

TEACHING OF BOTANICAL NOMENCLATURE THROUGH PRACTICAL APPLICATION—AN URGENT NEED¹

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Teaching of Botanical Nomenclature is carried out in several Universities of India through a few lectures that are mostly historical in view point, as opposed to practical. It is suggested that a very effective way of training botanical students in nomenclature is by the 'case method' of the International Code of Botanical Nomenclature. Solutions including process and investigation of three sample nomenclature cases are given in this paper.

Systematic Botany or Systematics embraces the whole field of systematic work and is broadly divisible into two parts: *Taxonomy* deals with the placement of an individual plant into a taxonomic group or taxon, and the assignment of the taxon into the general system of classification which is, of course, phylogenetic in nature; and *Nomenclature* deals with the determination or selection of the correct name to be applied to a known taxon in conformity with the International Code of Botanical Nomenclature. Systematic work is correctly and fully done only when both these steps or stages (*viz.* taxonomic and nomenclatural) are properly carried out. Nomenclature thus forms an inseparable and important part of Systematic Botany. Undoubtedly, nomenclature serves taxonomy.

The International Code of Botanical Nomenclature, is derived mainly from the Laws of Botanical Nomenclature proposed by Alphonse de Candolle in 1867. These laws, in their turn, are mainly based on the various aphorisms and pronouncements clearly stated by Linnaeus in his *Fundamenta Botanica* (1736) and explained in great detail in *Critica Botanica* (1737). The text of the current edition of the

"Code" (Stafleu *et al.* 1978) is based upon the decisions reached by the Nomenclature Section of the Twelfth International Botanical Congress held in Leningrad from 3rd to 10th July, 1975. It is the product of the intense study by specialists in the field of botanical nomenclature, who for nearly a century have been studying the problems connected with the naming of plants. In various botanical congresses held generally at an interval of about five years, every effort was made to make the system work satisfactory in all respects and to secure a stable and uniform system of plant nomenclature by way of suitable amendments to the Code, including amendments in the list of *nomina conservanda* which are often the result of considerable dedication and laborious bibliographic research.

In various floras of India published up to the early part of 20th century, much attention was not paid to the selection of the correct names of plants. Relevant synonymy was also invariably omitted. These have caused much confusion in the identity and nomenclature of several common Indian plants. A breakthrough in floristic research in India was noticed in 1953 when Santapau published his *FLORA OF KHANDALA ON THE WESTERN GHATS OF INDIA* adopting the correct identity and nomenclature of the plants treated therein and also

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by citing relevant synonymy. Several regional/district floras of India published since then, have followed suit. The plant names given in these floras no doubt vary considerably from the old floras. The majority of the recent name changes of Indian plants are due to strict application of the International Code of Botanical Nomenclature, while others are either due to the better understanding of the identity of the plant or even to the proper judgement of the taxonomic status of the species. Hence identity and nomenclature are equally important and they should go side by side in fixing the correct names of plants.

Santapau (1965) stressed that the "Code" should be included in the curriculum of at least such post-graduate students who take up any of the branches of plant systematics for their special study. It is gratifying to note that in recent times it has gained increased recognition and this is reflected by a large number of colleges and universities in India that include it in their syllabi. Normally taxonomic part is taught at length by lectures, laboratory work and on field excursions; but nomenclature is usually covered briefly in a few lectures that are mostly historical in view point, as opposed to practical. These lectures, no doubt, are of value, but the student does not gain a detailed knowledge of the laws of the Code, and this creates difficulty for him to follow the nomenclatural/taxonomic synonymy given in recent floras/monographs and to arrive at the correct names of plants. While naming the plants, he still uses the incorrect names given in the old out-dated floras. Hence a very effective way of training botanical students in nomenclature is by the *case method* of the International Code of Botanical Nomenclature. Harold St. John, as early as 1958, stressed this aspect in his "Nomenclature of Plants". Each student should be able to investigate and evaluate the validity of the publication cited,

search for synonymy in classical books/literature and for pertinent facts such as basionyms, homonyms, tautonyms and to understand the terms often used such as *comb. nov.* and *nom. nov.*

Solutions including process and investigation of three sample nomenclature cases are given below:

Ophioxylon serpentinum Linn. Sp. Pl. 1043. 1753.

Ophioxylon trifoliatum Gaertn. Fruct. Sem. Pl. 2: 123. 1791.

Rauvolfia serpentina (Linn.) Benth. ex Kurz, For. Fl. Burma 2: 171. 1877.

The earliest of these names is *Ophioxylon serpentinum* which is found in Linnaeus' Species Plantarum—1753. There on page 1043 Linnaeus validly published this name (according to Art. 32 to 45 of the International Code of Botanical Nomenclature). Further, according to Art. 13, valid publication of names for Spermatophyta and Pteridophyta, begins from 1st May, 1753 (Linnaeus, Species Plantarum ed. 1.). In Linnaeus' Species Plantarum the placing of the epithet in the margin opposite the name of the genus clearly indicates the combination intended (Art. 33). Bentham (in Genera Plantarum 2: 697. 1876) appears to have been the first in uniting *Ophioxylon* Linn. (Sp. Pl. 1043. 1753; Gen. Pl. ed. 5. 467. 1754) and *Rauvolfia* Linn. (Sp. Pl. 208. 1753; Gen. Pl. ed. 5. 98. 1754), after adequate comprehension of the generic characteristics of both the genera. The issue is of course a taxonomic one. He adopted the name *Rauvolfia* for the combined genus and this name is accordingly to be retained (Art. 57.2). Bentham did not really effect the transfer of the species *Ophioxylon serpentinum* Linn. to *Rauvolfia*.

Rauvolfia serpentina (Linn.) Benth. ex Kurz was a combination based on the oldest epithet-bringing synonym (basionym)—*Ophioxylon serpentinum* Linn. (Art. 33.2.). When

a species is transferred to another genus but retains its epithet the author of the basionym (who published this as a legitimate name) must be cited in parentheses, followed by the author who effected the combination (Art. 49). Kurz in his *Forest Flora Burma* 2: 171. 1877 first validly published the combination by directly giving reference to the basionym, but ascribed it to Benth. According to recommendation 46C. I, the correct author citation is the name of the publishing author (Kurz), but the name of the other person followed by the connecting word *ex* may be inserted before the name of the publishing author, if desired (i.e. Benth. *ex* Kurz).

Another question of some concern is the orthography of the generic name. Plumier followed by Linnaeus consistently used the Latin version of Rauwolf's name and named the genus as *Rauwolfia*. But Willdenow in his *Species Plantarum* and following him several others including authors of Indian floras spelt the generic name as *Rauwolfia*. However, according to Art. 73, the original spelling of Linnaeus (intentional latinisation of Rauwolf's name) viz. *Rauwolfia* is to be preserved.

In 1791, Gaertner (*Fruct. Sem. Pl.* 2: 123) validly published the name—*Ophioxylon trifoliatum*. However, this name became superfluous (Art. 63), as Gaertner's plant already had an earlier, validly published name—*O. serpentinum* Linn. (1753).

Hence, the correct name of 'Sarpagandha' is *Rauwolfia serpentina* (Linn.) Benth. *ex* Kurz.

Another case involving both identity and nomenclature is discussed below:

Entada pursaetha DC. Prodr. 2: 425. 1825.

Mimosa entada Linn. Sp. Pl. 518. 1753.

Entada rheedii Spreng. Syst. 2: 325. 1825.

Entada monostachya DC. Prodr. 2: 425. 1825.

Entada scandens auct. non Benth. 1841;

Gamble, Fl. Pres. Madras 417. 1919.

Most of the earlier Indian floras report the occurrence of *Entada scandens* (Linn.) Benth. in India. However, recent critical studies undertaken by way of 'type method' have revealed that the true *Entada scandens* (Linn.) Benth. which is synonymous to *Entada phaseoloides* (Linn.) Merrill does not occur in India, but is found only in Amboina in the Moluccas; and the correct identity of the common *Entada* occurring in India should be *Entada pursaetha* DC.

Now investigation of the nomenclature case reveals:

The earliest of these names is *Mimosa entada* which was validly published in Linnaeus' *Species Plantarum* p. 518. 1753. Augustin de Candolle (1825) while transferring this species to the genus *Entada*, could not retain the specific epithet "entada" as the resulting binary name "*Entada entada*" is a tautonym which is inadmissible according to Art. 23. Hence he proposed a new name *Entada monostachya* DC. (in his Prodr. 2: 425). The three competing names for this species in the genus *Entada* viz. *E. pursaetha* DC., *E. rheedii* Spreng. and *E. monostachya* DC. all date from 1825. Brenan (*Kew Bull.* 1955: 164. 1955) appears to have been the first to unite all the above three species; he adopted the name *Entada pursaetha* DC. for the combined species, and this name is accordingly to be retained (Art. 57.2).

Now regarding the citation of the misapplied name: according to Recommendation 50D.1, the name *E. scandens* as a misidentification should not be included in the synonymy of *E. pursaetha* but added after it. Further, the misapplied name, i.e. *Entada scandens* should be indicated by the words *auct. non* followed by the name of the original author (Benth.) and the bibliographical reference of the misidentification, i.e. reference to Gamble,

Fl. Pres. Madras or any other floras as the case may be which have misidentified the plant.

The correct identity and nomenclature of the common Indian species of *Entada* is, therefore determined as *Entada pursaetha* DC.

Another nomenclature case involving the proper judgement of the taxonomic status of two genera is given below:

In most of the older floras, the genera *Abelmoschus* Medicus, Malv. 46. 1787 and *Hibiscus* Linn. Sp. Pl. 693. 1753; Gen. Pl. ed. 5. 310. 1754 are treated as congeneric (i.e. synonymous). However, K. Schumann (in Engler & Prantl, Nat. Pflanzenfam. 3(6): 47. 1895) and following him several monographers treated them as distinct based mostly on the nature of the calyx: spathaceous, irregularly 2 to 3-lobed and caducous in *Abelmoschus*; and campanulate, cupular, regularly 5-lobed or truncate with minute teeth, and persistent in *Hibiscus*.

Consequently several species of *Hibiscus* including *H. esculentus* Linn. were transferred to genus *Abelmoschus*:

Abelmoschus esculentus (Linn.) Moench, Meth. Pl. 617. 1794.

Hibiscus esculentus Linn. Sp. Pl. 696. 1753.

Hibiscus longifolius Willd. Sp. Pl. 3: 827. 1800.

Abelmoschus esculentus (Linn.) Moench was a combination based on the oldest epithet-bringing synonym (basionym)—*Hibiscus esculentus* Linn. (Art. 33.2). Moench in his *Methodus Plantas* (1794) first validly published the combination by directly giving reference to the basionym. The author of the basionym is cited in parantheses, followed by the author

who effected the combination (Art. 49).

In 1800, Willdenow (Sp. Pl. 3: 827) validly published the name *Hibiscus longifolius*. However, this name became superfluous (Art. 63) as Willdenow's plant already had a prior validly published name—*H. esculentus* Linn. (1753).

Hence the correct name of 'bhindi' is *Abelmoschus esculentus* (Linn.) Moench.

The solutions of even these simple nomenclature cases bring the student in contact with several of the fundamental botanical publications. The correct interpretation depends on an understanding of the principles of priority, synonymy, regulation governing the binominal system, and other concerned Articles and Recommendations of the International Code of Botanical Nomenclature. Several other cases can be digested and solved in a similar way and certainly the study will aid in giving the student a sounder training in Botany. Only after investigation and evaluation of a few cases, he evinces interest in comparing the old and recent floras for name changes and in course of time will be able to fix for himself the correct identity and nomenclature of the common local plants in conformity with the rules of the International Code of Botanical Nomenclature.

It may be stated that name changes are annoying to ecologists, foresters, economic botanists and other plant users including teachers of Botany, who feel that the names ought to be stabilised. Stabilization is not fixation: stabilization should be achieved only through the application of the International Code of Botanical Nomenclature.

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541 species, while in three other regions, viz. Indo-Gangetic Plain it had increased from 19 to 25 species, Western Himalayas and Nilgiris from 4 to 6 species and Southern Region from 7 to 21 species.

The first water oligochaetes known from the Western Region at present are:

1. *Chaetogaster* large Brischke, 1896 from Sata.
2. *Chaetogaster* Western Himalayas Anna-Jala, 1903 from Khandala.

Stapleton (1923) has listed the known species of oligochaetes from the nine regions of the Indian sub-continent in which the Western region, comprising of Goa to Chhatisgarh to the sea has only 2 species of fresh water oligochaetes known, as belonging to family Naididae. The other eight regions have the following number of species of fresh water oligochaetes noted against them:

Total	Plants of India	Plants of Western Himalayas	Plants of Indo-Gangetic Plain	Plants of Western Himalayas & Nilgiris	Plants of Main Himalayas Area	Plants of Southern Region	Plants of Nilgiris (Region)
19	0	2	15	2	1	4	1
2	0	2	0	0	0	0	0
2	0	0	2	0	0	0	0
19	0	2	15	1	0	0	0
4	0	1	3	0	0	0	0
6	0	2	4	0	0	0	0
7	0	2	5	0	0	0	0
6	1	1	3	1	0	0	0

With a view to study the fresh water oligochaetes of Bombay, one of us (K.V.N.) made some collections in the summer of 1965 in and around Bombay city in addition Dr. U. Gopal-

Prasad (1961 and 1962) tabulated the fresh water oligochaetes then known to the above nine regions in which no additional water oligochaetes were observed in respect of W. Western Region, Nilgiris Region, N.E. Himalayas Region and Main Himalayas Area, Western Region and Nilgiris (Region).

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