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PROPOSALS TO AMEND THE CODE

Edited by Dan H. Nicolson[1]

Steps along the road to a harmonized bionomenclature

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Summary

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Steps taken towards an increasingly harmonized approach to the nomenclature of organisms in all groups since 1985 are identified. The key conclusions of an Exploratory Meeting on Harmonization held in 1994 are presented, along with the report of the first meeting of the Interim Commission on Bionomenclature held in 1995. The latter meeting made proposals on the harmonization of terms between the five existing *Codes*, and also prepared a first draft *International code of bionomenclature* to deal with names published after (provisionally) 1 January 2000.

> *Codes do not evolve but are made for convenience and we should quit bowing down to precedent ... if we seek stability.* – (Dwight, 1909).

Background

Biology as a science is unusual in that the objects of its study are currently named according to five different *Codes* of nomenclature, i.e. those for bacteriology (Sneath, 1992), botany (Greuter & al., 1994a), cultivated plants (Brickell & al., 1980), virology (Francki & al., 1990) and zoology (Ride & al., 1985). There have been periodic discussions on the differences and similarities between *Codes* over the last 50 years (e.g. Anonymous, 1944; Rollins, 1959), and a few attempts to produce a unified *Code*, some of which date back over 100 years (Dall, 1877; see also Savory, 1962). Interest in more unified ways of naming organisms has resurfaced in the last decade, stimulated in part by the unified approach now taken towards biology teaching, but more significantly by an increasing realization that (a) the different *Codes* had the same new problems to confront arising from new technologies, and (b) significant numbers of organisms could potentially be treated under more than one *Code* depending on the taxonomic perspective of an author (Hawksworth, 1992). Consideration of this issue has accelerated in the last two years, to the extent that the

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first draft of an *International code of bionomenclature* – developed by representatives of all five currently mandated international nomenclatural authorities – has now been referred to those bodies for scrutiny.

This article provides a synopsis of the steps taken since 1985, as these may not all be familiar to botanists, emphasizes the latest developments, and also considers those in prospect. The latter are particularly concerned with facilitating wide debate as, if any unified *Code* is to be produced and become operative from a future date, the biological community as a whole must be confident that it serves their best interests and that it will facilitate rather than inhibit their scientific endeavours.

Third International Congress of Systematic and Evolutionary Biology (ICSEB III), Brighton, July 1985

During ICSEB III, the International Union of Biological Sciences (IUBS), the international umbrella organization for bodies concerned with three of the five *Codes,* convened a workshop "to study future developments of the various *Codes* of nomenclature", following a session organized by the Systematics Association on *Codes* of nomenclature (Ride & Younès, 1986). An ad hoc Committee on Biological Nomenclature, meeting after the workshop, recommended that IUBS establish a Standing Committee on Biological Nomenclature mandated to inform IUBS "of developments in different disciplines of biological nomenclature to ensure that the need to achieve maximum harmony is recognized as a continuing aim of IUBS". In addition, the Congress passed resolutions encouraging all *Codes* "to make registration of new names mandatory once satisfactory registration procedures have been established and are operating" and also requested that future ICSEB provide "a forum ... for continuing [a] multidisciplinary approach to matters related to the nomenclature of organisms" (Ride & Younès, 1986: 70). IUBS subsequently instructed its Executive Committee to establish such a Standing Committee at its 22nd General Assembly in Budapest in September 1985 "to achieve maximum harmony between the different systems of nomenclature" (Anonymous, 1986: 59); the Executive Committee appointed Dr W. D. L. Ride (International Commission on Zoological Nomenclature, ICZN) to chair the Standing Committee.

XIV International Botanical Congress (IBC XIV), Berlin, July 1987

The question of a requirement for all names proposed after 1 January 1990 to be registered in order to be regarded as effectively published was a key topic for debate at this Congress and generated considerable controversy (Greuter & al., 1989: 14-30, 107-132). A Special Committee on Registration was appointed to investigate the matter further and to report to IBC XV. During the Congress little progress was made towards more unified approaches to nomenclature, but participation in the Nomenclature Section of the Congress by Dr Ride led to the publication of a detailed analysis of differences between the botanical and zoological Codes (Ride, 1988). However, during informal discussions it emerged that working towards lists of names in use and granting them specially protected status could be one route forward; this option was pursued further by an ad hoc working group convened by IUBS and IAPT at the International Mycological Institute (IMI, then in Kew) in April 1988 which included representatives of four of the five Codes. Amongst the

recommendations from this meeting was the proposal that a new Special Committee on Names in Current Use be established (Hawksworth, 1988; Hawksworth & Greuter, 1989).

23rd General Assembly of IUBS, Canberra, October 1988

The General Assembly received a report from Dr Ride's Committee, including that from the Kew ad hoc meeting, adopted a programme on Improvement of Stability in Biological Nomenclature, and invited the General Committee on Botanical Nomenclature to appoint a Special Committee on Names in Current Use (Anonymous, 1989: 42). The General Committee formed such a Special Committee in March 1989 (Nicolson, 1989) which rapidly started its work. The Special Committee met in Las Palmas, Gran Canaria, in November 1989 and at the IMI in June 1990, prepared to release draft lists of generic names in the spring of 1991, and also planned a major meeting on the topic for early that year.

Fourth International Congress of Systematic and Evolutionary Biology (ICSEB IV), College Park, Maryland, July 1989

The Special Committee on Names in Current Use organized an open meeting during this Congress which was attended also by several members of the ICZN. The ideas then exposed stimulated the ICZN to start considering accelerating the movement of zoological nomenclature on parallel lines (Savage, 1990). This is reflected in the draft of the next edition of the zoological *Code* which was issued for comment in June 1995.

Symposium on Improving the Stability of Names, Kew, February 1991

IUBS, in collaboration with IAPT and the Systematics Association, organized the first major international interdisciplinary meeting specifically to address the stability of names, held at the Royal Botanic Gardens in Kew, which attracted 123 participants from 20 countries (Hawksworth, 1991). A wide range of issues was debated, and the participation of bacteriologists and zoologists as well as botanists heightened the awareness of common issues to be confronted by the different nomenclatural bodies.

At the close of the meeting, the Special Committees on both Registration and Lists of Names in Current Use finalized their proposals to the subsequent International Botanical Congress (Greuter, 1991).

24th General Assembly of IUBS, Amsterdam, September 1991

It became clear at the Kew meeting that there were more common issues to confront than had been widely appreciated, and the matter was considered further at the 24th General Assembly of IUBS held in Amsterdam on 1-6 September 1991 (Younès, 1992: 68). That Assembly passed a resolution on biological nomenclature which, amongst other things, "encourages those concerned with biological nomenclature actively to seek ways of increasing harmonization in the various *Codes,* for example, with regard to the protection for names in current use, the registration of newly proposed names, the treatment of protists, homonymy between different groups, and where possible, the use of identical terms."

In addition, the IUBS Scientific Programme Committee reported that, amongst other topics, they would see advantage in the preparation of a comprehensive *Glossary of biological nomenclature.*

XV International Botanical Congress (IBC XV), Yokohama, August 1993

Decisions taken at the above Congress marked a change in direction in botanical nomenclature (Greuter & Nicolson, 1993, 1995; Hawksworth, 1995), although with hindsight some have been reluctant to accept what was democratically agreed (Brummitt, 1994; Strother, 1995). The key provisions in this respect of relevance to the issue of harmonization between the different *Codes* were: clarification of the groups of organisms covered, the rejection of names extended to any that could cause disadvantageous changes, the conservation of species names without restriction, the acceptance of metabolically inactive cultures as nomenclatural types, the establishment of a list of suppressed works, the use of "phylum" as an alternative to "division", and the introduction of registration as a criterion for valid publication of names proposed after 1 January 2000, subject to ratification at the IBC XVI in St Louis in 1999 (Greuter & al., 1994a). Although the proposals for the protection of lists of names in current use were narrowly defeated following extensive and often emotive debate (Greuter & al., 1994b), the Congress did appoint a Standing Committee on Lists of Names in Current Use "to initiate, assist, coordinate and vet production of further lists and of updatings of the existing lists of NCU and to report to each subsequent International Botanical Congress".

Further, discussion of a proposal to extend the principle of homonymy across *Codes* for names introduced after 1 January 2000 led to agreement to establish a new Special Committee on Harmonization of Codes, "particularly in relation to nomenclature in taxonomic groups that border on those covered by other *Codes*" (Nicolson, 1994). The Special Committee established under the auspices of the General Committee comprises D. L. Hawksworth (Convenor/Secretary; U.K.), M. A. Faust (U.S.A.), R. A. Fensome (Canada), W. F. Prud'homme van Reine (Netherlands), P. H. A. Sneath (U.K.) and P. H. Tubbs (U.K.) (Nicolson, 1994). To date, that Committee has been considering which are the particular topics deserving in-depth study with respect to the existing *Code,* but is not addressing the issue of a future unified *Code;* that topic is being considered by the General Committee. The Special Committee has to submit its report to *Taxon* on or before 1 August 1997.

Exploratory Meeting on Harmonization Between Codes of Nomenclature, Egham, March 1994

As a first step in the implementation of the resolution encouraging harmonization passed at the 24th General Assembly of IUBS, an Exploratory Meeting was convened at the IMI under the joint auspices of IUBS, IUMS (International Union of Microbiological Societies), and IAPT, and with support from CAB International (CABI), the Linnean Society of London, and the Royal Society of London. The meeting comprised representatives of the five different *Codes,* together with some other biologists with particular experience on specific topics to be explored. It considered the current state of bionomenclature, a wide range of cross-cutting issues (harmonization of terms, suprafamilial ranks, co-ordinate status of names, infraspecific ranks, italicization of scientific names, author citations, lists of protected names,

registration and valid publication, electronic publication, ambiregnal organisms, inter-*Code* homonyms, part- and form-taxon nomenclature, and gender of names), and future prospects. The full report of the Meeting (Hawksworth & al., 1994) included an executive summary, agreed by the 19 participants, which:

- Recognizes the crucial importance of scientific names of organisms in global communication to all concerned with the conservation, management, trade in, and use of the world's resources.

- Agrees that it would be highly advantageous to work towards a unified system of biological nomenclature, and notes that the XV International Botanical Congress in Japan in 1993 established a Special Committee on Harmonization of Codes.

- Recognizes that while there are differences in procedures between the current *Codes,* which could not be reconciled for the nomenclature of the past without an unacceptable disruption of names in use, there is considerable scope for harmonization which is to be actively pursued.

- Considers that the availability of lists of published names, and the registration of new names in bacteriology, botany, virology and zoology, will make possible the harmonization of nomenclatural procedures in biology.

- Agrees to work towards producing a *Glossary of biological nomenclature,* including both official and unofficial terms used in biological nomenclature.

- Recommends that, considering divergent rules and traditions concerning author citations for scientific names, use of such author citations be made optional (and be recommended only in a strictly taxonomic context), as is already the case in zoology.

- Recognizes the need to develop common procedures for the nomenclatural treatment of fossils, with particular emphasis on form genera and other parataxa, and to this end recommends IUBS in cooperation with international and national bodies such as the Systematics Association and Paleontological Association, to organize a discussion meeting on this topic.

- Agrees that the nomenclature of infraspecific taxa in ranks not regulated by the three main *Codes* is most appropriately regulated by international specialist commissions or groups (e.g. International Society for Plant Pathology Subcommittee on the Taxonomy of Phytopathogenic Bacteria for pathovars of bacteria, International Commission for the Nomenclature of Cultivated Plants for cultivars of plants).

- Encourages international, national, and other agencies to initiate and support current initiatives in compiling lists of names in current use and other catalogues of names, to be made accessible through hard copy and electronic media.

- Notes the rapid advances in electronic media for the storage of and access to taxonomic information, and the opportunities they provide in relation to inventorying the world's currently known and unknown biota, and encourages the IUBS Commission on Taxonomic Databases, in collaboration with the Special Commit-

tee on Electronic Publishing and Databasing, to prepare proposals for consideration by the pertinent nomenclatural committees.

- Recognizes the particular nomenclatural problems posed by ambiregnal organisms, that is those treated under different *Codes,* considers that small modifications to the *Codes* can accommodate these organisms to ensure that the names used will be unique, and recommends that while discussions continue authors should avoid exacerbating the problem.
- Appreciates the confusion that can be caused by the existence of homonyms in use under the different *Codes,* and recommends that (a) authors of new generic names avoid proposing a name established under another *Code* for a different taxon, and (b) provisions are introduced into each *Code* to disallow new generic names that are junior homonyms under any *Code.*
- Recognizes the importance of continuing the dialogue started at, and implementing actions identified by the Exploratory Meeting, recommends that an inter-union IUBS/IUMS International Commission on Bionomenclature (ICB) be established in 1994, and suggests that the new Commission includes a delegate representing each of the current five *Codes,* together with representatives from key user bodies (e.g. FAO, UNEP, IUCN, UNESCO, WHO).
- Recommends that the organizers of the Fifth International Congress of Systematic and Evolutionary Biology (ICSEB V), to be held in Budapest in 1996, include a session to review progress towards harmonization and other aspects of bionomenclature.

With respect to the proposal at the 24th General Assembly of IUBS that a glossary of terms used in biological nomenclature be developed, a preliminary draft was prepared for the meeting; following inputs from meeting participants, a *Draft glossary of terms used in bionomenclature,* with 1175 entries, was published for wider circulation and comment (Hawksworth, 1994).

25th General Assembly of IUBS, Paris, September 1994

The Assembly received the report of the Egham Exploratory Meeting (Hawksworth & al., 1994). Resolution No. 3 of that Assembly (Anonymous, 1995: 24): "endorse[d] the establishment of a new IUBS/IUMS Commission on Bionomenclature ... and urge[d] that Commission to expedite work towards a unified system of bionomenclature".

IUBS/IUMS Ad Hoc Meeting on Stability and Harmonization of Bionomenclature, Egham, May 1995

In order to initiate the implementation of the resolution passed by its 25th General Assembly, IUBS established an Interim Commission on Bionomenclature, and invited its members, with support from the International Council of Scientific Unions (ICSU), to participate in an ad hoc meeting at the IMI, Egham, Surrey, on 6-12 May 1995. The meeting, chaired by the President of IUBS, was attended by persons from the five internationally mandated nomenclatural bodies (B. J. Tindall, bacteriology; W. Greuter and J. McNeill, botany; R. P. Trehane, cultivated plants; M. A. Mayo,

virology; O. Kraus and P. K. Tubbs, zoology). Building on the discussions held at the March 1994 meeting at Egham, significant progress was made, culminating in the production of a first draft for an *International code of bionomenclature.* Consensus was reached on a wide range of issues, the most significant of which were contained in an agreed statement:

Harmonization of terms. – Agreement was reached on terms to be recommended for use in any future unified *Code,* and where appropriate in future editions of existing *Codes* (Table 1).

Treatment of ambiregnal organisms. – The meeting agreed to recommend for inclusion, in future editions of the various *Codes,* provisions to ensure that the correct name of a taxon of ambiregnal organisms is the earliest name that is acceptable under any *Code* and not a homonym under any other *Code.* The usual safeguards to protect general usage against destabilizing adoption of strict priority would apply. It was also agreed that a project to list homonyms between *Codes* be initiated to determine the extent of the problem and as a basis for the consideration of future actions.

Unified code of bionomenclature. – The procedure to develop a *Unified code of bionomenclature* to operate for all groups of organisms, and targeted to operate from 1 January 2000, was discussed in detail and the following timetable was agreed:

- *May 1995:* first draft circulated amongst Interim Committee.
- *June 1995:* second draft sent out to the pertinent nomenclatural authorities for information and comment.
- *June 1995:* IUBS and IUMS Executive Committees approached to endorse establishment of an IUBS/IUMS International Commission on Bionomenclature.
- *March 1996*: review and revision by the International Commission on Bionomenclature.
- *August 1996:* third draft issued to all ICSEB V and IUMS Congress registrants and debated during dedicated symposia at each Congress.
- *November 1996:* review and revision by the International Commission on Bionomenclature.
- *September 1997:* fourth draft submitted to IUBS 26th General Assembly and the subsequent IUMS Congresses, with a request to recommend adoption by the appropriate nomenclatural authorities.

Commission on Bionomenclature. – The meeting agreed to propose to the IUBS and IUMS Executive Committees, that an International Commission on Bionomenclature be established with a chair and the following composition: bacteriology (2), botany (2), zoology (2), cultivated plants (1), and viruses (1). The meeting felt that it would be appropriate to establish an International Consultative Group on Bionomenclature comprising representatives of pertinent intergovernmental agencies when the Fourth Draft was being prepared. The organizations invited to be represented should include at least: CABI, CBD, FAO, IUCN, UNEP, UNESCO, UNIDO, and WHO.

Table 1. Recommended replacements of different Code equivalents

Recommended	Bacteriological Code	Botanical Code	Virological Code (draft form)	Zoological Code
		THE NOMENCLATURAL FILTER		
Publication				
Published	Effectively published	Effectively published	Published	Published
Precedence	Priority	Priority	Priority[1]	Precedence
Date	Date	Date (or Priority)	—	Priority
Nomenclatural Status				
Eligible for registration	Validly published	Valid/Validly published	Valid	Available
Established	Validated	—	Approved[2]	—
Acceptable	Legitimate[3]	Legitimate[3]	Valid	Potentially valid
Taxonomic Status				
Accepted	Correct	Correct	Approved[2]	Valid
		OTHER NOMENCLATURAL TERMS		
Earlier homonym/ synonym	Senior homonym/ synonym	Earlier homonym/ synonym	—	Senior homonym/ synonym
Later homonym/ synonym	Junior homonym/ synonym	Later homonym/ synonym	—	Junior homonym/ synonym
Homotypic (objective) synonym	Objective synonym	Nomenclatural synonym	—	Objective synonym
Heterotypic (subjective) synonym	Subjective synonym	Taxonomic synonym	—	Subjective synonym
Name-bearing type	Nomenclatural type	Nomenclatural type	Type	Name-bearing type
Registration	Validation	Registration	Acceptance	—
Suppression (of a name)	Rejection	Explicit rejection *(nomina utique rejicienda)*	Rejection	Suppression
Adopted lists	Approved lists & Validation lists	—	—	Adopted lists
Protected names	Validated names	— Avowed substitute name and type	Approved names	— Explicit replacement nominal taxon

[1] Priority (**precedence**) is not used to determine status under the Virological Code.

[2] Only names judged to be taxonomically accepted names are **accepted** for "Approval" (**Registration**) under the Virological Code.

[3] Proscription of names that are not legitimate is confined to the Bacteriological and Botanical Codes.

The next steps for botanists

The last decade has been a dramatic period for the development of an improved system of biological nomenclature that can ultimately only benefit both the practitioners of biosystematics and the users of scientific names. An extensive period for detailed consultation is ahead, and it is crucial that botanists make their frank comments on the proposals as they proceed through the various drafts. The second draft has already been circulated to the General Committee on Botanical Nomenclature, and after their views and those of their counterparts in other disciplines have been received, a third draft will be made generally available at ICSEB V, in August 1996.

It is critical to recognize that the focus of the new *Code* being developed is planned to operate on names published after (provisionally) 1 January 2000; further, groups would "kick in" to certain of the provisions only after satisfactory lists of protected names were available. The current suite of *Codes* would continue to operate for the names of the past, subject to improvements in harmonization which do not increase instability in names (e.g. consistency in the usage of terms; see Table 1). In practice, for the convenience of users, binding between the same covers is one option that will be considered. The St Louis Congress in 1999 can thus expect to consider both modifications to the botanical *Code* which will involve increased harmonization, and a recommendation to adopt a new bionomenclatural *Code* from a date to be agreed.

Increased awareness of the importance of biodiversity has led to an appreciation by those involved with the Convention on Biological Diversity that there is a need for a clearing house mechanism for the exchange of information world-wide. A vital element in this, if smooth operation is to be ensured, is a harmonized system of nomenclature linked to a registration system for the names of newly described species. By putting their house in order, biosystematists have the potential to make a significant contribution to the implementation of one aspect of the Convention – and also to an improvement in the perception of the relevance of their science by government and other agencies as well as their scientific peers.

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