# Title:

# Protecting stable biological nomenclatural systems enables universal communication

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 Main text:

The fundamental value of universal nomenclatural systems in biology, and the key to their success, is that they have enabled unambiguous scientific communication among and across different cultures. The binomial/binominal systems (from herein biological nomenclatural systems) are codified in sets of rules for zoology (ICZN 1999), botany (ICN, Turland et al. 2018), and other branches of biology. These have served us to advance biological research (including paleontology) for more than 250 years. However, the very principles and fundamental conventions of biological nomenclature are now being questioned, and its stability compromised. Recent discussions and debates on biological nomenclature have asked for fairer, more inclusive and socially just scientific nomenclature for species and other taxa, with a possible collective aim to heal some of the wounds that colonialism, sexism, racism, casteism, and other human failings have inflicted in communities all over the planet (e.g., Hammer & Thiele 2021, Smith et al. 2022, Thiele et al. 2022, Tracy 2022, Wright & Gillman 2022, Harris & Xavier, 2023, Guedes et al. 2023, Mabele et al. 2023, Roksandic et al. 2023). These debates have also led to the suggestion that bulk revisions should be processed to remove 'inappropriate' names, such as eponyms dedicated to controversial people or words perceived as offensive in certain languages or regions. It is evident that such contentions come from very deep feelings, yet it is unclear that the consequences of some of these proposed revisions have been subject to a thoughtful critical analysis of their implications: the intended good would not outweigh the possible damage. Taking into account the diverse societal and geographical background of the proponents of such name changes, the number of names affected over time could easily be in the hundred thousands (Ceríaco et al. 2023), including eponyms, toponyms, racial slurs, names representing colonialism, and so forth.

Claimants for “Nomenclatural justice” have moved some legitimate social concerns into the scientific arena, where other considerations should prevail, in the spirit of cross-cultural understanding. While their intentions are undoubtedly good and the pursuit is laudable, most of these nomenclatural revisionist authors seem to ignore that their well-intentioned proposals try to address alleged problems that are mostly built on post-hoc premises, and that result in a direct attack against the foundations on which biological nomenclature, and thus natural sciences, are built. These proposals essentially disregard that present **nomenclatural systems** are already intended to **allow transcultural communication through a shared, operationally neutral system of terminology that is stable across space and time**. These benefits may not be maintained if actions to address social justice destabilize the nomenclature system and damage the currently standing pillars of universal scientific communication and mutual understanding.

Recent proposals, suggestions, and demands for extensive change dominate the discourse of critics who, by narrowly focusing on one facet of a much broader and complex picture, fail to recognize and acknowledge the critical importance of our current nomenclatural systems. While the legitimacy of the authors’ aspirations is beyond reproach, it is paradoxical that their impact on the discussion of biological nomenclature is amplified by several scientific journals, allowing politically motivated subjective reasoning to develop. Proposals to modify current biological nomenclature based on social arguments have consistently met resistance from nomenclatural experts, who provide technical and practical counter-arguments (e.g., Mosyakin 2022, 2023b, Ceríaco et al. 2023, Garbino 2023, Katumo et al. 2023, Pethiyagoda 2023, among others). However, the discussion arena has been unequal so far. The papers fueling the controversy find space in transdisciplinary journals with wide audiences, while technically argued opposing views are largely published in specialized journals with narrower audiences.

Here we present a response that aims at uniting a much more widespread concern that has remained almost silent: that the functionality of communication within the scientific community and across the whole society is the greatest contribution of the biological nomenclatural systems, and that this benefit may be jeopardized. Many of us, researchers in systematics, evolutionary biology, and other biological sciences, are concerned about well-intentioned but ill-considered and irresponsible opinions published on the subject that may irreparably damage the system of biological communication that unites us all and, in turn, the fundamental discipline that underlies and connects all others: taxonomy. In contrast to previous replies, which provide detailed responses to the multiple technical flaws in the well-meaning proposals, we would like to make explicit four essential, non-technical considerations that arise from the very reason why we have and need objective codes of nomenclature: universality, stability, neutrality, and transculturality. These considerations, implicit in our nomenclatural systems, seem to go unnoticed by many non-taxonomists, who inadvertently undermine these systems as a solution to pervasive social or political problems that transcend the scope of biological nomenclature.

The signatories call upon the scientific community to endorse the considerations we enumerate below on the grounds that, (i) they provide fair and impartial guides to the principles governing the current systems and practice of biological nomenclature, and (ii) they allow unambiguous universal communication in biology. Accordingly, no subjective, politically motivated, or opinion-based proposals should undermine them.

1. **Universality:** *biological nomenclature* ***must be shared across space*** *over the entire planet.*

This is the only way to ensure cross-cultural, universal communication.

It has been proposed that those taxon names that are deemed necessary to be replaced should be substituted by native names to honor indigenous cultures (e.g., Wright & Gillman 2022). The biological nomenclature systems were adopted exactly for the reason that they avoid the conundrum that multiple native vernacular names present for effective global communication. This is a practicality devoid of any colonial, racial, national, regional, cultural, or other non-universal legacies other than the Linnean origin of the systems. In fact, most European common names – which are by definition indigenous names – are not used as the genus or specific epithet for the corresponding taxa. In addition, there is no barrier to honoring native vernacular names: the codes make provision for names to be derived from any language, thus proactively avoiding any potential tongue-based discrimination in coining new names, and thus encouraging the use of native terms in scientific naming. Indeed, Heard & Mlynarek (2023) compiled examples of scientific names based on a variety of languages from Norwegian, Quechua, Te reo Māori, to Tselagi, Afrikaans, and Russian.

The current nomenclature systems proclaim for each species a single and unique, two-word disambiguator as the species name to be used in scientific contexts within every language on the planet. Re-instating vernacular names poses a situation with no single fair solution: among all the possible competing native names for the same taxon, which one should be used and in which language? It goes without saying that there is often no native name, and if native names are available, we often have several in different languages for the same species when its geographic range spreads over several language communities. Moreover, no language must have priority over another when it comes to naming species. This problem has already been faced by scientists (see Mosyakin 2023b), and has been solved by diligently respecting the nomenclatural priority (older names should prevail over newly coined names) on which the international nomenclatural systems are based.

It has recently been suggested that to compensate for any perceived bias and move towards cultural inclusion, the scientific names created in the future are the ones for which native language terms should be considered (see Hayova et al. 2023).

1. **Stability:** *Biological nomenclature* ***needs to be stable over time****, now and in the future.*

This is the only way to ensure trans-generational communication.

Critics argue that a bulk revisionary process should be opened in the nomenclatural systems to help heal the open wounds of colonialism in science (e.g., Wright & Gillman 2022, Guedes et al. 2023, Mabele et al. 2023). They seem to think that this process is a blanket solution for the complex problem posed by judging the past by today’s standards, forgetting that their views and grievances will likewise be subject to historical developments. It is entirely possible that in the future other people will see the decisions we are making now as unfair and demand never-ending revision processes. This paradox of future grievance threatens transgenerational communication and thus stability in the use of scientific names. The stability of the use of names over time is even addressed by codes on a case-by-case basis when universal communication is endangered (e.g., conserved types under ICN, Turland et al., 2018).

Preserving the stability of our universal nomenclatural systems seems the only reasonable and responsible way to ensure that the nomenclatural identity of taxa will be protected over time against the repetitive evolution of future grievances.

1. **Neutrality:** *Biological nomenclature must be understood simply as* ***a universal operational system of disambiguators*** *for taxa.*

Most members of society perceive scientific names as names only and devoid of other implicit content.

Names can be arbitrarily composed, although in many cases they are derived from Latin or Ancient Greek. Being either invented or mostly based on largely dead languages, the vast majority of scientific names make no sense to the general public, making them neutral in their meaning and use. This is true even for speakers of Latin-derived languages. Despite this reality, proponents of nomenclatural change insist that there are targeted oppressive or offensive messages within scientific names that are perceived by society. Offense in nomenclature is not generally the case, although it may be true in a few rare instances (e.g., intended insults targeting other researchers, such as *Centaurea latronum* Pau, meaning “thieves’s *Centaurea*”). Though biological scientific names were initially intended to act as descriptors and bear a meaning, names do not have to make semantic sense, to the point that they can be wrong or confounding, but still act as valid/available names as long as they maintain the principle of priority. For example, toponymic specific epithets created by error are well-known. *Quercus canariensis* Willd., believed to have been collected in the Canary Islands, is absent from these; *Scilla peruviana* L., an Old-World species, does not exist in Peru; and *Drimia maritima* (L.) Stearn grows inland. The biological nomenclatural systems have unquestionably evolved from an initial intention of creating short descriptors to be simply understood as a code of disambiguators.

Scientific names that include or are derived from terms that may be perceived as an offensive word in certain languages are in most cases a matter of coincidence. These names now considered offensive may be perceived as such by decontextualizing the moment in which they were coined, and either predate grievous connotations or simply refer to something different (e.g., *niger* as of black color, or the specific epithet *marica,* certainly unrelated to the Spanish translation: faggot). In the particular case of eponyms, while coined to honor particular people and play their role in science, such meaning is rarely understood beyond the immediate expertise field. Eponyms are also to a great extent devoid of any connotations for lay-people, who are more likely to think that *Magnolia* derives from the Latin root *magnus* (big), rather than being eponymic to the French botanist Pierre Magnol.

For all these reasons, we believe that neutrality in the meaning of scientific names is the rule; offensive contents in a scientific name are the exception or need to be inquisitively sought beyond its author’s original intentions and, in such case, is therefore the product of decontextualization. According to our consideration, a massive uncritical revision of potentially offensive scientific names might be doomed to find a large number of “false positives” of inappropriateness.

1. **Transculturality:** *Biodiversity and its associated scientific nomenclature must be understood as a universal heritage, and* ***this fact should take precedence over any locally biased interest****.*

At its very essence, the value of biodiversity is universal and transcultural and must transcend political boundaries to be shared across all cultures. So too must be the associated nomenclature system that we use to refer to it. Nature and its parts, as abstract entities, are shared World Heritage (not to be confused with material resources derived from nature). Conversely, problems with nomenclature arising within or involving particular cultures or countries (e.g., the Anglosphere) should in no way affect the otherwise neutral globality of nomenclatural codes. Science goes far beyond the views imposed by our immediate cultural spheres, historical moments, and personal contexts. Observing the principle of nomenclatural priority1 that has so far governed codes, rather than re-writing every name susceptible of change, is the only fair way to avoid encouraging nationalist or even chauvinist stances in biology, and the extreme consequences of shaking the foundations of all natural sciences.

**Concluding statement: let’s work for a fairer future scientific nomenclature**

We absolutely agree that the pervasive problems derived from colonial, imperial, totalitarian, racist, casteist, sexist, and other regrettable legacies are still present in society and should be addressed in science. We must work together to avoid perpetuating them and to reform society prospectively. In addition, where productive for the common good and nomenclatural stability, we must provide the codes of nomenclature with appropriate tools for a more just and sensitive future development (e.g., Mosyakin 2023a, 2023c) while not disturbing the existing fundamental nomenclatural procedures. Some straightforward measures that may add better opportunities towards equity and inclusion in nomenclatural practice could be the incorporation of cultural references in the newly coined names (e.g., common names, local terminology, and cultural traditions), honoring local researchers (Jost et al. 2023), or including local vernacular names in scientific publications, preferably in local scripts. Let's be thoughtful, fair, and considerate when creating names for taxa we will discover, to avoid harm or upset in the future.

We understand that a revision process for existing names may be considered by some in rare, exceptional instances as redress for flagrant direct violations of Human Rights. In these cases, these decisions must each be made very carefully and deliberately and in communication with stakeholders, weighing the potential confusion caused to scientific work against any positive reinforcement of those Human Rights affected, but certainly not as a bulk process.

Above all else, we must preserve the immense value of the current nomenclature systems that have withstood the tides of time for more than 250 years enabling universal communication. Raising the issue and acknowledging the problems derived from past legacies is important and there must be ways to compensate and move forward. However, such endeavors cannot become impediments to the ongoing scientific process. Science is universal and, if a common technique or procedure can be maintained for the benefit of all, it is worth protecting. Attempts to revise history in retrospect are as emotionally tempting as they are futile, and maintaining published scientific names is not an endorsement of the eponyms or of the intention behind the names, but a practical functional consideration that relies on the principle of priority as the fairest of solutions. Currently humanity faces urgent challenges like global change, deforestation, and species extinction. Meanwhile, basic biodiversity exploration must struggle to survive under unfavorable scientific climate (e.g., Löbl et al. 2023). A bulk revision could too easily divert the scarce human and economic resources allocated for taxonomy into an endless process that will backfire on all of us as scientists (Antonelli et al. 2023), and on taxonomists in particular, specially those from the Global South. To avoid dire consequences for the rest of human societies, nature needs to be understood and thus named in a stable, universal and operationally neutral and transcultural manner. Let’s not pave the road to hell with good intentions.



1 with some limitations precisely outlined in the nomenclatural codes.

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