



Reflections on Pavlinov (2021): understanding and expanding the study of the history and philosophy of nomenclature, a comprehensive state of the art

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Abstract

The philosophy of nomenclature (onymology/taxonymy) is an underdeveloped discipline. The book *Taxonomic nomenclature* of Pavlinov (2021) explores the history of scientific nomenclature and analyzes the theoretical and conceptual elements that underpin this discipline. It is a rich and comprehensive resource for both novice taxonomists, interested in the history and in nomenclature, and the more experienced, seeking to expand their knowledge of the field. In addition to the review, a deepening of the notions of taxonomic freedom and nomenclatural norms and principles, and a consensus on the binominal vs. binomial debate are proposed. The new concepts of methodology freedom and quality freedom are introduced, as well as some reflections on the notions of monosemy and universality.

Key words

Onymology, taxonymy, theoretical freedom, norms, principles.

Note

For clarity's sake, this article uses the vocabulary of the *International Code of Zoological Nomenclature* (Anonymous 1999) concerning general nomenclatural notions. The formula 'the author' designates I. Pavlinov. The following abbreviations are used: ICdZN, *International Code of Zoological Nomenclature*; ICmZN, International Commission on Zoological Nomenclature; ICN, *International Code of Nomenclature for algae, fungi, and plants* (Turland *et al.* 2018); ICNCP, *International Code of Nomenclature for Cultivated Plants* (Brickell *et al.* 2016). These Codes are designated by the formula 'International Codes'.

Introduction

Taxonomic nomenclature is a scientific discipline dedicated to establishing and managing the scientific names (nomen, pl. nomina) of taxa. Like any scientific discipline, it follows rules and usages and has both a myriad of theoretical concepts and a specific vocabulary. Nomenclature evolves jointly with the improvement of taxonomy, and the understanding of Nature and its theoretical background follows this movement albeit with a possible delay. The study of the philosophy of nomenclature, called onymology (Dubois 2000, Aesch 2018) or taxonymy (Pavlinov 2014), is an understudied but necessary discipline for a correct epistemological and practical approach to both nomenclature and taxonomy. In the book examined in this article, a praise-worthy effort to collect, analyze and review the literature on the subject offers to the reader a valuable grasp on the current standing of the discipline.

Overview

Igor Pavlinov's (2021) book *Taxonomic Nomenclature: What's in a Name* is divided into two parts. The first half focuses on the theoretical approach of nomenclature, while the second part leads us through the history of this discipline. The main subjects covered by the first part are the link between nomenclature and taxonomy, the theoretical structure and operating modes of nomenclature as well as a comprehensive list of the possible principles regulating the discipline. The historical part complements the first half, describing the main historical trends in chronological order. It also explores the discussions and oppositions that constructed nomenclature as we understand it today. If a good part of the book is, by the author's own admission, based on previous work, mainly published in Russian, the literature cited is up to date.

The book serves as a great introduction to onymology (renamed taxonymy by Pavlinov). Some more or less marginal points of nomenclature are missing, like an overview of the treatment of hybrids. The tone and general attitude towards different points of view or nomenclature systems are quite benevolent, distinguishing themselves from the rather vehement discussions that can occur in this field. Pavlinov describes three main theoretical historical paths in nomenclature, the 'essentialist', the 'nominalist' and the 'conceptualist' route. These philosophies competed, took turns throughout history, and occasionally coexist, as different systems or—awkwardly—under one system, but together they hold the theoretical background of nomenclature. The book develops a lot of concepts, many of which are new, and offers interesting standpoints on the others. Quite a lot of these elements would deserve an in-depth examination, but for the sake of this article, two main concepts and one terminology issue will be considered.

Theoretical freedom

Pavlinov demonstrates quite convincingly that the notion of (taxonomic) theoretical freedom (i.e., the nomenclature system should not influence the taxonomic theoretical framework or practice) in nomenclature, at least when taken globally, is merely "wishful thinking" (p. 12). He recalls the reasoning of Mayr (1969), who states that "the rules [of nomenclature] will have to be adjusted to the conceptual development of taxonomy" (p. 13 in Pavlinov). Moving from a Linnean essentialist understanding of nomenclature (i.e., a name expresses the essence of a being) to the nominalist understanding of nomenclature (i.e., a name is a label, a communication tool, with no intrinsic semantical value),

almost all the theoretical framework of both taxonomy and nomenclature are flipped over, and their interaction changed simultaneously.

However, when considered locally, many levels of theoretical freedom can be distinguished. There are several parameters of theoretical freedom, operating in a given understanding, or even system, ranging from being totally theory-free to totally dependent or theory-laden. The author demonstrates this fact very well, using the example of a ranked hierarchy. This structure element can be considered as forcing the taxonomists' hand to adjust their taxonomy to a system that has no current global ontological meaning and has been ignored or criticized both in an essentialist and nominalist context (p. 14).

It would seem reasonable that any nomenclatural system could then be positioned in a multi-dimensional space where each of these parameters could be represented, and classified as being more or less theory-free, knowing that none of them could reach a total theoretical freedom state. Nonetheless, it would be interesting to single out at least two specific parameters, for the purpose of accompanying current or future discussions in both onymology and taxonomy.

The first one is a part of theoretical freedom as it is traditionally defined in nomenclature and summarised in Aescht (2018). It could be called methodological freedom to be distinguished from the other parameters and determining whether the nomenclatural rules impose a particular or a combination of methods or approaches for taxonomic work (i.e., morphology, phylogeny, barcoding, etc.) to render a nomen available. For example, the *PhyloCode* proponents limit their acceptable taxonomy method to a phylogenetic definition, at least for the higher taxa. On the contrary, the ICdZN, for example, claims that it does not want to “restrict the freedom of taxonomic thought or actions” (Anonymous 1999, Preamble), and does not care for the taxonomic approach of authors. A case for the advantages of methodological freedom has been made in Dubois (2005).

The second one is a subordinate level of theoretical freedom that could be named quality freedom, in other words, the fact that nomenclature rules regulate (or do not regulate) the quality of taxonomic information associated with a nomen, and decide whether or not this quality is acceptable for the recognition of the availability of a nomen. What is meant by ‘subordinate’ is that this parameter is to be taken in a given nomenclatural system, and associated with a given method (or a combination thereof), and act therefore on a smaller scale than methodology freedom. This dimension of nomenclature might sound more practical than theoretical and is underdeveloped in the current Codes, once again to guarantee freedom in the practice of taxonomy. However, most of the controversies that have emerged lately in taxonomy, via its consequence in nomenclature, seem to be directly linked to issues pertaining to the concept of a ‘good quality’ of description, like in the case of Sharkey *et al.* (2021a–b), and their counterparts Zamani *et al.* (2022) or Meier *et al.* (2022) for an example in the context of the molecular/barcode data approach. An example of a more general approach to ‘quality’ is the case of “taxonomic vandalism” (Jones 2017), i.e., taxonomic works that are available but considered of poor quality by an important part of the community. This phenomenon leads to increasing the problem of the “synonymy load” (Dubois 2008), i.e., the quantitative importance of synonyms in a given taxonomy. In the context of the ICdZN, the ICmZN has always been very cautious with rulings pertaining to ‘quality’, making it quite ‘quality-free’. As a consequence, calls have been made for the ICdZN to become more explicit (Ahrens *et al.* 2021), and systems of regulations have been proposed (Kaiser 2013), the latter as means to control what is perceived by the proponents of these regulations as too much freedom.

Norms and principles

Introduction

Pavlinov distinguishes four levels of “primary regulators” in nomenclature, i.e., legal elements serving to “regulate the methods of posing and solving nomenclatural tasks”, viz. the “norms, principles, rules, and recommendations” (p. 30). The notions of norms and principles are those of interest here. The author defines a norm as “a kind of rather informal precept defining the general content of posing and resolving possible nomenclatural tasks”, and a principle as “a narrower interpretation of a norm by explicit formulation of the ways of posing and solving standard nomenclatural tasks in certain typical situations” (p. 30), two definitions that are, in my sense, unfortunately too vague to have a clear idea of how to apply them. Thereafter, in the book, the concept of “norm” is seldom used, and in a heterogeneous way. Unsurprisingly, this notion of “norm” (or an equivalent term) is absent from the ICN (Turland *et al.* 2018), the ICdZN (Anonymous 1999) or the *PhyloCode* (Cantino & de Queiroz 2020), as norms are understood as tacit regulators on which these systems are built, rather than explicit guidelines. The concept is also missing in the glossary published by Hawksworth *et al.* (2010), although an unrelated homonym is mentioned. However, after his formal definition, Pavlinov writes that “in this understanding, norms can be seen as the ‘frame-work’ principles that establish certain rational conditions for nomenclatural activity” (p. 30), which hits the nail on the head. Drawing this logic to the end, by considering norms as necessary elements of any nomenclatural system in order for it to be recognized as rational and scientific, we obtain a concept that allows us to classify other concepts, such as the 98 principles listed in the book, between the handful that is common to all scientific nomenclatural systems (norms), and those that are present in one or several systems without being universal (principles *sensu stricto*). Respecting these norms draws the barrier between vernacular and scientific nomenclature, and should lead to the improvement of nomenclature rigor. This definition of norms respects the author’s idea of the “nomenclature [regulative] pyramid” (p. 32) even though it singles out norms as being present at the top of every possible pyramid. It is also compatible with the given example of a norm “that denot[es] each taxon by a unique, universally acknowledged taxonomy [= nomen]” (p. 32, see Monosemy below).

The concept of principle is present in the ICN which separates principles, cited in the first division of the Code, from rules and recommendations, which appear in the second division. The same organization is observed in the *PhyloCode*. In the ICdZN, principles are peppered throughout the text. None of the three offers a definition for the concept of principle in their glossaries. This fact is not surprising, considering that principles tend to vary a lot in the way they are applied or understood, from general guidelines with a handful of exceptions (e.g., the Principle of Priority in the ICdZN) to essential laws like the principle of Phylogenetic context in the *PhyloCode*. The ICNCP (Brickell *et al.* 2016) has a definition for principle: “in a Code, a fundamental precept which the Articles are designed to satisfy”. This adds to the definition the fact that a principle is Code (or system) dependent. In its proposals, the *Linz Zoocode Committee* (Dubois *et al.* 2019) provides the following definition: “Within the frame of the *Zoocode*, a general statement of general value which applies to all relevant nomenclatural acts”. This definition furthers the idea that principles are on the higher end of the regulative pyramid. Providing a strict universal definition is thus difficult, and Pavlinov’s has the merit of encompassing all existing understanding of the “principle” concept.

Three immutable properties of principles can be distinguished. The first one, present in Pavlinov’s understanding, is that principles are subordinated to norms and other principles, and placed above rules. The second one is that principles are Code or system-specific. The third one, which can be used to distinguish them from norms, is that there is at least one alternative to a principle that can exist (even co-exist) without compromising the scientificity of the system. This alternative principle, however, does not have to be technically feasible, practical or desirable.

Examples

To illustrate the preceding points, the following notions will be discussed: monosemy, universality and priority. The first two should be treated as norms, while the last one is an example of a principle *sensu stricto*.

Monosemy

Monosemy, as Pavlinov suggests, can be understood as the unambiguous link between “one object [a taxon and] one name” (p. 36). Technically speaking, monosemy designates the fact that the nomen is unambiguously linked to one taxon, and not the fact that a taxon has only one nomen, but for the sake of this demonstration, let us keep the simpler definition.

Monosemy is, without any doubt, the basis of scientific nomenclature and its rationale. It is one of the main components that distinguish vernacular names from nomina, as the former are polysemic. Monosemy is presented as a principle, which is opposed to the principle of “admissible polysemy” (p. 53–55). Synonymy and Homonymy, at least in their current understanding, are principles subordinated to monosemy, or its “[other] side, [...] the principle of polysemy suppression” (p. 54). For the author, admissible polysemy encompasses nomina for taxa ranked over the family series [A], para-, morpho- and ichnotaxa [B], and for local varietal names in the nomenclature of cultivated plants [C]. Inter-Code homonymy [D] can also be considered an admissible polysemy, as well as some particular cases, e.g., homonymy between nomina of different ranks, such as the genus nomen *Ranoidea* Tschudi, 1838 and the superfamily nomen **RANOIDEA** Batsch, 1796 [E] in zoology, as well as nominative subgeneric and subspecific nomina in both botany and zoology [F].

There is a point to be made that monosemy should be treated as much as possible as a norm, as defined in this work, rather than just a principle, and admissible polysemy reduced to a minimum. Considering nomina with all the metadata associated with them—going even further than the concept of nominal complex (Dubois 2000), i.e., nomen + its author + its publication date, adding relevant nomenclatural system (or the classification), the rank (if relevant), and kind of taxon (morphotaxon, ichnotaxon...)—, gets rid of any issues possibly arising due to type B, D, E and F polysemy. In fact, these metadata are sufficient (in general taxonomy databases in particular, in which they are usually—at least in part—present) to provide enough context for the reader to eliminate any possible ambiguity on the nature of the nomen, and on what taxon it is applied, even with fragmented information and without context clues. For example, *bufo* Linnaeus, 1758 can designate both the species or subspecies if the binomen or trinomen is truncated. By adding the rank systematically, the polysemy is solved. Adding the nomenclatural system can be particularly useful in the case of the *PhyloCode* converted names, that are essentially homonyms of their International Codes counterparts.

The polysemy existing with nomina over the family series [A] has been a recurring critique addressed to the ICdZN (see Rowe & Gauthier [1992] for **MAMMALIA** Linnaeus, 1758 or Dubois [2004] for nomina within **AMPHIBIA**), especially by the proponents of the *PhyloCode* (Laurin 2008). For cultivated plants [C], what was written by Pavlinov might refer to at least two different situations. The first one is the fact that cultivated plants might have translated or transliterated nomina, but as these are considered synonyms, so are not a threat to monosemy. In fact, they are not synonyms the way the ICdZN or the ICN understands it, but merely different forms of the same nomen. The second one is that a given cultivar might cumulate one or many trade designations as well as an official ICNCP name. The latter is the only one that has scientific value and thus is covered by the norm.

There is however a specific case of non-marginal polysemy that appears between the ICN and the ICNCP. When there is no consensus about the ‘wilderness’ status of a plant, it might have two

competing nomina, one under each system (Malécot 2008), while the ICN and ICNCP are supposed to be compatible, without overlap. The same issue appears with ambiregnal protists that fall into both the realm of the ICdZN and the ICN. This phenomenon is not marginal, as Corliss (1995) estimated that 30,000 protistan nomina were in that situation. Corliss (1995) provided solutions, but none of them have been adopted, despite the fact that this situation is considered by many as undesirable (see Knapp *et al.* 2004).

Universality

The principle of “overall universality” (p. 50–51) *sensu* Pavlinov covers two main dimensions of nomenclature. The first one, which overlaps greatly with the Principle of Exhaustiveness of Dubois (2005), reflects the fact that nomenclature should be applied to all living (or once alive) organisms. Dubois’ Exhaustiveness differs in that he includes hybrids and teratological specimens, notions that are not mentioned by Pavlinov. In the latter’s understanding, the appearance of the principle of locality, i.e., the “divergence of particular nomenclature systems on conceptual, subject-area, regional, and other grounds” splits nomenclature into “dialects” (p. 51), that are confirmed by the principle of the Independence of the Codes. It can be argued that the principle of Independence should cover not only the fact that the Codes evolved distinctly but also that they recognize their inability to provide the universal coverage of living beings on their own, and acknowledge, more or less explicitly throughout their history, the existence and necessity of the other Codes. The *PhyloCode* and the *BioCode* (Greuter *et al.* 2011) do not need to refer to independence, as the former applies to every potential taxon while being a competing system to the International Codes, and the latter also covers all taxa, while being an ‘aggregator’ of the International Codes. They both provide, *de facto*, universal coverage, as they include all the possible taxa and stand, at first glance, without the need of another Code to apply to all living things. The *PhyloCode*, however, calls for the use of the International Codes to manage the nomina of species. So, it is not as universal as it could have been. On the other hand, the universal coverage, both taxonomic and of ranks, is one if not the major selling point of the *BioCode*. This part of Universality can be considered a norm, but the outlines of this norm can largely be discussed.

The second dimension of overall universality is that nomenclature can be applied “to all systematists dealing with [the precedently cited taxa]” (p. 51). This principle corresponds to Dubois’ (2005) Universality, excluding the latter adding a theoretical-freedom part to it, stating that “a universal code cannot be linked to a particular conception of taxonomy”. As a community, the fact that the overwhelming majority of taxonomists follow the same set of rules became an essential factor for recognizing a nomenclatural system. The universality of nomenclature, in this case, is not a norm *per se*, as a system can exist and be scientific, without being popular or widely used. However, the system must explicitly be *intended* to be universal to become a scientific nomenclature. Otherwise, it would be a particular case of vernacular nomenclature, linked to one or a few people, or a given community. So, the intent of universality is what really constitutes the norm.

Priority

The principle of priority is understood as the precedence given to an older nomen, when a zygoidy—a conflict for validity between two or more available nomina (Dubois 2013)—occurs. As clearly stated by Pavlinov, Priority, in its main forms, is actually a “limited priority” (p. 70), as starting dates control the past time limit. Many different understandings of priority exist, with different properties, as listed by Pavlinov (p. 71). If Priority is pushed as essential for the ‘stability’ of nomenclature, it

has a competing principle, Usage, and they coexist in the International Codes. The principle of Usage calls for the use of the ‘traditional’ or most widespread nomen to solve a zygoidy. The fact that both can co-exist means that the principle of priority and the principle of usage are indeed principles, and cannot be treated as norms.

Binominality and binomiality

The terms binomial and binominal (as well as binary that will not be treated here), have been used interchangeably to designate the current way of naming species. There have been quite a lot of discussions, opposing the proponents of the use of binomial (usually but not limited to botanists) and the users of binominal (usually but not limited to zoologists). Pavlinov, while being a zoologist, favors the first (see p. 60). There are multiple arguments to be made, for one or the other (e.g., Aubert [2016] for etymological arguments in favor of ‘binominal’). However, both terms do not cover the same notions. As a matter of fact, every Code conceives a nomen at the specific rank in a different way, and thus, both uses are right. In practice, the glossary of the ICdZN states:

“**Species name or name of a species.** A scientific name of a taxon at the rank of species. A binomen, the combination of a generic name and a specific name [...].
Specific name. The second name in a binomen and in a trinomen [...].”

Both definitions underline the fact that the specific part is considered a full-fledged name, making a species name the combination of two names and thus a binominal (two names) entity.

On the other hand, the ICN reads:

“**binary combination (binomial).** A generic name combined with a specific epithet to form a species name.”

This wording suggests that the specific part of the name is not considered of equal standing compared to the generic part, making a species name the combination of two inequivalent parts, and thus a binomial (two parts) entity.

This interpretation makes the term binominality consistent in zoology and binomiality correct in the botanical framework.

Conclusion

Pavlinov’s work provides a more than solid foundation in onymology for the reader and allows for further reflection and analysis of concepts that are handled, sometimes unknowingly, by taxonomists, but also by indirect users of nomenclature. The hindsight provided by reading this work also makes the reader aware of the innumerable discussions that have occurred throughout the history of nomenclature. Reflecting on the concepts and implicit structures that frame the logic behind the naming of taxa is an essential part of producing a satisfying taxonomy. This implies a better knowledge and further dive into the field of theoretical nomenclature, for which, once again, the book reviewed in this work is a great foundation to build on.

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