

Topic: - Concept of microbial species and strains

* Concept of microbial species: - In Biology, a species is one of the basic units of biological classification and a taxonomic rank.

⇒ A species is often defined as a group of organisms capable of interbreeding and producing fertile offspring.

* DNA-Hybridization: - Hybridization is the process of establishing a non-covalent, sequence specific interaction between two or more complementary strands of nucleic acids into a single complex, which in the case of two strands is referred to as a duplex.

⇒ oligonucleotides, DNA, or RNA will bind to their complement under normal conditions, so two perfectly complementary strands will bind to each other readily.

Life → Domain → Kingdom → Phylum → Class
→ Order → Family → Genus → Species.

⇒ The hierarchy of biological classification's eight major taxonomic ranks.

⇒ A genus contains one or more species. Intermediate minor rankings are not shown.

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* Hierarchy of Classification :- The system of placement of living organisms in a series of increasing taxonomic categories based on the similarities in their structure and origin that indicate a common relationship, is termed as "Hierarchy of classification."

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* Taxonomic Categories :- There are seven taxonomic categories in the following order - Kingdom, division/phylum, Class, Order, Family, Genus and Species.

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* Species :- It is regarded as the basic unit of classification.

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⇒ It can be defined as the group of organisms that resemble each other very closely in appearance and body features.

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* Genus :- The category of closely related species is called a Genus.

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⇒ A Genus may have many species.

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* Family :- The groups of similar genera are kept together under a family.

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* Order :- The group of related families constitute an order.

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* class: - The group of related orders form a class.

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* phylum/division: - The related classes that share common feature constitute phylum.

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* kingdom: - The highest taxonomic category is the kingdom.

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⇒ In Biology, a strain is a genetic variant, a subtype or a culture within a biological species.

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⇒ Strains are often seen as inherently artificial concepts, characterized by a specific intent for genetic isolation.

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⇒ Strains are derived from a single cell-colony and are typically quarantined by the physical constraints of a petri-dish.

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⇒ Strains are also commonly referred to within virology, Botany and with rodents used in experimental studies.

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⇒ Microbial strains can also be differentiated by their genetic makeup using molecular methods to maximize resolution within species.

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⇒ In Biotechnology, microbial strains have been constructed to establish metabolic pathways suitable for treating a variety of applications.

⇒ E. coli is most common species for prokaryotic strain engineering.

⇒ Scientists have succeeded in establishing viable minimal genomes from which new strains can be developed.

⇒ These minimal strains provide a near guarantee that experiments on genes outside the minimal framework will not be effected by non-essential pathways.

⇒ A strain is a genetic variant or subtype of a micro-organism (e.g. virus or bacterium or fungus). For e.g. a "flu" strain is a certain biological form of the influenza or "flu" virus.

⇒ These flu strains are characterized by their different isoforms of surface proteins.

⇒ New viral strains can be created due to mutation or swapping of genetic components, when two or more viruses

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infect the same cell in nature.

⇒ These phenomena are known respectively as Antigenic drift and antigenic shift.

⇒ Some rice strains are made by inserting new genetic material into a rice plant, but the descendants of the genetically modified rice plant are a strain with unique genetic information.

⇒ A laboratory mouse or rat strain is a group of animals that is genetically uniform.

⇒ Strains are used in laboratory experiments. mouse strains can be inbred, mutated or genetically modified, while rat strains are usually inbred.

⇒ Many rodent strains have been developed for a variety of disease models, and they are also often used to test drug toxicity.

⇒ Bacterial species is defined as "Genomically coherent group of organisms".

⇒ A species must have a type strain that is live. Anyone can obtain this strain for taxonomic study.