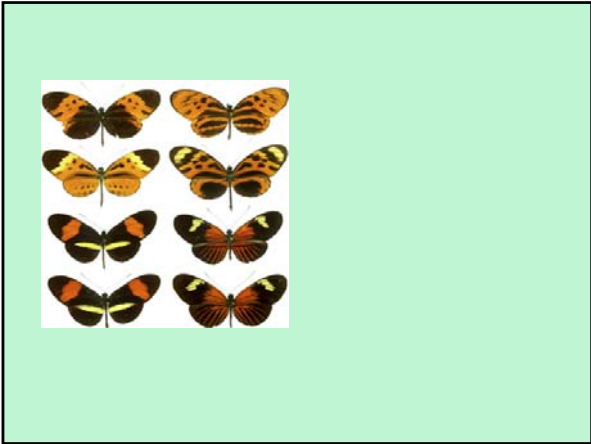
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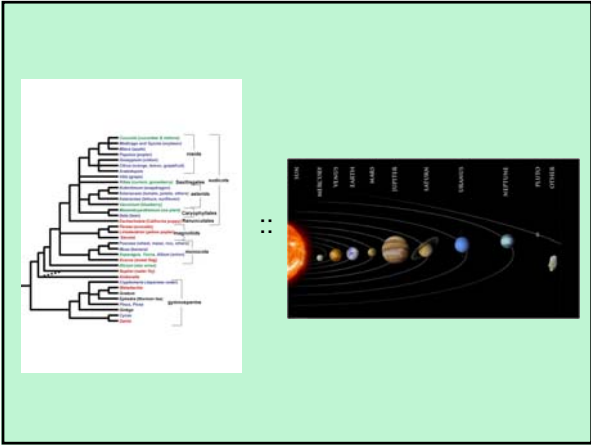
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**Ontology:**  
**Species as *types***



- Species as **natural kinds**
  - Essential property: necessary & sufficient
  - All and only individuals with essential properties are instances of the kind
  - Essential properties explain key characteristics of kind
  - Variation as deviation

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## Problems with typological thinking in biology

- Are any traits necessary of sufficient to species
  - Would a mutant lacking the traits be excluded from the species?
  - Would a mutant of another species that acquired the trait become a member of the species?
  - Are there any sharp boundaries between members and non-members of a species?
- Doesn't generally square with evolutionary thinking: expect variation

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## Ontology: Species as *Individuals*

- Hull & Ghiselin: evolutionary unit argument
  - Species as spatiotemporally continuous
  - Species themselves as evolutionary units
- Organism/species relationship
  - Not member/class, but part/whole
- Species not subject to scientific laws
  - If laws pertain only to classes of things
- Search for *essence* of species (e.g. 'human nature'??) may be misguided

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## Criteria for species membership

- Morphological
- Biological
- Phylogenetic
- Others

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## Morphological species concept

- Group based on overall similarity of morphological characteristics (may or may not be essential)
- Problems:
  - Objective similarity?
  - Contact with evolutionary theory?

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## Biological Species Concept

- Reproductive isolation
- Connection: actual or possible reproductive links
- Protection of favorable gene combinations
- Mechanism to prevent outcrossing:
  - Isolating mechanisms

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## Problems with BSC

- Problems with plants and single-celled organisms
  - Especially asexual organisms: Is each individual a different species?
  - Plants: reproductive isolation is weak
- Challenge temporally: depending on which organisms you start with, set the forward and backward limits of the species
- Groups that might not interbreed but easily could and groups that are different despite gene flow
  - Might try *potential* interbreeding, but no way to spell that notion out

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## Phylogenetic species concept

- First principle: taxonomy should accurately reflect genealogy
- To be members of the same species, members must share common descent
- Necessary, but not sufficient

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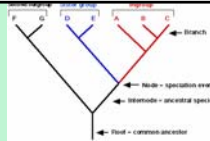
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## Problems with the Phylogenetic Species Concept



- Need a means of identifying speciation events and so must use something like break in interbreeding or cohesiveness
- “the most plausible account of species is that they are lineages between speciation events. The biological species concept, perhaps supplemented by the ecological species concept or by something else, reemerges as an account of speciation” (Sterelny and Griffiths, p. 192).

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## Other species concepts

- Homeostatic Property Clusters
- Population Structure Theory
- Cohesion species concept
- Ecological species concept

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## One concept or many?

- What would the correct (perfect?) species concept look like? When would we know if we got it?
- Kitcher argues for two concepts based on proximate/ultimate distinction.
  - Proximate: structural similarities (species as classes / kinds)
  - Ultimate: genealogical (species as individuals)

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## Classification & human interests

- Dangers associated with assuming homogeneity within classifications

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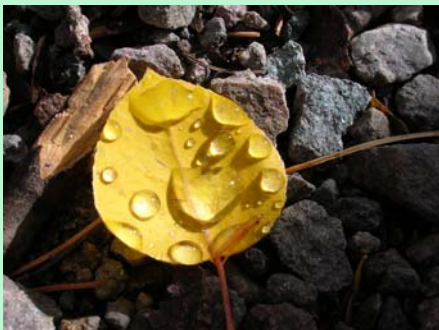
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