

**COURSE NAME-GYMNOSPERMS,
TAXONOMY OF ANGIOSPERMS AND
ANATOMY
(PAPER CODE: BOT 503)**

Unit –7 : International Code of Botanical Nomenclature

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Introduction

- The art of naming the object is known as Nomenclature. And when it comes to naming of plants it is called Botanical nomenclature.
- Common name is the same of the plant in a particularly area or locality given by the people of that particular area. Such names vary from place to place and language to language. The common names are simple and hence easy to remember, usually descriptive of the plant, and larger numbers of people will sometimes know what you are talking about when common names are used than is the case with scientific names.
- The two major problems with common names are: (1) there are about more than 250,000 species of vascular plants and only a small percentage has common names; (2) the same name is often used for different plants and the same plant may have different common names in different regions.

- Country like India the name changes even with the dialect. To overcome the problems of common names, scientists suggested name in such a way that it is accepted in the world and is used internationally. But again, the problem remains the same, *i.e.*, the language which is not universal. So the botanists agreed to lay down certain rules and conditions.
- The main suggestion was that the language of the name should be Latin because: (a) The language is not a national language of any country at present (b) European languages derived from Latin only (c) Past European scholars learnt their subjects in Latin. A lot of previous botanical literature is written in Latin only. The ICBN sets the formal starting date of plant nomenclature is 1 May 1753, the publication of *Species Plantarum* by Linnaeus.
- The International Code of Botanical Nomenclature (ICBN) has been established to provide a uniform set of rules to be followed in applying names to plants. The rules contained in the ICBN are revised during the International Botanical Congresses (IBC), which are held after every six years. The code of the ICBN is composed of six principles.

- The *International Code of Botanical Nomenclature* (ICBN) which is now called *International Code of Nomenclature for algae, fungi, and plants* (ICN) is the set of rules and recommendations dealing with the nomenclature of plants, fungi and a few other groups of organisms, all those "traditionally treated as algae, fungi, or plants".
- The name *International Code of Botanical Nomenclature* (ICBN) was changed to *International Code of Nomenclature for algae, fungi, and plants* (ICN) after XVIIIth International Botanical Congress held in Melbourne in July 2011 as part of the *Melbourne Code* which replaces the *Vienna Code* of 2005.
- The Vienna Code, based on the decisions of the XVII IBC at Vienna was preceded by the St Louis Code (1999) and the Tokyo Code (1993). The name of the *Code* is partly capitalized and partly not. The lower-case for "algae, fungi, and plants" indicates that these terms are not formal names of clades, but indicate groups of organisms that were historically known by these names and traditionally studied by phycologists, mycologists, and botanists. There are special provisions in the *ICN* for some of these groups, as there are for fossils. Its intent is that each taxonomic group ("taxon", plural "taxa") of plants has only one correct name that is accepted worldwide. The value of a scientific name is that it is an identifier; it is not necessarily of descriptive value, or even accurate.

- The *ICN* can only be changed by an International Botanical Congress (IBC), with the International Association for Plant Taxonomy providing the supporting infrastructure. Each new edition supersedes the earlier editions and is retroactive back to 1753, except where different starting dates are specified. For the naming of cultivated plants and bacteria there are a separate code, the *International Code of Nomenclature for Cultivated Plants*, (**ICNCP**, also known as the **Cultivated Plant Code**) and **International Code of Nomenclature of Prokaryotes (ICNP, formerly known as International Code of Nomenclature of Bacteria (ICNB) or Bacteriological Code (BC)**, which gives rules and recommendations that supplement the *ICN*.

Binomial Nomenclature

- Linnaeus for the first time proposed that every living organism should have binomial name, *i.e.*, a name with two epithets, first is generic and other specific epithet followed by authority. Linnaeus proposed some rules for generic names of plants in *Fundamenta Botanica* (1736) and *Critica Botanica* (1737). A.P.de Candolle for the first time proposed rules for nomenclature of plants which are passed by International Botanical Congress at Paris(1867).
- The generic epithet is always a noun showing colour, name in honour of person or adjective, *e.g.*, *Nicotiana* named after Jean Nicot a French diplomat and scholar had introduced tobacco to France. Species is an adjective *e.g.*, for white colour it is *alba*, red-*rubra*, green-*viridis* black colour-*nigrum etc.* for cultivated one it is *sativa*, edible one *esculenta etc.* These names are not used always and species may be a Pronoun, *e.g.*, *americana*, *indica*, *benghalensis*, *etc.* It may characterize shape of a leaf (character of plant), *e.g.*, *hastata*, *cordata*, *sagitata etc.* name of other scientist to whom the plant is dedicated, *e.g.*, *pangteyana*, *sahnia*, *etc.*

Principle V of ICBN states that a scientific name must be treated as if it were Latin, but the Articles 16-28 of the *Code* also specify what form the name must take in Hierarchy. The rank or category of hierarchy should be as follow:

• Taxonomic Rank	Suffix	Examples
• Division (Phylum)	-phyta	Magnoliophyta
• Class	-opsida	Magnoliopsida, Liliopsida
• Order	-ales	Magnoliales, Liliales
• Family	-aceae	Magnoliaceae, Liliaceae
• Tribe	-eae	Magnolieae, Lilieae
• Genus	A noun	<i>Magnolia, Lilium</i>
• Species	Depends	<i>Magnolia grandiflora, Lilium grandiflorum</i>

AIMS

The functions of nomenclature are to provide labels/names for all taxa at all levels in the hierarchy of classification. Plant nomenclature is, to some degree, the dialect of systematic botany. It originates from the binomial nomenclature that was originally codified in the legendary works of Linnaeus, *Species Plantarum* (1753). The process of naming of plants based on international rules proposed by botanists by organizing congress called International Botanical Congress (IBC) and published its outcomes in a code form for future precise nomenclature of taxa which is recognised and accepted at international level. It an essential process to overcome the problems of common name. Thus, first aim of ICBN is to give a proper name to any taxon which is valid at international level. The three major aims of ICBN are:

- To provide stable method of nomenclature.
- To avoid and reject the names which cause confusion.
- To avoid useless creation of names.

- The ICBN is divided into three parts (i) Principles, (ii) Rules and Recommendations and (iii) Provisions. The objective of principle is to guide decisions concerning the International Code of Botanical Nomenclature (ICBN). The objective of the rules is to bring past nomenclature into order and to follow rules for future nomenclature. The objective of the recommendations is to bring uniformity and clearness in future nomenclature. The objective of provisions is to provide opportunity for the modification of code and appendices.

PRINCIPLES

There are six principles that guides in correct naming of taxa concerning the International Code of Botanical Nomenclature (ICBN).

- **Principle I: (Straight forward Principle)**

Botanical nomenclature is independent of zoological nomenclature.

The Code applies equally to names of taxonomic groups treated as plants whether or not these groups were originally so treat. If an organism is considered to be a plant, then it must be named in accordance with the *Botanical Code*. If it is considered a animal or bacterium, it must be named according to the zoological, Bacteriological *Code*.

- **Principle II: (Type Principle)**

The application of names of taxonomic groups is determined by means of nomenclatural types.

The name of new Taxon is valid only when the type of the name is mentioned meaning thereby that all names are permanently attached with specimen designated as type. Single specimen, may be whole plant or a part of it with which the name of taxon is permanently attached, is known as **holotype**.

- **Principle III: (Principle of Priority)**

The nomenclature of a taxonomic group is based upon priority of publication.

This principle states, in essence, that if a taxonomic group has been given two or more names, the correct name is the first name which published with ICBN standards (*i.e. valid publication*).

- **Principle IV: (Principle of Uniqueness)**

Each taxonomic group with a particular circumscription, position, and rank can bear only one correct name, the earliest that is in accordance with the Rules, except in specified cases.

The uniqueness principle states that there is only one correct name for a particular taxonomic group within a given taxonomic treatment.

- **Principle V: (As-it-should-be Principle)**

Scientific names of taxonomic groups are treated as *Latin* regardless of their derivation.

Principle V states that scientific names are treated as if they were *Latin*, regardless of their derivation.

- **Principle VI (Retroactivity Principle)**

The Rules of nomenclature are retroactive unless expressly limited.

The Retroactivity Principle means that anyone proposing a change in the *Code* needs to consider the effect that the proposed change will have on names published in a wide range of literature and over a considerable period of time. This is an intimidating requirement. It is why all proposed changes to the Code undergo committee scrutiny before being voted on. If the committee has a problem with a proposed change, one of its members will get in touch with the person proposing the change. The committee member may point out unforeseen consequences of the proposed change. Alternatively, he or she may suggest examples that will make a stronger case for the change, or suggest modifications that will avoid some undesirable consequences.

RULES AND RECOMMENDATIONS

The rules governing botanical nomenclature have a long and tumultuous history. The person was Linnaeus who laid down the foundation of nomenclature in his work *Philosophia Botanica* (1751). In 1813 A. P. de Candolle proposed elaborated form of the rules regarding plant nomenclature in *Théorie élémentaire de la botanique*. The first set of international rules was the *Lois de la nomenclature botanique* ("Laws of botanical nomenclature") that was adopted as the "best guide to follow for botanical nomenclature" at an "International Botanical Congress (IBC)" convened in Paris in 1867. It is the product of intensive study by the best brains in the botanical science.

Some Important Rules and Recommendations:

1. All those plants which belong to one genus must be designed by the source generic name (**Rule 213**).
2. All those plants which belong to different genera must be designated by different generic names (**Rule 214**).
3. He who establishes a new genus should give it a name (**Rule 218**).

4. Those generic names are best which show essential characters of plants or its appearance (**Rule 240**).
5. Generic names one and a half foot long or difficult to pronounce or unpleasant are to be avoided (**Rule 249**).
6. The specific name must distinguish a plant from all its relatives (**Rule 257**).
7. Size does not distinguish species (**Rule 260**).
8. The original place of plant does not give specific difference (**Rule 264**).
9. A generic name must be applied to each species (**Rule 284**).
10. The specific name should always follow the generic name (**Rule 285**).

PROPOSED BIO- AND PHYLO-CODES

Bio-Code

As information on the world's biota becomes increasingly integrated across different groups of organisms, from bacteria and fungi to animals and plants, there is concomitant rising need for a consistent and harmonized approach to the regulation of scientific names. The *Bio-Code* initiative represents a concerted effort, by biologists intimately involved in the operation of the current system of separate codes, to devise a unified approach to the future naming of organisms of all kinds. This need has become pressing in view of common issues that the separate organismal codes now have to address, consequent on the rapid changes taking place in global informatics, database architecture, molecular systematics and ecology, and electronic publication.

A more radical approach was made in 1997 when the International Committee on Bionomenclature (ICB) presented the long debated Draft Bio-Code, proposed to replace all existing Codes with an harmonization of them. The originally planned implementation date for the BioCode draft was January 1, 2000, but agreement to replace the existing Codes was not reached.

Draft Bio-Code (2011) compiled by Greuter *et al.*, (2011) is most appropriately viewed as a framework over-arching the practices of the current series of codes, but which also addresses ways in which some of the key issues of current concern in systematics could be handled by all codes, for example the registration of new names and electronic publication. In addition, it has been drawn up so that its provisions can be adopted at the appropriate time for any particular group of organisms, at any rank or range of ranks. Such adoption is to be determined by the appropriately mandated international body if and when the necessary structures exist and are operational

Phylo-Code

The Linnaean system of binomial nomenclature is landmark for today's taxonomists but now failed to govern the naming of clade and species. A group of organisms which members shows a common ancestry called clade. A clade is a group having all the descendants of the last common ancestor of the members of the group. De Queiroz and Gauthier developed the theoretical foundation of the phylo-Code in a serial publication of papers in 1990, 1992 and 1994. In version form phylo-Code first time published in 2000.

- According to Cantino and Queiroz (2010) in contrast to the rank-based codes, the PhyloCode will provide rules for the purpose of naming clades through explicit reference to phylogeny. In doing so, the PhyloCode extends "tree-thinking" to biological nomenclature. This development parallels the extension of tree-thinking into taxonomy, as manifested in the concepts of species as lineage segments and supraspecific taxa as clades. The PhyloCode, however, is designed for the specific purpose of naming clades. The purpose of the PhyloCode is not to replace existing names but to provide an alternative system or governing the application of both existing and newly proposed names. In developing the PhyloCode, much thought has been given to minimizing the disruption of the existing nomenclature.
- In the pre-existing code the name of a species changes whenever a species is referred to a different genus as a result of phylogenetic or phenetic consideration. In this the supraspecific names are associated with clade as they are operationally defined in terms of ranks and types.

- The phyloCode (Phylogenetic code) Botanical nomenclature is proposed to promote clear communication and efficient storage and retrieval of biological information. The code was cited on 1st January 2000. Presently phyloCode governs only clade names.

The first public draft of the PhyloCode covered only Clade names. Then in 2002 it was decided that:

- (i) The rules for clade names and rules for species names would be published in separate documents.
- (ii) The timing of implementation of the two documents would be independent.

The rules for clade names are implemented before the names of species. The decision was reconsidered in 2006.