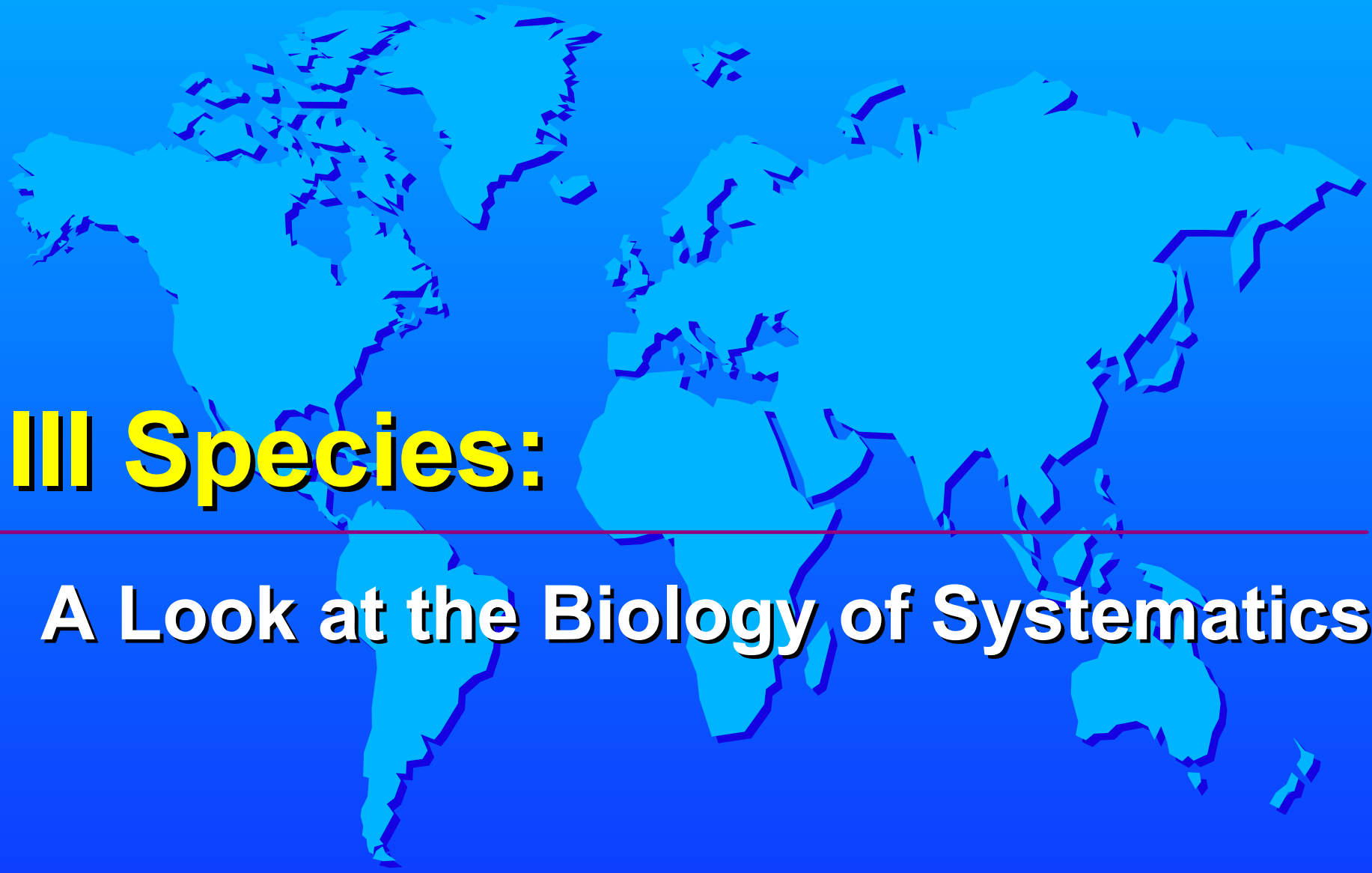

Ill Species:

A Look at the Biology of Systematics

Can we define what a "species" is?

- Typological view: Species are seen as distinct entities and are clearly differentiated.
- Evolutionary view: Species are groups of individuals that exhibit phenotypic variation.
- Geographical variation in populations is an important element in the evolutionary process.
- Biological Species Concept (BSC) - Species are groups of actually or potentially interbreeding populations

continued -

- which are reproductively isolated from other such groups.
- Phylogenetic (cladistic) Species Concept - A species is the smallest diagnosable cluster of individual organisms within which there is a parental pattern of ancestry and descent.
- Evolutionary Species Concept - A species is a single lineage of ancestral descendant populations of organisms which maintains its identity from other such lineages and which has its own evolutionary tendencies

continued -

- and historical fate.
- Ecological Species Concept - A species is a lineage or a closely related set of lineages which occupies an adaptive zone minimally different from that of any other lineage in its range and which evolves separately from all other lineages outside its range. The *adaptive zone* is defined as the resource space plus predators and parasites.

continued - *(continued)*

- Recognition Species Concept - A species is a field for gene recombination with reproductive mechanisms facilitating gene exchange. This is a corollary to the BSC.
- Cohesion Species - The most inclusive population of individuals having the potential for phenotypic cohesion through intrinsic cohesion mechanisms.
- Nominalists versus pluralists!
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The Species and Conservation

- How do species concepts affect conservation efforts? BSC versus PSC?
- Is conserving species enough? ecotypes and plasticity, ecological effects of localized extinctions, effect on genetic diversity within species as ecotypes are lost
- Species categories: keystone species, indicator species, umbrella species, flagship species, vulnerable species, economically important species.

The Species and Conservation *(continued)*

- Phylogenetic considerations can strengthen conservation arguments for more broad, regional conservation programs. Basal taxa may have low species numbers, restricted geographic range and be more susceptible to extinction.
- Allopatric speciation, founder effect and genetic drift.

The Species and Conservation *(continued)*

- Increased habitat fragmentation could encourage speciation but can easily lead to local extinctions.
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Endangered Species Act (ESA) and Convention on International Trade in Endangered Species (CITES)

- ESA created in 1973 - most powerful environmental protection law ever created by any nation.
- ESA defines a species as "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature".
- Endangered species - "in danger of extinction throughout all or a significant portion of its range".

Convention on International Trade in Endangered Species (CITES) *(continued)*

- Threatened species - "is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range".

Convention on International Trade in Endangered Species (CITES) *(continued)*

- ESA includes provisions to conserve "the ecosystems upon which endangered species and threatened species depend" by designating an listing *critical habitat* when a species is listed. Critical habitat is defined as specific areas within the species' range with physical of biological features either (1) essential to conservation of the species, or (2) which may require special management considerations or protection".

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- Convention on Internation Trade in Endangered Species (CITES) - Adopted in March 1973 with over 125 signatory countries. The goal of CITES is "to regulate the complex wildlife trade by controlling species-specific trade levels on the basis of biological criteria". Appendix I to the treaty prohibits all comercial trade in listed species; Appendix II list species not immediately threatened with extinction but next to go, limited commercial trade is

continued -

- allowed; Appendix III is an optional list that countries can use to protect species that might be endangered by trade.
- Species and extinction are the criteria of concern in CITES; subspecies and geographic information are not specified. The treaty uses the laws of each country to decide legal trade.