Communication

Address Social Injustices in Taxonomy: Implement Extended Revisions of Names with Ethical Issues and Persistent Identifiers for Tracing Name Changes

Desalegn Chala *, Dag Endresen, Sebsebe Demissew, Laura A. Slaughter, Einar Broch Johnsen, Nils Chr. Stenseth

Posted Date: 22 July 2024

doi: 10.20944/preprints202407.1673.v1

Keywords: Catalogue of Life (COL); ethical issues in taxonomic names; nomenclature; Persistent ID; social injustices in taxonomic names; social equity in science; Taxonomy

Communication

Address Social Injustices in Taxonomy: Implement Extended Revisions of Names with Ethical Issues and Persistent Identifiers for Tracing Name Changes

Desalegn Chala [1,*], Dag Endresen [1], Sebsebe Demissew [2], Laura A. Slaughter [3], Einar Broch Johnsen [4] and Nils Chr. Stenseth [5,6]

[1] Natural History Museum, University of Oslo, Oslo, Norway.
[2] Department of Plant Biology and Biodiversity Management, College of Natural Sciences, Addis Ababa University, Addis Ababa, Ethiopia
[3] dScience - Centre for Computational and Data Science, University of Oslo, Oslo, Norway
SINTEF Digital, Oslo, Norway
[4] Department of Informatics, University of Oslo, Oslo Norway
[5] Centre for Ecological and Evolutionary Synthesis (CEES), Department of Biosciences, University of Oslo, Blindern, PO Box 1066, Oslo NO-0316, Norway
[6] Department of Zoological Sciences, Addis Ababa University, Addis Ababa, Ethiopia
* Correspondence: desdchala@gmail.com

Abstract: The binomial nomenclature system, introduced by Carl Linnaeus in the 18th century, has been fundamental for scientific communication and data management. Despite its utility, some scientific names reflect historical biases and ethical issues, including colonial legacies, racism, sexism, and derogatory terms. Recent debates highlight the need to address these injustices, with arguments both for and against revising such names. Critics argue that extensive revisions could disrupt scientific stability, while proponents emphasize the moral imperative to correct these issues. In this opinion paper, we advocate for the establishment of a dedicated committee within international nomenclature bodies to revise taxonomic names with clear ethical concerns and recommend the use of persistent identifiers to effectively manage and track name changes, mitigating potential disruptions to taxonomy and the science that depends on it. By adopting transparent revision processes and making use of digital technology, we can address ethical issues without remarkable upheaval. Science should not perpetuate historical injustices, and it is vital for the scientific community to proactively address social injustices in nomenclature to mitigate ongoing debates and resistance.

Keywords: Catalogue of Life (COL); ethical issues in taxonomic names; nomenclature; Persistent ID; social injustices in taxonomic names; social equity in science; Taxonomy

Main

The invention of binomial nomenclature by Carl Linnaeus in the 18th century provided a universal language for scientists, ensuring each species has a unique name decisive for effective communication and collaboration. Binomial nomenclature facilitates storage and retrieval of biological information, crucial for managing vast biological data and formulating conservation strategies [1].

However, some scientific names reflect historical biases, and some have ethical issues that perpetuate injustices within scientific contexts, and therefore have become the topic of recent debates [2–8]. Some scientific names carry colonial legacies, such as eponyms honoring colonial actors reflecting not only structural racism, but the subjugation and exploitation of indigenous populations [2,9]. Others are named after individuals who committed atrocities, like Hitler [5,10]. Additionally, there are concerns about gender biases in taxonomic names [7], and the use of derogatory terms and racial slurs [11,12]. While many authors argue that scientific names reflecting colonialism, racism, sexism, and casteism should be revised [2,3,7,10,11,13,14], some other authors fear that making

 doi:10.20944/preprints202407.1673.v1

extensive revisions to remove "inappropriate" names could disrupt the stability of binomial nomenclature and the science that depends on it [6,15].

Among the articles opposing revising these names, the most notable and widely circulated is Jiménez-Mejías et al. (2024) [6], which included more than 1,500 scientists as signatories (coauthors). While the paper acknowledges several of the issues that concerns us, it also presents the following points as arguments: 1) advocating for offensive name changes could lead to bulk revisions and disrupt established systems; 2) what is considered acceptable today might not be in the future, leading to a continuous process of revision of names; 3) name change proposals are driven by deep emotions without considering the potential irreparable damage it can cause in science; and 4) disparities in media coverage, noting that papers advocating nomenclatural justice often reach broader audiences compared to opposing views confined to specialized journals. We find most of these reasons provided by Jiménez-Mejías et al. lacking solid basis.

In this opinion paper, we argue the need for the international code of nomenclature bodies to establish a committee dedicated to revising taxonomic names with clear ethical concerns and addressing grievances for others as they arise. The committee should agree on best practices for naming that will focus on ethical issues. We also argue that digital solutions can efficiently manage name changes, thereby making the assertion that revising offensive names threatens the stability of science a groundless statement. Lastly, we discuss that there is already a tradition for changing incorrectly written names.

Transparent revision processes are essential, and science is best served through open discussions with consensus solutions for problematic names. Given the digital technology, revising names should not cause huge scientific disruption, whereas the cost of exclusion and reduced diversity in science are much greater. While plant scientists are set to vote on whether to remove offensive names at the Madrid International Botany Congress 2024 [16], we believe this issue should not be decided by voting. Addressing social injustice in science is crucial. Although such injustices may persist, so will resistance and debate, making it important to take proactive measures.

Establish a Committee or Consortium and Implement Extended Revision

Hereby, we propose forming a committee or consortium of taxonomists as a devoted task force in each field to handle issues, including recommending changes to offensive names using a consensus process. This can be organized in many ways, perhaps as a "charter" to be signed by the community that suggests names to review. Changes can be agreed upon during special occasions, such as at the International Botanical Congress. Additionally, we advocate for the establishment of best practices and guidelines against using scientific names with potential ethical issues as well as mechanisms to check for such problems. We therefore call for the international code of nomenclature bodies to establish committees dedicated to promptly revising taxonomic names with clear ethical concerns and addressing grievances. Based on the number of articles already published concerning this matter, there is enough evidence demonstrating the need to establish a transparent process for name revision, in which the criteria are very clear and agreed upon in the scientific community. Based on such criteria, a nominated committee could consider proposals for revisions.

This approach will not only promote the detachment of science from emotions but also mitigate ongoing debates. We believe the consortium should focus on changing the names while maintaining taxonomic descriptions and authors' names. The scientific community will benefit from a forward-looking approach by avoiding names that could potentially provoke ethical issues, such as those associated with individuals (eponyms), ethnic groups, or even places or geographic regions. Instead, emphasizing diagnostic morphological, physiological, anatomical, or behavioral features for scientific naming ensures inclusivity and respect in taxonomy [7].

Persistent IDs

In the digital era, there are solutions that exist to handle name changes, and the problems arising from the claimed bulk revision are exaggerated [17,18]. Digitalization of nomenclature decouples the need for persistent naming from the universal language provided by the binomial nomenclature, and

 doi:10.20944/preprints202407.1673.v1

this decoupling will enable us to handle a revision of names in a less disruptive way. The widespread adoption of Digital Object Identifiers (DOI) [19] and Open Researcher and Contributor ID (ORCID) [20] identifiers allows automatic updates and links to authors' profiles, ensuring researchers can track and access scientific papers regardless of name changes. By assigning a unique persistent identifier to each taxon, it is possible to manage changes in nomenclature, enhancing data clarity and accessibility while maintaining the integrity of scientific communication [19,21]. Initiatives like the Global Biodiversity Information Facility (GBIF) [22] and databases such as the Catalogue of Life (COL) [23] assign unique identifiers to species records, aiding in maintaining consistency and reliability in species data across various databases and tracing name changes.

The use of scientific names as the primary identifiers for taxa by itself is problematic in many ways [17,18]. Scientific names function well as a human-readable labels, but this creates ambiguity and confusion for automatic biodiversity data processing by machines [24]. This confusion can impede search systems and data integration, highlighting the need for a more robust identification system that will improve scientific communication. The shift towards using a persistent identifier scheme such as a "DOI for scientific names" [19] can address these issues by providing a stable, machine-readable alternative that reduces ambiguity. Implementing "scientific name DOIs" or similar persistent identifiers for taxa will not only improve overall stability in nomenclature but also mitigate concerns that changing names will harm scientific communication. These digital solutions offer a practical way to handle name changes without disrupting the underlying scientific framework. Thus, while scientific names will remain the primary identifier for humans, persistent identifiers can be used as the primary identifier for machines that will easily allow for tracking name changes.

The use of persistent identifiers facilitates the digital transition by enhancing machine readability [17,18], having applications in newly emerging methodologies in biodiversity research such as biodiversity digital twins [25,26]. Biodiversity digital twins are emerging as a cutting-edge methodology in biodiversity research, allowing researchers to simulate and analyze ecological processes in real or near-real time [27–30]. This methodology involves automated access to data from different sources, data fusion, detecting changes at the source, and data assimilation and for this the use of persistent identifiers for taxonomic names is central. Moreover, persistent identifiers enhance the efficiency of data retrieval and sharing, thereby accelerating the digital transition in biodiversity science. By ensuring that each taxonomic name is linked to a unique and persistent identifier, we can build more robust and interoperable digital twins, ultimately advancing our understanding and conservation of biodiversity.

Correcting and Replacing Names: Towards Increased Inclusivity in Science

As science advances, splitting and lumping taxa are common, implying that biological nomenclature is already subject to change [31]. The scientific community frequently revises nomenclature to reflect new discoveries and consensus, including reclassifying species based on genetic evidence [31–33]. So, this shouldn't be otherwise different for scientific names that have ethical issues. In fact, by ignoring their harmful connotations, the scientific community is endorsing the legacies they represent [4,5].

Article 32.2 of the International Code of Zoological Nomenclature requires name changes to ensure gender agreement [34], stating, "If the gender ending is incorrect, it must be changed accordingly (the author and date of the name remain unchanged)." Similarly, the International Code of Botanical Nomenclature enforces Article 23.5, which mandates gender agreement in botanical names. Given that nomenclature codes accommodate changes for grammatical accuracy, it is absurd to resist changing offensive names on the grounds of maintaining stability. If name changes are accepted to match gender, why should changing offensive names be problematic?

Name changes can be simple and done in a systematic way. Similar to Malcolm X's name change, which redefined rather than erased his identity, taxonomic revisions can uphold fairness without causing disruption. Malcolm X, originally Malcolm Little, adopted "X" to symbolize his lost African ancestry as well as reject his ancestral "slave name" as a means of self-defense. Though we are against

 doi:10.20944/preprints202407.1673.v1

the use of eponyms, for names associated with colonial masters and notorious figures, appending just an "x" may suffice. For example, renaming *Anophthalmus hitleri* Scheibel to *Anophthalmus hitlerix* can address its association with Hitler without altering other taxonomic aspects.

For taxonomic names containing derogatory terms, such as *Hottentotta* W. (Table 1), complete renaming is obligatory. It is unjustifiable to perpetuate such offensive terms in scientific nomenclature. The genus *Hottentotta*, comprising about 61 species, is a prime example. The term "Hottentot" is a derogatory name historically used to refer to the Khoikhoi people of South Africa. Imagine Khoikhoi schoolchildren learning about genus named with a term that demeans their heritage. While it may not be possible to erase the scars of historical injustices, it is possible to cease reopening and perpetuating these wounds. Failing to recognize the harm these names cause and refusing to change them is a profound disservice to the scientific community. Addressing these issues is not just about correcting names; it is about respecting the dignity and history of the people affected by such terminology.

By committing to ethical revisions, the scientific community can maintain the integrity and stability of nomenclature while ensuring that it aligns with modern values of social justice and equity. This approach not only maintain the scientific utility of taxonomic names but also promotes a more inclusive and ethical scientific practice. Scientific names rooted in colonialism, racism, sexism, and casteism diminish the practice of science, and may lead to reduced diversity in the scientific community; hence, we should facilitate their revision.

Table 1. examples of some scientific names with ethical problems. COL - Catalogue of Life.

Scientific Name	Ethical problems	COL identifier
The genus *Hottentotta*	The use of “Hottentot” as a derogatory term for Indigenous Black people in Africa. It was historically used by European colonizers to refer to the Khoikhoi people of southwestern Africa, but it carries negative and demeaning connotations. The genus "*Hottentotta*" comprises around 61 recognized species of scorpions.	4YXK (https://www.catalogueoflife.org/data/taxon/4YXK)
over 150 names with caffra,	It is derived from "Kaffir," a derogatory term historically used in South Africa to refer to Black Africans [2,12]. It is derived from the Arabic word "kafir," which means "infidel" or "non-believer.	
Anophthalmus hitleri	The blind beetle named after Adolf Hitler by an entomologist who admired him gained popularity among Neo-Nazis, leading to its near extinction.	677KF (https://www.catalogueoflife.org/data/taxon/677KF)

 doi:10.20944/preprints202407.1673.v1

Uta stansburiana	The lizard named after Howard Stansbury, known for his involvement in the massacre of Timpanogos Native Americans.	7F3TX (https://www.catalogueoflife.org/data/taxon/7F3TX)
Rhynchophanes mccownii	A bird that lives in the Great Plains and named after John Porter McCown, who was involved in forcible relocations of Native Americans during the 1840s, and who left the United States Army to serve as a Confederate general during the Civil War.	4SS3Y (https://www.catalogueoflife.org/data/taxon/4SS3Y)
African vertebrates eponyms are mostly white males	From the African vertebrates currently listed on the IUCN Red List which makes about 1,565 species—about 24% of birds, reptiles, amphibians, and mammals—are named after white, male Europeans from the 19th and 20th centuries [5].	
Agathis australis	Giant conifers changed to *Agathis australis* while New Zealand's Indigenous Māori have called them "kauri" for centuries. the colonial legacy of renaming everything that already had names— names embodying Indigenous knowledge and important for their sense of place and belonging	5TQT6 (https://www.catalogueoflife.org/data/taxon/5TQT6)

Conclusion and Recommendations

The push for nomenclatural justice is not just emotional; it recognizes the ethical responsibility of science to reflect modern values. Science does not exist in a vacuum and should not perpetuate historical injustices. Scientific names are part of a broader cultural and historical context, and ignoring their social implications is a political stance that paints the field of taxonomy in a bad light. Incorporating social justice into scientific practices enriches science by ensuring it serves all members of society fairly and equitably. The wide dissemination of papers advocating for nomenclatural justice highlights its relevance and importance. The limited visibility of opposing views in specialized journals does not undermine the legitimacy of the push for change; it underscores the need for these discussions to reach a broader audience.

 doi:10.20944/preprints202407.1673.v1

As a general way forward, we believe that binomial nomenclature can benefit from the following recommendations, which we would like to bring to the attention of the executive nomenclature committees across various fields:

1) Implement and utilize digital globally unique persistent identifiers for each taxon to manage name changes effectively and enhance scientific communication. Promote the use of digital persistent identifiers instead of nomenclatural scientific names as the primary identifier for a taxon so that the identifiers won't change with names. Additionally, incorporate this technology into taxonomic curricula to raise awareness and encourage its adoption. This can be easily achieved by consistently promoting and relying on the existing digital persistent identifiers from the Catalogue of Life (COL), for example. The international code of nomenclature bodies for the different fields can either establish a central initiative to issue persistent identifiers or collaborate with COL to centralize the governance of issuing persistent identifiers.

2) Avoid eponyms and focus on descriptive features: Future naming conventions should avoid using names of individuals, ethnic groups, or even places to prevent potential ethical issues. Scientific names should be based on diagnostic morphological, physiological, anatomical, behavioral characteristics or some attributes of the species rather than potentially controversial references or eponyms which have nothing to do with the species. This is also highlighted in earlier studies [7,10].

3) Due to the lack of justification for keeping names with ethical issues, international code of nomenclature bodies for various taxa should take prompt and concrete steps to revise taxonomic names with ethical concerns. This would address grievances, ongoing allegations, and debates.

4) We also recommend implementing guidelines and procedures to assist bringing an end to the scientific names with ethical issues. Additionally, mechanisms should be established to check for such problems before endorsing new scientific names.

References

1. Godfray, H. C. J., Knapp, S. & Mace, G. M. The role of taxonomy in species conservation. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences* **359**, 711-719 (2004). https://doi.org/doi:10.1098/rstb.2003.1454
2. Hammer, T. A. & Thiele, K. R. (119–122) Proposals to amend Articles 51 and 56 and Division III, to allow the rejection of culturally offensive and inappropriate names. *TAXON* **70**, 1392-1394 (2021). https://doi.org/https://doi.org/10.1002/tax.12620
3. Trisos, C. H., Auerbach, J. & Katti, M. Decoloniality and anti-oppressive practices for a more ethical ecology. *Nature Ecology & Evolution* **5**, 1205-1212 (2021). https://doi.org/10.1038/s41559-021-01460-w
4. Mabele, M. B., Kiwango, W. A. & Mwanyoka, I. Disrupting the epistemic empire is necessary for a decolonial ecology. *Nature Ecology & Evolution* **7**, 1163-1163 (2023). https://doi.org/10.1038/s41559-023-02105-w
5. Guedes, P. *et al.* Eponyms have no place in 21st-century biological nomenclature. *Nature Ecology & Evolution* **7**, 1157-1160 (2023). https://doi.org/10.1038/s41559-023-02022-y
6. Jiménez-Mejías, P. *et al.* Protecting stable biological nomenclatural systems enables universal communication: A collective international appeal. *BioScience* (2024). https://doi.org/10.1093/biosci/biae043
7. Poulin, R., McDougall, C. & Presswell, B. What's in a name? Taxonomic and gender biases in the etymology of new species names. *Proceedings of the Royal Society B: Biological Sciences* **289**, 20212708 (2022). https://doi.org/doi:10.1098/rspb.2021.2708
8. Antonelli, A. *et al.* People-inspired names remain valuable. *Nature Ecology & Evolution* **7**, 1161-1162 (2023). https://doi.org/10.1038/s41559-023-02108-7
9. Smith, G. F. & Figueiredo, E. "Rhodes-" must fall: Some of the consequences of colonialism for botany and plant nomenclature. *TAXON* **71**, 1-5 (2022). https://doi.org/https://doi.org/10.1002/tax.12598
10. Roksandic, M. *et al.* Change in biological nomenclature is overdue and possible. *Nature Ecology & Evolution* **7**, 1166-1167 (2023). https://doi.org/10.1038/s41559-023-02104-x
11. Cheng, S. J. *et al.* Championing inclusive terminology in ecology and evolution. *Trends in Ecology & Evolution* **38**, 381-384 (2023). https://doi.org/https://doi.org/10.1016/j.tree.2022.12.011

12. Smith, G. F. & Figueiredo, E. (126) Proposal to add a new Article 61.6 to permanently and retroactively eliminate epithets with the root caf[e]r- or caff[e]r- from the nomenclature of algae, fungi and plants. *TAXON* **70**, 1395-1396 (2021). https://doi.org/https://doi.org/10.1002/tax.12622
13. Tracy, B. H. What's in a Fish Species Name and When to Change It? *Fisheries* **47**, 337-345 (2022). https://doi.org/https://doi.org/10.1002/fsh.10750
14. Kean, S. Science's debt to the slave trade. *Science* **364**, 16-20 (2019). https://doi.org/doi:10.1126/science.364.6435.16
15. Ceríaco, L. M. P. *et al.* Renaming taxa on ethical grounds threatens nomenclatural stability and scientific communication: Communication from the International Commission on Zoological Nomenclature. *Zoological Journal of the Linnean Society* **197**, 283-286 (2023). https://doi.org/10.1093/zoolinnean/zlac107
16. Callaway, E. Many plant names are offensive., botanists will vote on whether to change them. *Nature News* (2024). https://doi.org/https://doi.org/10.1038/d41586-024-02337-1
17. Patterson, D., Mozzherin, D., Shorthouse, D. P. & Thessen, A. Challenges with using names to link digital biodiversity information. *Biodiversity Data Journal* **4** (2016). https://doi.org/10.3897/BDJ.4.e8080
18. Remsen, D. The use and limits of scientific names in biological informatics. *ZooKeys* **550** (2016). https://doi.org/10.3897/zookeys.550.9546
19. Page, R. Ten years and a million links: building a global taxonomic library connecting persistent identifiers for names, publications and people. *Biodiversity Data Journal* **11** (2023). https://doi.org/10.3897/BDJ.11.e107914
20. Haak, L. L., Fenner, M., Paglione, L., Pentz, E. & Ratner, H. ORCID: a system to uniquely identify researchers. *Learned Publishing* **25**, 259-264 (2012). https://doi.org/https://doi.org/10.1087/20120404
21. Jones, A. C., White, R. J. & Orme, E. R. Identifying and relating biological concepts in the Catalogue of Life. *Journal of Biomedical Semantics* **2**, 7 (2011). https://doi.org/10.1186/2041-1480-2-7
22. GBIF Backbone Taxonomy. Checklist dataset (2023).
23. Lien, A. M. *et al.* Widespread support for a global species list with a formal governance system. *Proceedings of the National Academy of Sciences* **120**, e2306899120 (2023). https://doi.org/10.1073/pnas.2306899120
24. Laurenne, N., Tuominen, J., Saarenmaa, H. & Hyvönen, E. Making species checklists understandable to machines – a shift from relational databases to ontologies. *Journal of Biomedical Semantics* **5**, 40 (2014). https://doi.org/10.1186/2041-1480-5-40
25. de Koning, K. *et al.* Digital twins: dynamic model-data fusion for ecology. *Trends in Ecology & Evolution* **38**, 916-926 (2023). https://doi.org/10.1016/j.tree.2023.04.010
26. Trantas, A., Plug, R., Pileggi, P. & Lazovik, E. Digital twin challenges in biodiversity modelling. *Ecological Informatics* **78**, 102357 (2023). https://doi.org/https://doi.org/10.1016/j.ecoinf.2023.102357
27. Ovaskainen, O. *et al.* Prototype Biodiversity Digital Twin: Real-time bird monitoring with citizen-science data. *Research Ideas and Outcomes* **10** (2024). https://doi.org/10.3897/rio.10.e125523
28. Khan, T. *et al.* Prototype Biodiversity Digital Twin: Invasive Alien Species. *Research Ideas and Outcomes* **10** (2024). https://doi.org/10.3897/rio.10.e124579
29. Groeneveld, J. *et al.* Prototype Biodiversity Digital Twin: honey bees in agricultural landscapes. *Research Ideas and Outcomes* **10** (2024). https://doi.org/10.3897/rio.10.e125167
30. Chala, D. *et al.* Prototype biodiversity digital twin: crop wild relatives genetic resources for food security. *Research Ideas and Outcomes* **10** (2024). https://doi.org/10.3897/rio.10.e125192
31. Wiemers, M. *et al.* An updated checklist of the European Butterflies (Lepidoptera, Papilionoidea). *ZooKeys* **811** (2018). https://doi.org/10.3897/zookeys.811.28712
32. Costello, M. J., May, R. M. & Stork, N. E. Can We Name Earth's Species Before They Go Extinct? *Science* **339**, 413-416 (2013). https://doi.org/doi:10.1126/science.1230318
33. Alverson, A. J. Molecular Systematics and the Diatom Species. *Protist* **159**, 339-353 (2008). https://doi.org/https://doi.org/10.1016/j.protis.2008.04.001
34. van Nieukerken, E. J. *et al.* Stability in Lepidoptera names is not served by reversal to gender agreement: a response to Wiemers et al. (2018). *Nota Lepidopterologica* **42** (2019). https://doi.org/10.3897/nl.42.34187