

Type Locality

- According to Article 72h type locality is the place from where type specimen was taken.
- Specimens collected from type locality are called topotype
- Population that occur at type locality is topotypical population
- Preserved specimen/type locality

Type Locality

- Damage holotype
- Information about environment
- Temperature/Humidity/soil type
- Missing type locality
- Article 72H contains advice on designations or restriction
- Designations or restriction not done routinely but by specialists by their revisionary work

END

Principles of Systematics

Module# 67

Principles of Systematics

Concept of Priority

Concept of Priority

- Fundamental principal of Zoological nomenclature
- Essentially it is a principle of recognizing first valid name of a species.
- A principle in taxonomy: the first properly published name of a species or genus takes precedence over any subsequently published
- (Article 19)

Concept of Priority

- The name which was use first time should be valid name
- Once name has been used, no subsequent publication of that name for other texon.
- There are formal provisions for making exceptions to this principle.

Concept of Priority

Limitations

- Priority starts from May 01, 1753
- Apply only to family level
- Not according to Zoological code

Concept of Priority

- If an archaic or obscure prior name is discovered for an established taxon, the current name can be declared conserved name (zoology), and so conserved against the prior name.
- Conservation can may be avoided in Zoology as these names fall in formal category of ***Nomen oblitum***.

Concept of Priority

Nomen oblitum

- In taxonomy, a forgotten name; i.e. the name of a senior synonym that has not been used in the zoological literature for at least 50 years.
- Such names should not be used if they upset a better-known name, but should preferably be suppressed by the ICZN.

Concept of Priority

- If a current name for a taxon have archaic or obscure homonym (same name to different taxon), the current name can be declared as ***Nomen protectum*** (available name).

END

Principles of Systematics

Module# 68

Principles of Systematics

Concept of priority

Concept of Priority



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What does priority means?

- The first Scientific name applied to the leopard shark was *Triakis californica*
- Proposed by British Zoologist Edward Gray (1851)
- He did not provided proper description
- In 1854 *Mustelus felis* by william Orville published
- In 1855 *Triakis semifasciata* by C F Girard

Concept of Priority

Error in date recording

- *Triakis semifasciata*
- *Nomen protectum* (available name)
- *Mustelis felis* was invalidated (as a *nomen oblitum*).

Concept of Priority

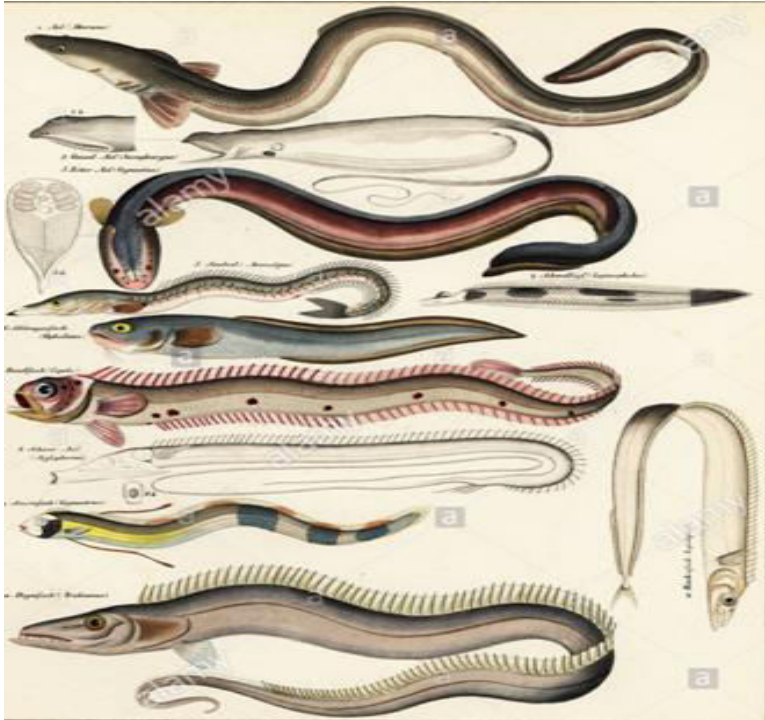


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Example

- In 1855 John Edward Gray published the name of Pronghorn (*Antilocarpa anteflexa*)
- Based on pairs of horns
- 1815 George Ord Published *Antilocarpa americana* for the same species.
- So the older name *Antilocarpa americana* takes the priority over *the Antilocarpa anteflexa*

Concept of Priority



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Example

- In 1856 Johann Jakob Kaup published the name *Leptocephalus brevirosteris* for new species of eel.
- In 1893 same name was given to juvenile form of European eel whose name was *Muraena anguilla* given by Carl Linnaeus in 1758.
- Old name was retained.

Principles of Systematics

Module# 69

Principles of Systematics

Concept of Availability

Concept of Availability

- Taxonomic name which should be used is called Valid (Accepted, correct) name.
- The name must have been published according to requirements detailed in Articles 8-20.
- An available name can be valid or not
- An unavailable name is never valid.
- Availability criteria vary depending on nomenclature

Concept of Availability

- The term available means “legitimate”
- A name may be available in this technical sense even though as Junior homonym
- It is automatically invalid at the time of publication (Article 53 and 59a).
- Need to differentiate between **available** and **valid names**

Concept of Availability

- Available (properly published).
- Valid (not preoccupied by senior synonym or homonym)
- Article 11-19 describe prerequisite for making a specific name available.
- Particularly article **13a** is very important.

Concept of Availability

- According to article **13a** names published after 1930 must be
- Accompanied by description that states the characters that are purported to differentiate the Taxon
- It is good taxonomic practice to include in the original description not only such diagnostic information but also differential diagnosis (comparison with other related species)

END

Principles of Systematics

Module# 70

Principles of Systematics

Concept of Availability

Concept of Availability

Nomen nudum

- A name published without satisfying the condition of availability is called nomen nudum.
- Especially if it fails to satisfy the conditions of Article 12-16.
- A nomen nudum has no standing in Zoological nomenclature

Concept of Availability

Nomen nudum

- If editors of journals were more familiar with the provisions of the Code, they would not permit publications of so many unavailable names because they violate one or another of Article 8-20.

Concept of Availability

Differential Diagnosis

- Description of characters after 1930 (Article 13a)
- Comparison with close relative
- Description of diagnostic differences (NOT mandatory)

Concept of Availability

Names Given to Hybrids

- Hybrids are normally individuals not population
- Not considered as Texa
- Article 1b (3) states clearly that a name given to an animal that is later found hybrid remain available for the purposes of homonymy, not for purposes of Synonymy
- A name given to hybrid can not be applied to either of parental species.

Concept of Availability

Synonyms

- Different names for same thing
- Earliest published name **senior synonym**
- Later published name **junior synonym**

Concept of Availability

Types of Synonyms

Objective synonym

- The name that objectively refer to the same thing/name based on the same specimen or illustration (at Genera level)

Subjective synonym

- Name based on different type material (*Antelocarpa anteflexa* 1855 vs *Antelocarpa americana*)
- *Antelocarpa anteflexa* was unusual specimen of *Antelocarpa Americana*)

END

Principles of Systematics

Module# 71

Principles of Systematics

International Code for Zoological Nomenclature

International Code for Zoological Nomenclature

Zoological Nomenclature

- System of scientific names applied to taxonomic units of animals
- The term nomenclature comes from Latin words
- **Nomen** which means Names
- **Calare** mean to call
- Call by names

International Code for Zoological Nomenclature

Important requisite of taxonomic names

- **Uniqueness**
- **Universality**
- **Stability**

International Code for Zoological Nomenclature

ICZC

- Set of rules for naming animals and resolution of nomenclatural problems
- Authoritative document that contain valid rule of Zoological nomenclature
- Original codes and its revision were the work of International Congress of Zoology

International Code for Zoological Nomenclature

ICZC

- Now these congresses are defunct
- Role have been taken over by **General Assemblies of International Union of Biological Sciences (IUBS)**
- International Congresses of Zoology have appointed a judicial body (**International Commission on Zoological Nomenclature**) to interpret the rules and publish opinions on controversial issues.

International Code for Zoological Nomenclature

ICZN

- Article 76 through 82 specify the duties of the commission.
- Latest edition of code was published in February 1985
- Can be ordered from International Trust for Zoological Nomenclature 56, Queen Gate London or
- University of California Press, Berkeley and Los Angeles.

International Code for Zoological Nomenclature

ICZN

- Code consists of three parts
- The code proper
- Appendices (A section giving additional information at the end of Book)
- Glossary (a list of technical or special words)

International Code for Zoological Nomenclature

Code proper

- **Preamble:** Introduction to book or written documents
- 90 articles grouped in 18 chapters
- Each article is composed of one or more mandatory rules
- Followed by recommendations and illustrative examples
- Use of recommendation is not mandatory

International Code for Zoological Nomenclature

Appendices

- Appendices are like recommendations not to be followed strictly as article.
- These are five in number and are designated as A-E.

Glossary

- The terms used in the text are clearly defined in the Glossary.

END

Principles of Systematics

Module# 72

Principles of Systematics

Molecular Systematics

Molecular Systematics

- Classification of organisms on the basis of **distribution and composition of chemical substances** in them.
- Comparisons of Molecular components (DNA, RNA and Proteins) help to establish relationships among different animal taxa.
- **Molecular Phylogenetics-** relationships based on molecular data and statistical analysis.

Molecular Systematics

- First phylogenetic tree based on molecular data 1967 **Fitch and Margoliash**
- Researcher realized that although traditional taxonomic methods are good but Molecular evidences could be final confirmatory
- Phylogenetic studies help to assess the historical processes which affect relationships

Molecular Systematics

- Phylogeographic studies help to understand the distribution
- Phylogenetic and Phylogeographic studies started with the introduction of mDNA markers in population genetic studies.
- The goal is to provide insight into the history of groups of organisms and the evolutionary processes that create diversity among species.

Molecular Systematics

- The use of amino-acid or nucleotide-sequence data in determining the evolutionary relationships of different organisms.
- Essentially it involves comparing the sequences of functionally homologous molecules from each organism being studied, and determining the number of differences between them.

Molecular Systematics

- The greater the number of differences, the more distantly related the organisms are likely to be.
- Genetic distances
- Cluster analysis
- Gel electrophoresis
- Agarose/PAGA

END

Principles of Systematics

Module# 73

Principles of Systematics

Molecular Systematics

Molecular Systematics

Applications

- Solving taxonomic problems
- Reorganization of tree of life
- Identifications of immature stages
- Identification of cryptic species
- Identification of disease vectors
- Testing food authenticity
- Monitoring of illegal trade
- Monitoring quality of water
- Identification of damage specimens

Molecular Systematics

Applications

- Identification of sibling species and sub-species

END

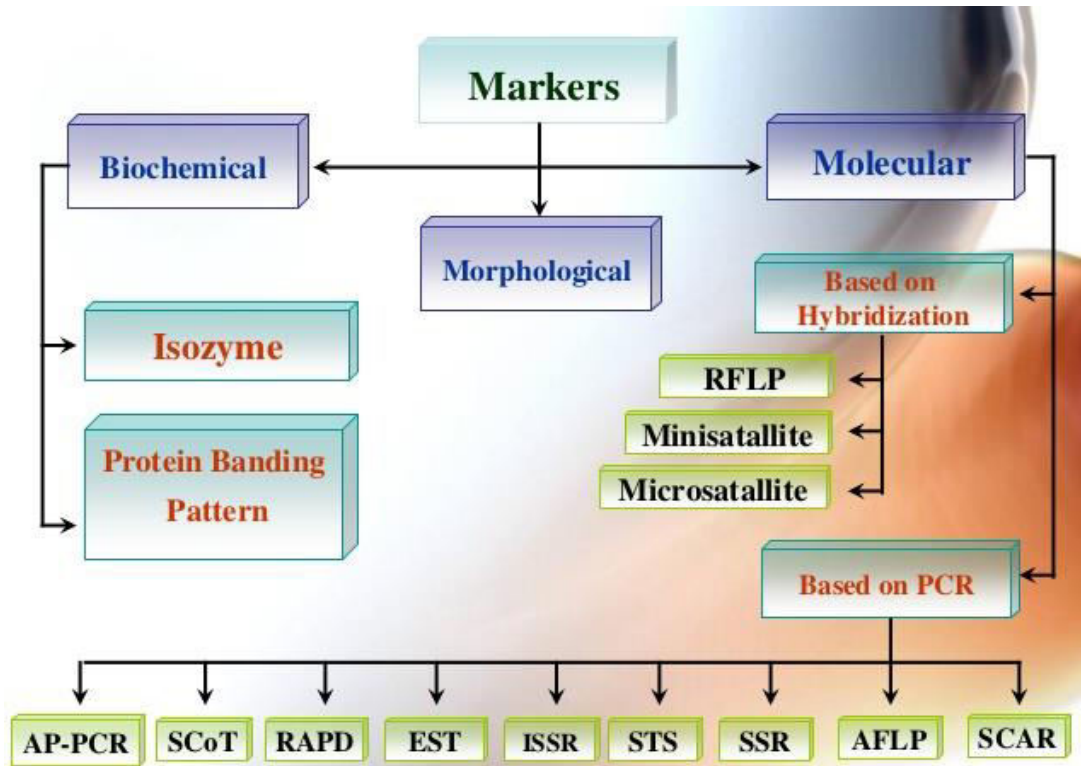
Principles of Systematics

Module# 74

Principles of Systematics

Molecular Markers

Molecular Markers

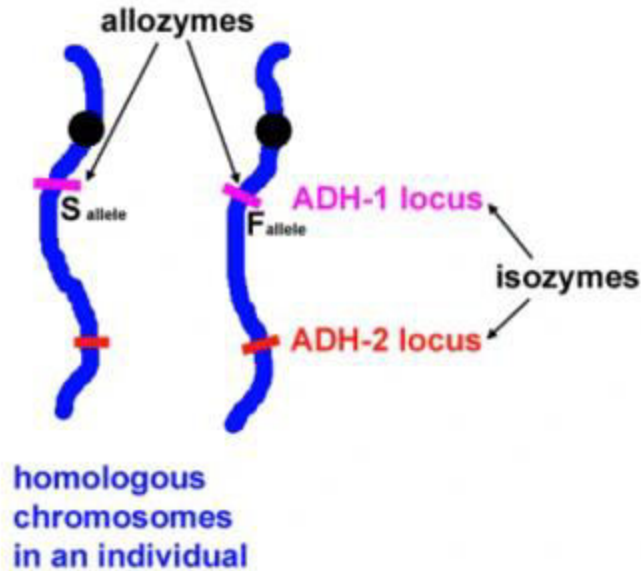


<https://www.slideshare.net/FAOoftheUN/molecular-markers-types-and-applications-55688001>

Types of Markers

- **Type I:** Associated with genes of known function. Alloenzymes are type I markers as the protein they encode are associated with genes of known function.
- **Type II:** Associated with genes of unknown function. Microsatellite and other neutral markers are type II markers.

Molecular Markers



<https://www.google.com/search?q=allozyme+markers&sa=X&hl=en&sxsrf=ALeKk03E32wxhpW4rE2JMvw2sHLDIUkIGQ:1604826259215&tbm=isch&source=iu&ictx=1&fir=yKMV0K4mxTe3YM%252C37qgcbgAr7dpfM%252C%252Fm%252F02x3b9m&vet=1&usg=AI4>

Allozymes

- Variant form of an enzyme
- Different structurally but not functionally from other alloenzyme coded by different allele present at same locus.
- Codominant markers that express in heterozygous in MF

Isoenzymes

- The enzymes that perform the same function, but which are coded by genes located at different loci

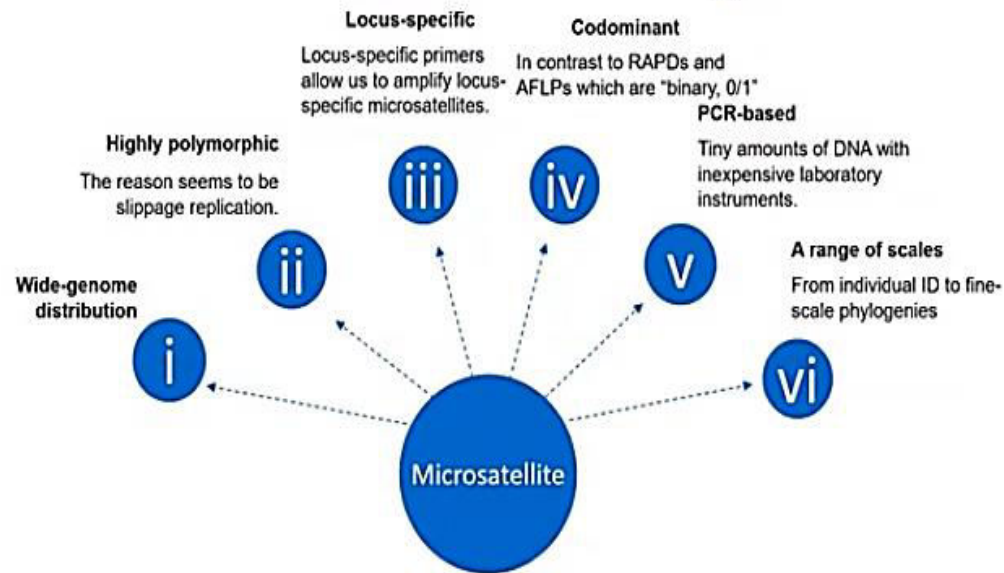
Molecular Markers

Mitochondrial DNA Markers

- Non-Nuclear DNA
- Present in Mitochondrial
- Maternally inherited as haploid genome
- Entire genome undergo
transcription as single unit
- No recombination
- Homologous markers

Molecular Markers

— 2 Why microsatellites are valuable markers?



<https://www.youtube.com/watch?v=r-8SXTHzJFU>

Microsatellite

- Simple DNA sequence
- Repeated several times across various points in DNA of an organism
- 2-6 nucleotides
- 5-50 times
- Present at thousands of locations in an organism
- Microsatellite sequences are composed of non-coding DNA and are not parts of genes.

Principles of Systematics

Module# 75

Principles of Systematics

Molecular Markers

Molecular Markers

SNPs

- Single Nucleotide substitution
- Single Nucleotide
insertion/deletion
- These point mutations give rise to
various alleles with alternate
bases at particular nucleotide
position
- Most abundant polymorphism in
genome of an organism
- Can be detected by PCR, microchip
array or fluorescence technology

Molecular Markers

DNA barcoding

- CO1 gene
- 658 base pairs
- Species specific
- Highly conserved
- High mutation rate
- Widely used in identification of arthropods
- Universal primers
- Reliable and quick method
- Hebert Paul 2003

END

Principles of Systematics

Module# 76

Principles of Systematics

Molecular Markers

Molecular Markers

Protein (Biochemical markers)

- Available since 1950s
- Related to variation in protein and amino acid bending pattern
- Can be studied using Gel electrophoresis e.g esterase, Acid phosphatase, peroxidase etc.
- Advantage
- Require simple equipment
- A vigorous complement to the morphological assessment of variation

Molecular Markers

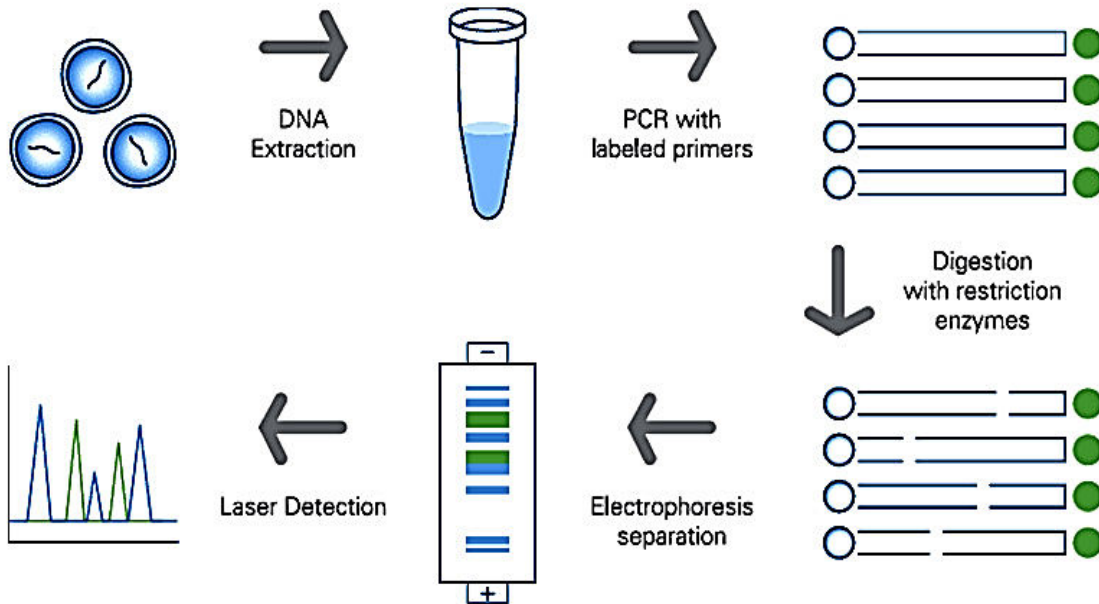
Protein (Biochemical markers) Disadvantages

- Subject to environmental influences
- Limited in numbers

Molecular Markers

Hybridization based techniques (Non-PCR)

- RFLPs (Restriction Fragment Length polymorphism) Analysis
- Introduced by Bostein et al. 1980
- Relatively slow process
- Use of radioisotopes has limited use of RFLPs in certified laboratories



Molecular Markers

PCR based techniques

- RAPD (Random Amplified polymorphic DNA)
- ISSR (Inter-Simple Sequence Repeat)
- SSR (Simple Sequence Repeat)
- AFLP (Amplified Fragment length Polymorphism)
- EST (Expressed sequence Tags)
- SCoT (Stop Codon targeted marker)

END

Principles of Systematics

Module# 77

Principles of Systematics

Molecular Markers

Molecular Markers

Advantages of Molecular Markers

- Ubiquitous
- Stably inherited
- Multiple alleles for each marker
- Devoid of pleiotropic effects
- Detectable in all tissues, all ages
- Long shelf life of DNA samples

Molecular Markers

Application of Molecular Markers

- Fingerprinting
- Diversity studies
- Genetic maps
- Gene tagging
- F1 identification
- Seed testing
- Comparative maps

END

Principles of Systematics

Module# 78

Principles of Systematics

Methods of Animal Preservation

Methods of Animal Preservation

Animal Preservation

- Long term animal preservation in best possible condition
- May be assessed as reference collection in future for scientific purposes
- Many methods are used for preservation of vertebrate and invertebrates

Methods of Animal Preservation

Reasons of Animal Preservation

- Taxonomic reasons
- For detail examination
- For morphological examination of particular animal as each and every animals can not be in researcher's vicinity
- For zoological museum record

Methods of Animal Preservation

Steps for Animal Preservation

- Killing and relaxing of animals
- Fixation (stop cellular respiration, kill bacteria within organism, a good penetrating ability)
- Storage in bottle, vials, jars, bottles etc.

Methods of Animal Preservation

Type of specimens

- Entire fluid preserved specimens
(for study of histology and anatomy, entirely change fur colour)
- Study skins with skulls /partial skeleton (Some bones in skin) for studying colour, hair quality and moulting pattern
- Mounted skins
- Entire skeletons (Anatomy, age determination, geographic variations)

END

Principles of Systematics

Module# 79

Principles of Systematics

Methods of Animal Preservation

Methods of Animal Preservation

Formalin as Preservative

- It is used for vertebrate only
- Not used for long term storage
- Acidic and difficult to handle
- Used when colour of animal is important
- Alcohols dissolve most colour immediately
- Penetrate more easily and internal organs remain in better condition

Methods of Animal Preservation

Side effects of Formalin

- Fumes of formalin are harmful
- Extreme discomfort of eyes and nose
- Severe irritation if contact with body
- Can cause cancer
- Hand should be rinsed after use
- Should be placed at safe place
- Water-tight

Methods of Animal Preservation

Industrial Alcohol (For fixing and storage)

- Not used for killing and fixing of vertebrates.
- For long term storage
- Colour of sample is lost quickly
- Glycerin in alcohol help to preserve colours and to keep specimens flexible
- 70-75% alcohol is used for long term storage
- 95% of DNA studies

Methods of Animal Preservation

Side effects

- Skin irritation with prolong contact.
- Industrial alcohol is toxic and should not be drunk
- Highly flammable
- Rapid evaporation
- Should be kept covered not in open jars.

END

Principles of Systematics

Module# 80

Principles of Systematics

Methods of Animal Preservation

Methods of Animal Preservation

Iropropyl Alcohol

- Cheep
- Easy to obtain
- Available strengths (90%, 70%)
- For use dilute upto 40%
- Can be hard to specimens and
specimens tends to brittle over
the time
- Can be buffered with few drops
of glycerin
- Pinch of calcium carbonate tablet
(crush form of tablet)

Methods of Animal Preservation

Ethyl Alcohol

- Better solution for long term storage of invertebrate specimens
- 80% ethyl alcohol
- Denatured alcohol
- Painting supplies
- Should be buffered with glycerin/antacid tablets

Methods of Animal Preservation

Fish preservation

- After capture fishes are placed in 10% formalin for quick killing.
- This is highly painful
- Fishes dies with its parts well spread off and body straight and well stretched.
- Examination and counting of rays, fins etc. very easy.
- 30 cm fish, Fish in formalin for one week, in water for one day (leech out formalin), use alcohol for long term preservation

END

Principles of Systematics

Module# 81

Principles of Systematics

Methods of Animal Preservation

Methods of Animal Preservation

Herptiles

- Individually kept in plastic jars
- Killed by freezing or chloroform
- Shallow trays are used for herptiles
- Snakes should be coiled
- Frogs are placed on their bellies with their limbs set at right angles to their bodies.
- Small salamanders fixing time 2 days
- Month for alligator, snapping turtle

Methods of Animal Preservation

Herptiles

- Add water for day or two
- 75% alcohol for long term storage.

Methods of Animal Preservation

Birds and Mammals

- Skinned
- Skulls or skeletal mounts
- Remove flesh
- Boiling or dermested beetle
- Placed defleshed bones in bleach or hydrogen peroxide solution to whiten
- Allow to dry
- Place in bag with complete label

END

Principles of Systematics

Module# 82

Principles of Systematics

Methods of Animal Preservation

Methods of Animal Preservation

Preservation of invertebrates

- Use of alcohol is the easiest way
- One should be aware about the type of alcohol
- Each specimen type require different concentration of alcohol
- Preserved in jars, tubes or bottles

Methods of Animal Preservation

Coelenterates, platyhelminthes and echinoderms

Coelenterates are difficult to preserve

- Preserve in 70% alcohol or 5% formalin
- Hydra can be quickly fixed in warm Bouin's warm not hot.

Platyhelminthes (flatworms)

- Bouin solution for fixation
- Paraffin is best long term preserving and storage medium for all flatworms.

Methods of Animal Preservation

- **Echinoderms** are narcotized by addition of magnesium sulphate or methanol to the sea water in which they live
- When completely insensitive to stimulus such as pricking, 70% alcohol for preservation and storage

Methods of Animal Preservation

- **Arthropods** are easy to process as killed immediately and preserved and store in alcohol
- Crabs and prawn may be killed in formalin but renders their joints hard and brittle.
- Larger invertebrate need to be injected 10% formalin to prevent from rotting
- Industrial alcohol is used for most arthropods.

Methods of Animal Preservation

- Insects, crustaceans and arachnids can be simply dropped in alcohol for immediate preservation.
- Industrial alcohol is used for most arthropods.

END

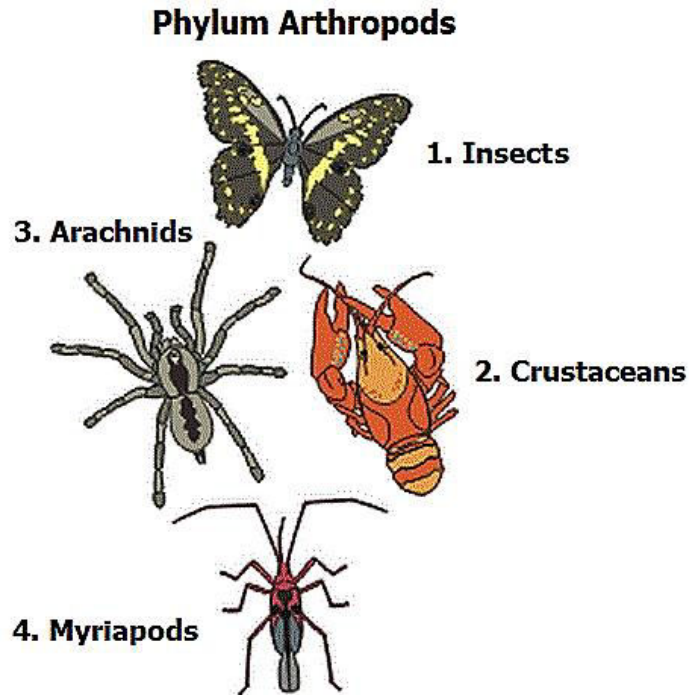
Principles of Systematics

Module# 83

Principles of Systematics

**Morphological
Identifications of
Model Arthropod**

Morphological Identifications of Model Arthropods

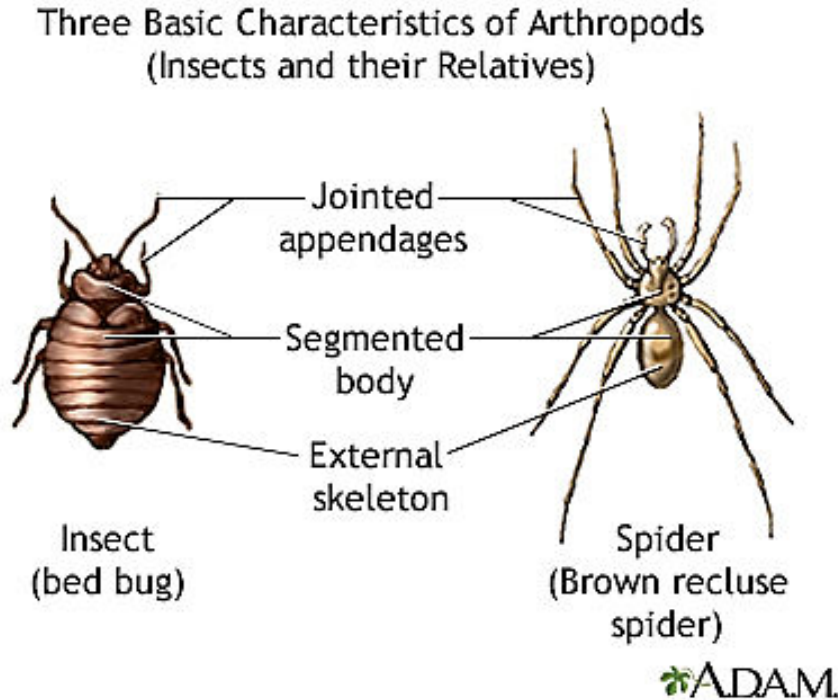


What is an Arthropod?

- Any member of Phylum Arthropoda
- Include lobster, prawn, mites, insects, spiders, centipedes, millipedes
- Represented in every habitat of earth
- Show great diversity of adaptations

https://www.google.com/search?q=distribution+and+abundance+of+arthrpods&tbm=isch&ved=2ahUKEwiHrMC3i5XtAhU1gc4BHc6LBOEQcCegQIABAA&oq=distribution+and+abundance+of+arthrpods&gs_lcp=CgNpbWcQAzoECCMQJzoECAAQZoCCAA6BggAEAgQHjoECAAQGD0ECAAQHjoGCAAQBRAeULTPCljDgtgq78LaABwAHgDgAHUCYgB6luSAQ4yLTizLjluMC4yLjEuM5gBA6ABAaoBC2d3cy13aXotaW1nwAEB&sclient=img&ei=0Mq5X4eED7WCur4PzpeSiA4&bih=657&biw=1360#imgsrc=Wkf1B_slQa0UyM&imgdii=b2K7h2f-v7gNoM

Morphological Identifications of Model Arthropods



https://www.google.com/search?q=basic+body+characteristics+of+arthropods&sxsrf=ALeKk024Jhkr92CzBt-ISL1YUUtAMZ600A:1606011594113&source=lnms&tbn=isch&sa=X&ved=2ahUKEwiPv8m0i5XtAhVXShUIHV4dBeAQ_AUoAXoECCIQAw&biw=1360&bih=657#imgrc=82cOAzf5eyewuM

- Some are aquatic, others are terrestrial, some are free living, other are parasitic
- All arthropods have a body supported by hard exoskeleton
- Legs, antennae and mouth are jointed
- Tube like heart
- Overall body bilateral symmetrical

Morphological Identifications of Model Arthropods

- Seven million species
- Arthropods are the most successful of all animal phyla based on diversity, distribution, and numbers.
- Nearly one million species identified so far, mostly insects.
- The exoskeleton, or cuticle, is composed of protein and chitin.

Morphological Identifications of Model Arthropods

- Molting of the cuticle is called ecdysis
- Extensive cephalization
- Open circulatory systems in which a heart pumps hemolymph through short arteries and into open spaces (sinuses)
- Aquatic members- gills for gas exchange; terrestrial members- tracheal system of branched tubes leading from surface throughout body

END

Principles of Systematics

Module# 84

Principles of Systematics

**Morphological
Identifications of
Model Arthropod**

Morphological Identifications of Model Arthropods

- Appendages in arthropods are modified for a number of functions:
- Walking legs
- Mouth parts
- Antennae
- Claws
- Organs for mating
- Holding eggs

Morphological Identifications of Model Arthropods

- Segmentation is an ancestral characteristic that carries over from the Annelids
- Note the similarity of the insect caterpillar to polychaete worms
- The exoskeleton provides rigid support and strong points for muscle attachment
- The exoskeleton also forms a protective shell

Morphological Identifications of Model Arthropods

- The **exoskeleton** prevents drying out, but also prevents respiration through the skin
- The exoskeleton provides rigid support, but prevents growth – requiring molting
- **Striated muscle** associated with the exoskeleton, and **smooth muscle** associated with the gut

Morphological Identifications of Model Arthropods

- Reduced body cavity, filled with blood, forming an ***open circulatory system***
- Specialized ***excretory glands*** (coxal, antennal or maxillary glands; malpighian tubules)
- Specialized ***respiratory organs*** (gills, tracheae, book lungs)
- Dorsal brain with fused ventral nerve cords

Morphological Identifications of Model Arthropods

Four lineages of arthropods

- Trilobites – extinct
- Chelicerates – horseshoe crabs, spiders
- Uniramians – centipedes, millipedes, insects
- Crustaceans – crabs, lobsters, barnacles

From these lineages arose five major classes of arthropods.

END

Principles of Systematics

Module# 85

Principles of Systematics

Identification Keys and catalogues

Identification Keys and Catalogues

- Identification keys aids in the identification of biological identities:
- Plants
- Animals
- Fossils
- Microorganisms
- Pollens

Identification Keys and Catalogues

- Keys are constructed so that user is presented with series of choices about the characteristics of unknown organisms
- By making correct choice at each step of key user is ultimately let to identity of unknown specimen
- At each step use must answer a question about one of more character of gentility to be identified.

Identification Keys and Catalogues

- If at each step there are only two alternative, the key is said to be **DICHOTOMOUS** (sequential key, analytical key, pathway key)
- **POLYTOMUS** key

Identification Keys and Catalogues

Methods of using taxonomic keys

- Read introductory comments, format of the key, abbreviations etc before using key
- Read both choices at each step of the key
- Use glossary to find out the definition of any term you do not understand
- Use a ruler if measurements are needed, do not guess
- Examine several specimens of same species

END

Principles of Systematics

Module# 86

Principles of Systematics

Identification Keys and catalogues

Identification Keys and Catalogues



Dichotomous keys

- If each step in a key has only two alternative the key will be dichotomous
- A dichotomous key is a device for identifying unknown organisms to some taxonomic levels such as species, genus or family level.
- These most commonly published keys were first published by Jean B. Lamarck 1778

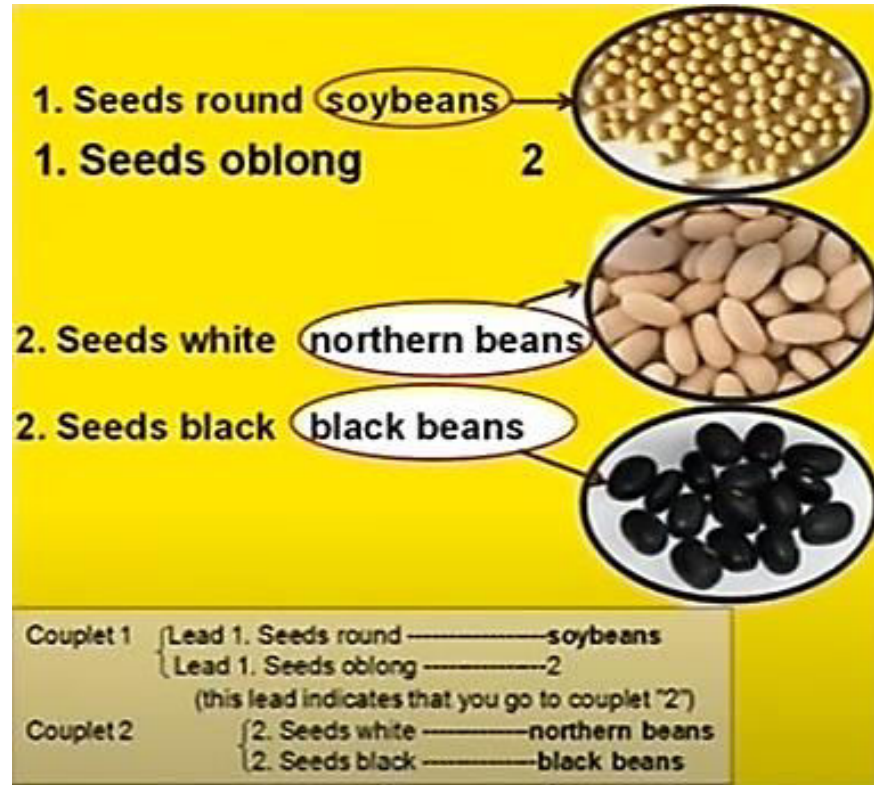
Identification Keys and Catalogues



Dichotomous keys

- Consists of series of paired statements, called couplets.
- Couplets describes some features of organism
- Each statements in a couplet is called a lead
- The statements or leads are in contract (Mutually exclusive)

Identification Keys and Catalogues

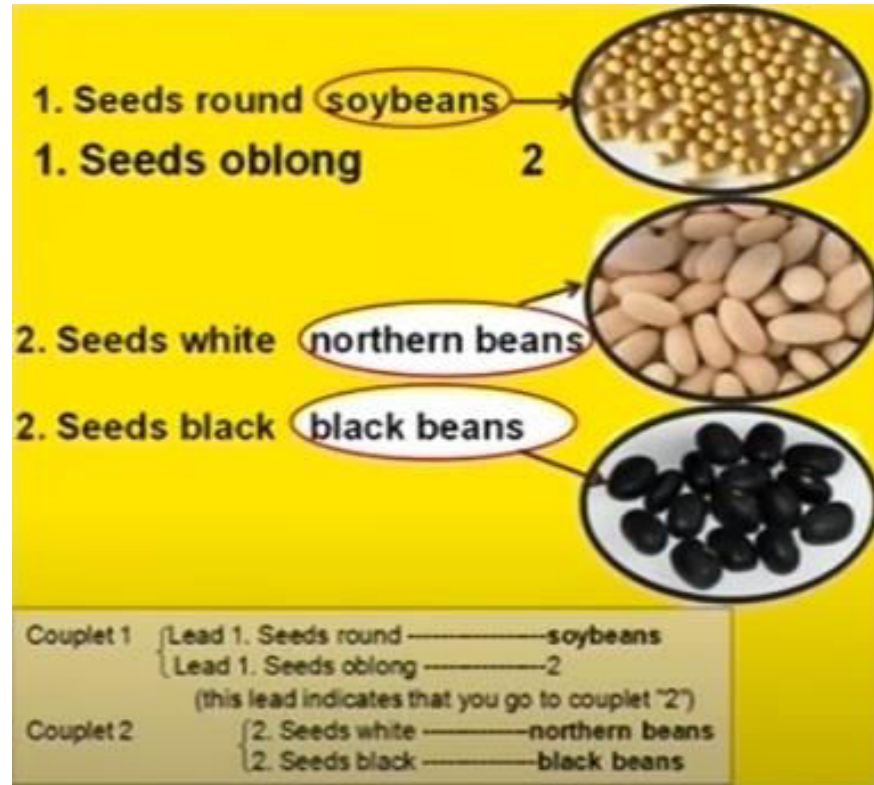


<https://www.youtube.com/watch?v=srJ4aab5RYc>

Dichotomous keys

- The use of key begins with first couplet and select the statement which best fit the organism to be identified
- The leads typically begins with board characteristics and become narrower as more choicely are required.
- We move through key-Single choice remains

Identification Keys and Catalogues



Dichotomous keys

- If we continue to select correct option of couplets for unknown organism, correct identification of animals will be achieved.

<https://www.youtube.com/watch?v=srJ4aab5RYc>

Principles of Systematics

Module# 87

Principles of Systematics

Identification Keys and catalogues

Identification Keys and Catalogues

Catalogue

- No study in science is complete until it is made available to others
- The best way is to made it available through circulation
- In taxonomy publication may be in the form of Books, pamphlets, journal articles, catalogues, checklist etc.

Identification Keys and Catalogues

Catalogue

- Catalogue is mainly an index to the taxa arrange in such a way that as to give a vivid picture of references for both zoological and nomenclatural purpose.
- The **Catalogue** currently compiles data from 168 peer-reviewed taxonomic databases, that are maintained by specialist institutions around the world.

Identification Keys and Catalogues

Catalogue of life

- The **Catalogue of Life** is an online database
- It provides the most comprehensive and authoritative index of known species of organisms .
- The Catalogue interface is available in twelve languages and is used by research scientists, citizen scientists, educators, and policy makers

Identification Keys and Catalogues

Catalogue of life

- June 2001; 19 years ago
- Current status is active
- Registration not required
- Not commercial
- Available in English

Identification Keys and Catalogues

Catalogue of life

- The Catalogue listed 300,000 species by 2003, 500,000 species by 2005, and over 800,000 species by 2006. As of 2019, the Catalogue lists 1.9M extant and extinct species.
- There are an estimated 14M mainly unpublished species.

END

Principles of Systematics

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Principles of Systematics

Construction of Identification Key