

ZOO 461: PRINCIPLES OF SYSTEMATIC ZOOLOGY (2 UNITS)

Course synopsis

Zoological classification – the species category, polytypic species, population systematics, intra-specific categories, higher categories

Methods of zoological classification – taxonomic collections and identification, taxonomic characters, qualitative and quantitative analysis of natural variation, procedures of classification.

Zoological nomenclature – essential rules and interpretation of rules.

Practical: Class visit to Abeokuta Museum – tour of the different galleries and a general lecture by the Curator and Educational Officers on museum establishment and the role of a zoologist.

Lecture notes

High points

KINGDOMS OF LIFE

Classification based on Aristotle's findings has outlined its usefulness. Thus, five kingdoms of life were proposed as follows – Monera, Protista, Plantae, Fungi, Animalia.

Kingdom Monera – This contains prokaryotes

Kingdom Protista – This contains unicellular eukaryotes (Protozoans and algae).

Kingdom Fungi – Organisms that obtain their food through absorption. E.g. Molds, Yeast.

Kingdom Animalia – It comprises invertebrates (except protozoans) and vertebrates. They ingest their food and digest it internally.

Kingdom Plantae – are multicellular organisms that are photosynthesizing e.g. higher plants and multicellular algae.

ANIMAL PHYLOGENY

Phylogeny (origin) is the science of genealogical relationship among lineages of life forms. Phylogeny of an animal group represents the concept of the stages its evolution has taken. It is the evolutionary history of the group.

ONTOGENY AND PHYLOGENY

Phylogeny represents the evolutionary history of any taxon. Ontogeny refers to the history of the development of an individual from zygote to maturity.

Biogenetic law states that “ontogeny is the short any rapid recapitulation of phylogeny.

All metazoans pass through contain common developmental stages. These stages in succession are the zygote, cleavage, blastulation of gastrulation. Each of these successive. Stages in the development of an individual representing one of the adult form that appears in its evolutionary history.

Naming

Basically a two step process

1. Taxonomist finds something new to be unnamed
2. A name is given according to the rules of nomenclature

Step 1 - “Is it a new species?”

1. Are the diagnostic (unique) characters constant across large samples within the genus?
2. Have you compared the new species with descriptions of all its congeners (globally)
3. If the group has not been revised (well), have you examined the primary type specimens of all congeners?

Rules of International Code of Zoological Nomenclature must be followed

1. Typification - the name-bearing type, all names are tied to a type specimen
2. Principle of Priority - oldest name is valid
3. Principle of Stability - case by case basis to prefer stability over priority (in rare cases)

ICZN regulates names from superfamily to Subspecies

History of the Code

Linnaean system of binominal nomenclature

- Vast improvement over phrase names and prior naming systems
- No stability, Linnaeus & users of his system would change names to “improve” them (e.g. change the name to better reflect distribution)
- Lamarck, 1798, criticized lack of rules, instability, & chaos under the Linnaean system

ICZN - goals for the code

1. Promote stability
2. Promote universality
3. Names will be unique & distinct

Nomenclature:

Provisions for the formation and use of a system of names (rules) e.g. *nomenclatural status* of a name – its standing in nomenclature, does it conform to the *rules*?

Taxonomy:

The theory & practice of classifying organisms (opinions) e.g. *taxonomic status* of a name - is it valid, is it unique to one species?

Collections

Collections, specimens, curation (readings)

Ethics

Using collections, finding material, borrowing specimens (types often not loaned)

- loans to advisors, not students
- many museum specimens are not identified or are mis-identified, few are cataloged

Nice summary of value of collections to society - know some examples

- Cost savings to have access to large samples
- Historic data: pathogen outbreaks, habitat loss, biological invasions, climate change

Kinds of collections:

Identification collections –

short series, local area, e.g. field station collections

Research collections - long series, rare specimens, large population samples, authoritative identifications

- type specimens

Ethics of collecting:

- Millions of animals are sacrificed each day for human consumption
- Billions of organisms die each day from predation, illness, accident
- “If you are going to kill something you should prepare it as a specimen for perpetuity, for study...”

- Variation is so great, historical records so important, identifications so difficult

Specimens are required

- Attempts to eliminate collecting in society e.g. “butterflies through binoculars” are well-intentioned but are naïve or worse...

- They can be dangerous!