

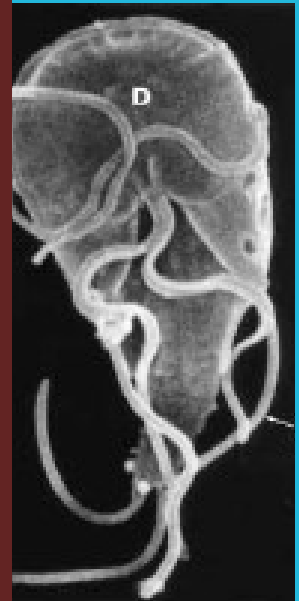
Chapter 4

Nomenclature of Parasites, International Zoological Nomenclature, Rules and Regulations

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Taxonomy is concerned with Classification or systematic arrangement of organisms into groups or categories called Taxa (singular Taxon). Taxonomy can be divided into three parts:-

i. Classification :-

Classification is the orderly arrangement of units or groups or larger units.

ii. Nomenclature :-

The naming of units defined (characterized) and delineated by classification.

iii. Identification :-

Using the criteria established for classification and nomenclature, organisms are identified by comparing the characteristics of the “unknown” to the “known” units. Identification of a newly found parasite requires adequate characterization, description and comparison with published descriptions of organisms. These three parts of taxonomy are largely independent.

History of Nomenclature:-

To achieve consistent naming of species on an international basis, it is necessary to establish rules to be followed by biologists. This was accomplished by botanists and zoologists early in the 1900. Subsequently the **International Code for Zoological Nomenclature** was first published in the year 1901.

Some principles of Nomenclature :-

Codes of nomenclature are based on certain principles:-

- i) Each distinct kind of organism is designated as a species.
- ii) The species is designated by a Latin binomial to provide a characteristic international label (Binomial system of nomenclature)

- iii) The application of names is regulated.
- iv) A law of priority ensures the use of the oldest available legitimate name.
- v) Designation of categories is required for classification of organisms.
- vi) Criteria are established for effective publication of new specific names, as well guidance in coining new names.

Scientific name of parasites

- i. Parasite of each distinct kind is recognized as a species.
- ii. Each species has a Genus and Species
- iii. Genus name written in capital letters. Genus name is Greek or Latin word. A new word compounded from Latin or Greek root, or the Latinized name of a person. It is always used as a Latin noun which may be masculine, feminine or neuter gender. The gender ending with species term must agree with gender of the genus term. Proper name of organisms are always italicized.

- a) *Ascaris* –Greek (Askaris, pleural askarids)
- b) *Taenia* – Latin – (Greek (Taenia meaning a band)
- c) *Fischoederius* -The name of this parasite has been derived from the name of parasitologist Fischoeder.

The second word, a specific epithet (with rare exceptions) is not capitalized and is thus descriptive. It may be any one of the following parts of speech:-

- a) An adjective modifying the noun:-

Fischoederius ***elongatus*** (elongated)

Fasciola ***gigantica*** (Bigger in comparison to other species of the same genus)

- b) An adjective in the form of the present participle of a verb.
- c) A noun in the possessive modifying the generic name.
- d) A noun in apposition, an explanatory noun. :-

Fasciola *hepatica*, *Stilesia* *hepatica*

e) The name of the author of the parasite is written along with the name of the parasite as follows:-

Moniezia expansa (Rudolphi, 1810)

Fasciola hepatica (Linnaeus, 1758)

Fasciola gigantica (Cobbold, 1885)

f) Subspecies of the parasites are written as :

Species:- *Echinococcus granulosus* (= *E. granulosus*)

Sub-species :- 1. *Echinococcus granulosus granulosus* (= *E.g. granulosus*)
2. *Echinococcus granulosus canadensis* (= *E.g. canadensis*)

Species :- *Echinococcus multilocularis* (= *E. multilocularis*)

Sub-species:-1 *Echinococcus multilocularis multilocularis* (*E.m. multilocularis*)
2. *Echinococcus multilocularis sibiricensis* (*E.m. sibiricensis*)

Common names of parasites:-

In addition to their scientific names, parasites also have common names comparable to those of familiar plants and animals. Names of plants provide an illustration:-

<u>Common Name</u>	<u>Scientific or Botanical name</u>
Red oak	<i>Quercus rubra</i>
White oak	<i>Quercus alba</i>
White birch	<i>Betula populifolia</i>

A similar situation exists with parasites

Nasal schistosomiasis	<i>Schistosoma nasale</i>
Liver fluke	<i>Fasciola gigantica</i>

History of classification

Aristotle first classified the Living Things into **Plant**, **Animal** and **Human**. To him, the **Plants** had vegetative souls, that governed feeding and reproductive activities. Animals had both vegetative and animal souls which regulated movements. Aristotle classified 500 species. The animals which had red blood were classified into mammals, birds, reptiles, and fishes. On the other hand those with colorless blood were classified into squids, shellfish and insects etc. The human had vegetative, animal and rational soul which performed the intellectual activities.

Later on Theophrastus, disciple of Aristotle somewhat advanced the plan of classification using his own observations and maintaining a quite remarkable a standard of accuracy. However, it is said that he had no outstanding contribution to the theory of classification. Like Theophrastus, Roman Pliny the Elder (A.D. 23-79), whose **Natural History** contained a vast amount of information. , much of it is based on hearsay, also had little contribution to classification. Till the Renaissance, the naturalists had thought that, Aristotle, Theophrastus, and Roman Pliny the Elder had described the most, if not all, of the world's animals and plants. They spent much of their time trying to fit all plants, including those growing in central Europe, in to Theophrastus's descriptions of the vegetation of the warm Mediterranean region.

The geographical discoveries of the sixteenth centuries proved that new species of plants and animals did exist and scholars included these new types in their books. The chief divisions of plants in those days were trees, shrubs, half shrubs and herbs. When listing an individual plant, a botanist would give its name in various languages, the statements of the ancient authors, about it, the writer's judgment of it, and finally its medicinal powers.

Works of Linnaeus

The haphazard method of classification proved completely unsatisfactory. It was not, however, until time of the 18th century Sweedish scholar Karl von Linne (better known as **Linnaeus**) that the first effective classification system was set up.

Linnaeus divided all the plants into classes based into stamens or male elements, in each flower. Each class was further subdivided into orders, according to the numbers of pistils, or female parts, in the flower. He sub-divided the others into genera on the basis of certain minor differences. The genera in turn were divided into species. Linnaeus divided all animals in into six great classes:-

- i) Quadrupeds (four legged animals : Mammals
- ii) Birds
- iii) Reptiles (in which he included frogs and salamanders)
- iv) Fish
- v) Insects
- vi) Worms

Binomial nomenclature

The classification method of Linnaeus marked a great advance in the field of nomenclature. However, it became apparent in time that **there** were srious defects in the system. Biologists tried to find more natural method of classification than the one commonly employed by Linnaeus.

International Code of Zoological Nomenclature (ICZN):

In 1898, the International Congress of Zoology organized an **International Commission on Zoological Nomenclature** to establish rules for naming of the organisms. Animals are generally given a genus name and a species name (the

Binomial Nomenclature introduced by Linnaeus). Sometimes, the sub-genus or sub-species or both are also given; this is called Polynomial (many term) nomenclature. From time to time, the Commission issues new rules and makes decisions on disputed names. **International Code of Zoological Nomenclature** adopted in 1958 was extensively revised for publication in 1981. The most recent provisions of the Code (Fourth edition) supersedes those of the previous editions with effect from 1 January 2000. This Code has been adopted by the International Commission on Zoological Nomenclature and has been ratified by the Executive Committee of the International Union of Biological Sciences (IUBS) acting on behalf of the Union's General Assembly. The Commission may authorize official texts in any language, and all such texts are equivalent in force and meaning. The Code proper comprises the **Preamble**, **90 Articles** (grouped in 18 Chapters) and the **Glossary**. Each Article consists of one or more mandatory provisions, which are sometimes accompanied by Recommendations and/or illustrative Examples. In interpreting the Code the meaning of a word or expression is to be taken as that given in the Glossary. The provisions of the Code can be waived or modified in their application to a particular case when strict adherence would cause confusion, but this can only be done by the Commission, acting on behalf of all zoologists and using its plenary power, and never by an individual. In addition to the Code itself, the present volume contains a **Preface** (by the present and preceding Presidents of the Commission) and an **Introduction** (by the Chairman of the Editorial Committee). There are three Appendices; the first two of these have the status of Recommendations, and the third is the Constitution of the Commission. The English and French texts of the Code are published on behalf of the Commission by the International Trust for Zoological Nomenclature, a not-for-profit company established in the U.K. to provide financial and secretarial support for the Commission's work.

Preamble of the International Code of Zoological Nomenclature:

The International Code of Zoological Nomenclature is the system of rules and recommendations originally adopted by the International Congresses of Zoology and, since 1973, by the International Union of Biological Sciences (IUBS).

The objects of the Code are to promote stability and universality in the scientific names of animals and to ensure that the name of each taxon is unique and distinct. All its provisions and recommendations are subservient to those ends and none restricts the freedom of taxonomic thought or actions.

Priority of publication is a basic principle of zoological nomenclature; however, under conditions prescribed in the Code its application may be modified to conserve a long-accepted name in its accustomed meaning. When stability of nomenclature is threatened in an individual case, the strict application of the Code may under specified conditions be suspended by the International Commission on Zoological Nomenclature.

Precision and consistency in the use of terms are essential to a code of nomenclature. The meanings given to terms used in this Code are available in the Glossary. Both the Preamble and the Glossary are integral parts of the Code's provisions.

The International Commission on Zoological Nomenclature is the author of the International Code of Zoological Nomenclature .

Modern system

In any modern system of classification, the arrangement of various plants, and animals into categories must reflect their evolutionary relationship. Closeness or distance of relationship is established by comparisons of structural or behavioral characters in living forms coupled with evidence of the fossil record. During the 1970s and 1980s the techniques of molecular biology were added to clarify the

evolutionary relationships in classification. Comparisons of tissues proteins and nucleic acid sequence in the DNA and NA chains of different species are now used to indicate the time that has elapsed since such species diverged from each other .In other modern classification system, each living thing belongs to a Species, Genus, Family, Order, Class, Phylum and Kingdom.

Further reading :

1. Regarding the **International Code of Zoological Nomenclature**, or the application of its provisions to particular cases, interested students may further search at : The Executive Secretary, I.C.Z.N., c/o The Natural History Museum, Cromwell Road, London SW7 5BD, U.K. (e-mail: iczn@nhm.ac.uk)
2. Mehlhorn, Heinz (ed). 1988. Encyclopaedic Reference of Parasitology. Biology, Structure, Function. First Edition, Springer.