#424197
Topic: Classification

Why are living organisms classified ?

Solution

There are different life forms living on earth which are millions in number. The study of individual life form is difficult and impossible as they all have different size, shape, habita and diet. So scientists come up with a solution for classification of living beings based on rules and principles that helps to identify and classify that organism along with its nomenclature. It helps to allow group and identification of organism via the standardized system called Linnaeus taxonomy and is based on similarities between them. Classification also allows the biologists to understand the interconnection of living organisms. Once the organisms are classified and characterized they are easy to study as they are given a unique scientific name. They are then grouped based on similarities and differences and placed under respective groups or taxon. For example, three pairs of legs and two pairs of wings an organism is identified as an insect.

#424198
Topic: Classification

Why are the classification systems changing every now and then?

Solution

Millions of plants, animals, and microorganisms found on earth, have been identified by the scientists while many new species are still being discovered around the world. Therefore, to classify these newly discovered species, with new characters, new systems of classification have to be devised every now and then. This creates the requiremen to change the existing systems of classification.

#424298
Topic: Taxonomy

What different criteria would you choose to classify people that you meet often?

Solution

We can classify people on the basis of their education, profession, hobbies, native place, gender, etc. This is a generalised criteria which when applied to organisms with scientific names needs to meet the criteria of their phyla, order, genus, nature of feeding, etc.

#424299
Topic: Systematics

What do we learn from identification of individuals and populations?

Solution

Through identification of individuals and populations; we can learn about the native place, mother tongue, costumes, food habit, religion, caste, etc.
This kind of identification makes easy categorization of them.

#424303
Topic: Taxonomy

Define a taxon. Give some examples of taxa at different hierarchical levels?

Solution

A particular level of hierarchy in the classification of living beings is called as a taxon. A taxon is a group of one or more populations of an organism or organisms seen by taxonomists to form a unit.
For example, the basic level of classification is species, followed by genus, family, order, class, phylum or division, in ascending order. The highest level of classification is know as a kingdom. So each of these categories can be called as a taxon.

#424304
Topic: Taxonomy

Identify the correct sequence of taxonomical categories?
(a) Species - Order - Phylum - Kingdom
(b) Genus - Species - Order - Kingdom
(c) Species - Genus - Order- Phylum

Solution

(a) and (c) represent correct sequences of taxonomic categories as the correct hierarchical arrangement of taxonomic categories in ascending order is

Species → Genus → Family → Order → Class → Phylum → Kingdom

In sequence (b), species should have been followed by genus. Therefore, it does not represent the correct sequence.

#424305

Topic: Taxonomy

Try to collect all the currently accepted meanings for the word species. Discuss with your teacher the meaning of species in case of higher plants and animals on one hand, an bacteria on the other hand?

Solution

In biological terms, species is the basic unit of taxonomy. It can be defined as a group of similar organisms capable of interbreeding freely among themselves under natural conditions to produce fertile offsprings.

Therefore, a group of similar individuals that are reproductively isolated from other groups of individuals forms a species.

Species can also be defined as a group of individuals that share the same gene pool.

#424307

Topic: Taxonomy

Define and understand the following terms:

(i) Phylum (ii) Class (iii) Family (iv) Order (v) Genus

Solution

(i) Phylum

The phylum is second highest unit of classification after Kingdom. It includes one or more related classes of animals. In plants, instead of phylum, the term ‘division’ is used.

(ii) Class

The class is a taxonomic group consisting of one or more related orders. For example, the class, Mammalia, includes many orders like Primata (Man), Carnivora (tiger) etc.

(iii) Family

Family is a taxonomic group containing one or more related genera, eg., Family hominidae contains apes, monkeys and man. In plants, families are categorized on the basis of vegetative and reproductive features.

(iv) Order

Order is a taxonomic group containing one or more families. For example, the order, carnivora, includes many families.

(v) Genus

Genus is a taxonomic group including closely related species. For example, the genus, Solanum, includes many species such as nigrum, melongena, tuberosum, etc.

#424308

Topic: Tools for study of taxonomy

How is a key helpful in the identification and classification of an organism?

Solution

Key is a taxonomical aid that helps in identification of plant and animal species. These keys are based on similarities and dissimilarities in characters, generally in a pair called couplet.

Each statement in a taxonomic key is referred to as a lead. For categorizing each taxonomic rank, such as family, genus, species, etc., different keys are used. It is also useful ir identification of unknown organisms.

Keys are of two types - indented and bracketed keys. Indented key provides a sequence of choices between two or more statements while in bracketed key, a pair of contrasting characters is used.

(i) Indented key to identify different species of *Rhododendron*.

1. Leaves evergreen

2. leaves densely hairy below, orange or white hair; flower

appears to have separate petals *Rhododendron groenlandicum*

3. Hair absent on leaves, flower has five petals fused in a shallow

tube *Rhododendron maximus*

4. Leaves deciduous

5. pink flowers with two free petals and three fused petals *Rhododendron canadense*

6. white to pink flowers with all petals fused together

(ii) Bracketed key to identify different species of *Rhododendron*.

1. Leaves evergreen - 2

2. Leaves deciduous - 3

3. Leaves densely hairy below, orange or white hair; flower

appears to have separate petals *Rhododendron groenlandicum*

4. Hair absent on leaves, flower has five petals fused in shallow

tube *Rhododendron maximus*

5. Pink flowers with two free petals and three fused petals *Rhododendron canadense*

6. White to pink flowers with all petals fused together - 4

#424309

Topic: Taxonomy

Illustrate the taxonomical hierarchy with suitable examples of a plant and an animal.

Solution

The arrangement of various taxa in a hierarchical order is called taxonomic hierarchy.

In this hierarchy, species is present at the lowest level whereas kingdom is present at the highest level.

Classification of a plant :

As an example, let us classify *Solanum melongena*, (Brinjal).

Kingdom – Plantae

Division – Angiospermae

Class – Dicotyledonae

Order – Solanales

Family – Solanaceae

Genus – Solanum

Species – melongena

Classification of an animal :

As an example, let us classify man.

Kingdom – Animalia

Phylum – Chordata

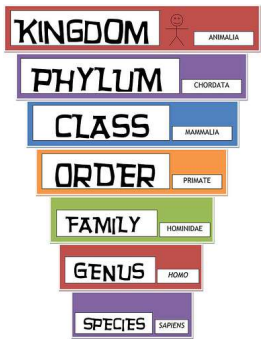
Class – Mammalia

Order – Primate

Family – Hominidae

Genus – Homo

Species – Sapiens



#424310

Topic: Classification

Discuss how classification systems have undergone several changes over a period of time?

Solution

The classification systems have undergone several changes with time. The first attempt of classification was made by Aristotle. He classified plants as herbs, shrubs, and trees. Animals, on the other hand, were classified on the basis of presence or absence of red blood cells. This system of classification failed to classify all the known organisms.

Therefore, Linnaeus gave a two-kingdom system of classification. It consists of kingdom Plantae and kingdom Animalia. However, this system did not differentiate between unicellular and multicellular organisms and between eukaryotes and prokaryotes. Therefore, there were large numbers of organisms that could not be classified under the two kingdoms.

So, Ernest Haeckel, then, separated unicellular eukaryotic organisms into separate kingdom named Protista and hence, gave three kingdom classification.

After that Copeland separated all prokaryotic organisms into a separate kingdom named Monera and hence, Four-Kingdom systems of classification came into existence.

And lastly, a five kingdom system of classification was proposed by R.H. Whittaker in 1969 to separate achlorophyllous, decomposer organism into a separate kingdom named Fungi. So five kingdoms now are:

1) Monera

2) Protista

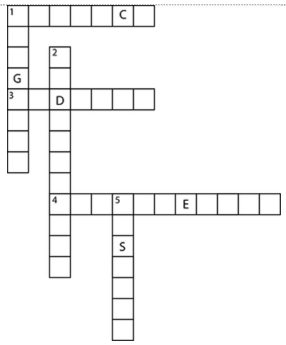
3) Fungi

4) Plantae

5) Animalia

#464531

Topic: Taxonomy



Complete the crossword puzzle.

Down

1. Species on the verge of extinction.

2. A book carrying information about endangered species.

5. Consequences of deforestation.

Across

1. Species which have vanished.

3. Species found only in a particular habitat.

4. Variety of plants, animals and microorganisms found in an area.

Solution

Down

1. ENDANGERED

2. RED DATA BOOK

5. DESERTS

Across

1. EXTINCT

3. ENDEMIC

4. BIODIVERSITY

1. Endangered species is a species of animal or plant which is in danger of getting extinct.

2. A Red Data Book is a book that compiles a list of species whose continued existence is threatened.

5. Deforestation means clearing or cutting of trees on a large scale. The loss of vegetation can cause climate change, desertification, soil erosion, fewer crops, flooding etc.

1. An extinct species is a species which can no longer be found on the Earth.

3. An endemic species is one that is only found in that region and nowhere else in the world.

4. Biodiversity is the variety of plant and animal life in the world or in a particular habitat,

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#464547
Topic: Taxonomy

How would you choose between two characteristic to be used for developing a hierarchy in classification?

Solution

For classifying an organism in a hierarchical fashion, the most fundamental and visible character is first taken into consideration. For example- plants differ from animals in havi chloroplast and lacking locomotion, lacking cell wall. But, only locomotion is considered as the most basic characteristic of classification. After choosing the fundamental, basic characteristic one can further classify the organism on the basis of the first feature chosen.

#526207
Topic: Living, nonliving and dead

Find out through internet and popular science articles whether animals other than man has self-consciousness.

Solution

Self consciousness is defined as the awareness of oneself. Other than man there are some animals which are self-conscious. These include dolphins, elephants, chimpanzees, apes and monkeys. Self-consciousness in animals can be studied using the mirror test. When chimpanzees were exposed to the mirror for the first time they were threatened. However on repeated exposure they started looking into the mirror and grooming, picking their nose, making faces, etc.