

SPECIES CONCEPTS

Species concept

- Cuvier in 1829 defined species as 'The assemblage descended from one another or from common parents and of those who resemble one another.'

Typological species concept

- According to this species concept the observed diversity of the universe reflects the existence of a limited number of underline 'universals' or 'types'.
- Individuals do not stand in any special relation to each other being merely expressions of the same type.
- Variation is considered as irrelevant phenomena.

- This species concept was the concept of Linnaeus and his followers but it goes back to the philosophy of Aristotle and Plato.
- This species concept is called essentialistic species concept. According to this concept species can be recognized by their essential characters and these are expressed in their morphology.
- It is also called morphological species concept.

Postulates

- Species consists of similar individuals.
- Each species is separated from all the other by sharp discontinuity.
- Each species is constant through time.
- There are strict limits to possible variations within any one species.

Criticism

- The concept is rejected because of two practical reasons
- Individuals are frequently found in nature that are clearly conspecific inspite of striking difference resulting from sexual dimorphism, age, polymorphism.
- There are species in nature that differ hardly in morphology but are reproductively isolated.

Nominalistic species concept

- This concept was popular in France in 18th century but surprizingly it is still used very rarely by some botanists.
- They believe that only individuals exist while species are man's own creation.
- Accordind to this concept 'Nature produces only individuals and nothing more.They are mental concepts that have been created to refer to great number of individuals collectively.

Criticism

- No biologist can agree that the species is man made.
- It is now an established fact that they are products of evolution.
- The basic drawbacks of the concept was the misinterpretation of the relation between similarity and relationship.
- Members of a species are similar to each other because of common descent .it is not true that they belong to this taxon because they are similar as claimed by this concept.

Biological species concept

- This concept was introduced by Mayr.
According to this concept
- “Species are group of interbreeding natural populations that are reproductively isolated from other such groups”

- Thus this species has three separate functions.
- 1.Members of a species form a reproductive community that is individuals of a species recognized each other as potential mates.
- 2.Species is an ecological unit that interacts as a unit with other species which shares its environment”
- 3.Species is a genetic unit that consists of a large gene pool where as an individual is merely a temporary vessel holding a small portion of a gene.

DIFFICULTIES IN APPLICATION OF BIOLOGICAL SPECIES CONCEPT

- INSUFFICIENT INFORMATION:

Individual variations in all its forms often raises the doubt whether a certain morphotype is a separate species or only a phenon within a variable population.

Organisms may look different and yet be the same species. For example, look at these ants. You might think that they are distantly related species. In fact, they are sisters—two ants of the species *Pheidole barbata*, fulfilling different roles in the same colony.

UNIPARENTAL REPRODUCTION

- Asexual groups do not fulfill the criteria of interbreeding which is the foremost characteristic of biological species concept.
- Asexual reproduction is frequent among lower invertebrates with parthenogenesis occurring even in insects ,lower vertebrates upto reptiles.

EVOLUTIONARY INTERMEDIACY

- Organisms may appear to be alike and be different species. For example, Western meadowlarks (*Sturnella neglecta*) and Eastern meadowlarks (*Sturnella magna*) look almost identical to one another, yet do not interbreed with each other—thus, they are separate species according to this definition.

- **Ring species** are species with a geographic distribution that forms a ring and overlaps at the ends. The many subspecies of *Ensatina* salamanders in California exhibit morphological and genetic differences all along their range. They all interbreed with their immediate neighbors with one exception: where the extreme ends of the range overlap in Southern California, *E. klauberi* and *E. eschscholtzii* do not interbreed. So where do we mark the point of speciation?

Chronospecies

- **Chronospecies** are different stages in the same evolving lineage that existed at different points in time. Obviously, chronospecies present a problem for the biological species concept—for example, it is not really possible (or very meaningful!) to figure out whether a trilobite living 300 million years ago would have interbred with its ancestor living 310 million years ago.

The occasional breakdown of isolated mechanism

- Reproductive isolation may breakdown even among good species .Usually this lead to the production of occasional hybrids which are either sterile or of low viability and so do not cause any taxonomic difficulty.e.g Mules and hinny.

