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# The "Kaiserian shortfall", fishes, and the regulation of taxonomy by the *Code*

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## Abstract

Since 2013, there has been a heated debate over bad practices in zoological nomenclature and taxonomy (which have been called 'taxonomic vandalism') and what to do about them. Mostly, the critics have been calling 'vandals' those who propose new names based on the appropriation of results generated by other researchers. Some herpetologists have suggested establishing new 'aspidonyms' to replace nomina proposed in such circumstances, thus ignoring Article 23 of the *Code*, which establishes the principle of priority in zoological nomenclature. In turn, the Commission has decided against their request to suppress names proposed by 'taxonomic vandals', so the problem remains unsolved. Even though plagiarism and other similar, unethical behaviours are deplorable, I call attention to another phenomenon that is detrimental to nomenclature, i.e., the proposition of new nomina whose application is dubious due to poorly constructed diagnoses and other shortcomings that are mainly a result of insufficient peer review. Since the beginning of the 21st century, dozens of Neotropical fish species have been described in substandard works. The fact that a proportion of the taxa that have been named lacks a workable diagnosis, while many of their names were proposed in unscientific or unethical circumstances and are rejected by those adhering to scientific principles, is herein referred to as 'Kaiserian shortfall' in honour of the herpetologist that has been leading the struggle against taxonomic vandalism. My approach to fighting against the Kaiserian shortfall includes changes to the *Code*, which in my view should regulate taxonomy as well as nomenclature. I suggest that: [1] only online papers be regarded as published work, observing Article 8.5; [2] only journals included in a list compiled by a consortium of scientific societies and approved by the Commission be suitable for the publication of nomenclatural acts; [3] a published work, in the sense of the *Code*, must include an exhaustive diagnosis for each taxon described or redescribed; and [4] only works issued in English can be regarded as published.

## Keywords

Diagnosis, ichthyology, Neotropical, peer review, taxonomic vandalism.

## Introduction

"One species, one name" is the motto of biological nomenclature, a global initiative to ensure taxon names remain standardized, unique, universal and intelligible. By proposing a new taxon nomen, a scientific name for an array of animals, zootaxonomists not only submit work for scrutiny by our discipline but also, potentially, to the ruling of the single institution that accounts for and adjudicates nomina: the International Commission on Zoological Nomenclature (the Commission). Successive generations of Commissioners have created iterations of the *International Code of Zoological Nomenclature* (the *Code*), currently in its fourth edition (Anonymous 1999), and through this document, a kind of social contract among taxonomists with no legal enforcement, the Commission regulates what happens to animal nomina once they have been proposed via the science of taxonomy.

Among the *Code*'s 90 Articles are those that allow taxonomists to determine what constitutes a published work, what criteria have to be fulfilled to make a nomen available for the purposes of zoological nomenclature, and what factors determine which of two nomina attributed to the same taxon may have precedence, what a type series is, or how to correctly form a taxon name. The *Code* also provides a series of non-mandatory Recommendations, with diverse advice, including which information about a holotype should be included in an original description or what the responsibilities of authors, editors, and publishers are in the production of taxon names. None of the *Code*'s provisions are science, and the *Code* amounts to an accounting system (Kaiser 2013).

Overall, the creators of the *Code* seemed to embrace the idea that a community of equals in science could manage the affairs of taxonomic science without much interference of a governing body, and only a series of 'pointers' in the form of articles were needed. If, by coincidence, two nomina happen to be proposed for the same taxon with a one-month lag, discussing the rightful nomen of that taxon is pointless: the oldest prevails. If a new nomen is proposed but subsequently is discovered to be a junior homonym of another nomen, the older nomen is not supressed in favour of the more recent: in those cases, a new replacement name is proposed. Personal preferences for this or that nomen are precluded by the *Code*, which seeks to regulate nomenclature as objectively as possible.

What, then, are the issues taxonomists have been clashing with during the last three centuries that are unlikely to be solved spontaneously? It is not just the Linnean shortfall (Brown & Lomolino, 1998)—the fact that many species remain to be named—, for that is the main reason why taxonomists still have work to do. No, what really troubles taxonomists are species taxa that, despite being named and described, are of uncertain identity. Such cases lie at the intersection between the realm of taxon delimitation, which is unregulated; and the realm of taxon naming, which is regulated by the *Code*. Because the *Code* abstains from demanding that works proposing nomenclatural changes meet certain standards, the association between some nomina and the biological entities they should represent becomes weakened.

While species with dubious identity may have been briefly described, they may be known only from [1] an already decayed holotype that no longer can be satisfactorily compared with recent material (for example, the fish *Chalceus fasciatus* Cuvier, 1819; Melo, 2005); or [2] an illustration of the holotype that may not be considered as a sufficient and reliable source of information (for example, the fish *Curimatus acutidens* Valenciennes, 1837, a nomen made available only from a drawing). More rarely, no type-related material remains extant, and a redescription based on topotypes may even be impossible if the determination of a type locality fails (for example, the fish *Tetragonopterus astictus* Ulrey, 1894; Fricke *et al*., 2025). Thus, the application of such species names to known populations is problematic and, with time, their usage either ceases or grows inconsistent. Until now, we have discussed uncertainties regarding species described in the dawn of taxonomic studies. Does that mean the problem remains in the past, though?

## A recalcitrant thorn in our flesh

Nowadays, a fair number of recently proposed taxon names may be fated to a similar destiny as the aforementioned species, because poor taxonomy is acceptable under the *Code*, which, as said above, governs the nomina but not the science behind their creation. Estimating the number of *nomina dubia* being established in the present is quite difficult. Certainly, very few authors are responsible for making such names available, but some of them are prolific. DoNascimiento & Prada-Pedreros (2020) commented on several dubious fish names proposed by Carlos Ardila, who since 1994 has published 100 species descriptions, mostly in self-published papers (Fricke *et al*. 2025*a*). From 2006 to 2024, Ardila was responsible for 93 of the 4,774 new freshwater fish species described globally in the period (Fricke*et al.* 2025*b*). That is 2 % of all freshwater species being described by a single author using questionable science—an author who proposes almost five species names a year, a rate far larger than that of most other authors (see the worksheet *Authors' Count of Species/Subspecies Descriptions*, available at the *Catalog of Fishes* website).

Other authors have published papers on the taxonomy of Neotropical fishes where the peer-review process fell woefully short, as recognized by the many inconsistencies that would have been easily detected by expert reviewers. Román-Valencia (2003) described a new species with the following diagnosis: "*Bryconamericus carlosi* is readily distinguished from its congener [*sic*] by its low number of vertebrae (33), having a completely ossified pterotic and the end of the pelvic bone bent, and its lack of a nasal bones [*sic*]". On page 478, he stated: "Observations of cartilage and bone were made on one cleared and counterstained specimen". In addition to basing the whole diagnosis on the osteological analysis of a single individual, he did not list any comparative material from close species on which he could have observed osteological characters. No expert reviewer would accept that paper for that reason alone.

For those who are not acquainted with fish anatomy, it is very unlikely that *Bryconamericus carlosi* really lacks a nasal bone. Most likely, this structure—which lies on the surface of the head and is weakly attached to the skull—was lost during clearing and staining. So, in sum, Román-Valencia did not seem to know how many vertebrae the congeners of *Bryconamericus carlosi* have; or whether their pterotic is completely ossified; or whether their pelvic bone is bent; or whether they have a nasal bone. Indeed, he could not possibly know whether specimens of *B. carlosi*, other than the single cleared and stained one, have those character states. Still, he thought he had enough evidence to propose a new taxon.

Give César what's César's: instead of self-publishing like Ardila, at the very least César Román submitted that paper to a proper journal, the *Bollettino del Museo Regionale di Scienze Naturali*, from Torino, Italy. Still, that journal has published only three papers on fish taxonomy to date—two of which by César Román—and that is no surprise, since the journal evidently is a regional outlet. Being such, the journal is not prepared to process papers on Neotropical fish taxonomy, because its editorial board will not be able to find the best reviewers nor to decide whether the article is ready for publication or not. Journals like that have been used very frequently by César Román to publish his research, apparently to avoid their review by proper experts. Consequently, he already has published 82 fish species descriptions (Fricke *et al*. 2025*a*), many of which with important flaws. Elsewhere in the world of fish taxonomy this practice might be less common, but it is undeniable that some groups of Neotropical fish are heavily plagued with poor taxonomy.

One would assume that in the 21st century taxonomists have learnt that nomenclatural acts must be supported by a minimum quantity of reliable data; that adequately constructed diagnoses are a *sine qua non* condition for proposing new taxa; and that publication should present a sufficient amount of knowledge so that any interested researcher may learn how to recognise the taxa described therein. Then why do taxonomists still struggle to understand the identities of so many recently described

species, and why do they routinely and repeatedly must re-examine specimens already examined by other researchers, a task that consumes their limited time and funding to fix others' mistakes and omissions? More importantly, as the body that already determines nomenclatural rules, can the Commission not assist in promoting a qualitative improvement in taxonomy, since substandard taxonomy feeds problematic nomina into nomenclature?

## Cutting vandalism off at the root

The oversight in taxonomic science is traditionally provided by the process of peer review. When self-lenience threatens the quality of one's work, there is nothing better than someone else's learned opinion to identify and correct existing flaws. Yet, as pointed out by DoNascimiento & Prada-Pedreros (2020: 13), "Unfortunately, a peer review process for the publication of taxonomic descriptions is not a prerequisite of a published work in the sense of the *Code*". In fact, it can be argued that not all reviewers and editors are equally thorough or qualified to judge taxonomic work. But first, let me examine briefly what the *Code* does require.

To begin, what constitutes published work? Well, almost anything. No, not a handwritten napkin. But a few copies spit from a household printer and distributed to a bunch of local libraries? Depending on how Articles 8.1 and 8.4 are read, yes (e.g., Kaiser 2014). The rules conveyed therein are so loosely stated that either they are too easy to comply with (Article 8.4), or it is too difficult to disprove their observance (Article 8.1). Worse yet, some excerpts are subject to wild interpretation, for instance: "issued for the purpose of providing a public and permanent scientific record" (Article 8.1.1). The question is, what do 'public', 'permanent', and even 'scientific', mean in this context?

## Publicness and permanence

As mentioned at the beginning of the article, biological nomenclature is a global initiative. In the 21st century, there is no excuse to consider anything as "public"—at a global level—unless it is online. A Dutch taxonomist might be interested in studying Brazilian species, a Paraguayan taxonomist may want to work with the Australian fauna, and so forth. However, if the literature pertinent to those subjects is available only in a few libraries in a handful of different countries, is it not less public than it would be on the internet? That is why I believe printed material produced in our day and age should not be regarded as published works, but merely as their physical copies.

For millennia, humanity has been preserving knowledge in the form of handwritten or printed documents. Libraries have long been trusted not only with the task of safeguarding them, but also of cataloguing and organizing them so that users can find the information they need. Even though many books printed before the invention of digital media have later been digitalized and made available online, many still are available only as physical copies. Despite initiatives like the Biodiversity Heritage Library, this also includes old taxonomic works. Many taxonomists are likely to have an emotional attachment to books and paper, and to experience satisfaction when handling original copies of a classic paper published decades ago. All those factors concur to make some taxonomists less prone to accept the proposition that only digital articles be considered as published in the sense of the *Code*.

On the other hand, the role of traditional libraries has been shifting sensibly in the last decades. Visiting libraries could be the only way a researcher could obtain access to most volumes in the past. Books also used to be given a greater importance than they are given nowadays, when researchers are rewarded for publishing articles more than for publishing books. Although articles are given the

greater importance nowadays, keeping journal subscriptions may not be a good deal for libraries, since access to papers via the internet may be facilitated in several ways and the physical space of most libraries is not growing at the same pace as the exponentially expanding scientific literature. Unfortunately, libraries, as well as museums and collections, are being forced to prove their worth as administrators search for ways of making them more 'efficient'.

Hard disks, in turn, can store works published in digital format by the millions with negligible use of physical space. At least in terms of keeping record of all taxonomic papers published in our era, the computer has more advantages than the traditional libraries. Universities throughout the world may create digital archives to help preserve the works that are relevant for zoological nomenclature, so that every one of them will exist in multiple copies. Housing them is one of the possible missions of a library of the 21st century. Preservation in the long term is not a real challenge for digital archives, as losing all the data to cyber-attacks or by the physical destruction of the hard disks that keep record of taxonomic works seems to be a very unlikely prospect. Because some journals, such as *Neotropical Ichthyology*, no longer exist in printed format, traditional libraries also cannot store original copies of their articles any longer. Altogether, continuing to hold printed material as published for nomenclatural purposes has doubtful advantages and has the shortcoming of allowing journals with restricted distribution to produce available nomina.

If we are to limit published works to online material, as I advocate here, there must be means of assuring that unchanged copies of original descriptions are going to be preserved in online archives. That is determined in Article 8.5.3.1, although I think electronic papers should obligatorily be stored in several different archives, instead of the minimum of one. However, if we continue to hold printed material as published work, there must be criteria that specify what constitutes a permanent record. Clearly, permanence is directly proportional to the number of copies and to the number of libraries that secure those copies, as well as the solidity of those institutions. Article 8.1.1, in its present form, only demands that the publishers have the 'purpose' of providing a permanent record, not that they take specific actions in that sense.

Publicity is a broad concept. Even though I am aware this is controversial subject, I would go as far as to say that every taxonomic work should be published in English, although the publication of translated versions should be encouraged. This statement might sound biased, but in reality, it is quite the opposite. Like it or not, English is the most widely known language in the world. That many people have a hard time reading in English is a fact, but imagine having to read in several different languages! Botanists dealt with this problem by requiring, in their nomenclatural code, that new names proposed before 2012 be accompanied by a diagnosis or description in Latin and, after 2011, in Latin or English (Article 39 in Turland *et al*. 2018).

Some will argue that knowing several languages is part of the job description. After all, establishing English as the official language of zootaxonomy from now on does not change the fact that many works published in the past were written in French, German, Portuguese, Russian, Spanish, Latin, Japanese, etc. Because the nomina proposed in those works will remain available, the inescapability of reading them will linger. Learning languages, therefore, is a must, they will say; and it is no different from learning how to recognize species or any other skill in the repertoire of a proper taxonomist. Knowledge is knowledge, right? Unfortunately, this belief may not survive being confronted with the reality of some countries.

Brazil, for example, has many competent taxonomists, but a relatively small part of the population has a reasonable knowledge of English. Unfortunately, not all people pursuing high academic degrees are among those who have mastered the language, which stems from the fact that few Brazilian schools have serious bilingual education, so that proficiency in a second language most often is achieved during early adulthood, if ever. Other European languages commonly used in descriptions of Neotropical taxa in the past or in recent times (mainly German, French and Latin) are studied

by a much smaller part of post-graduate students. Reasons for that are both economic and cultural, since language courses are expensive and the scope of usefulness of those languages is very limited as compared with the advantages of multilingualism in Europe, for example. Expecting that every taxonomist can understand four or more languages sounds a little elitist.

As automatic translators become more and more efficient, many will argue that English as a *lingua franca* has become obsolete. Especially with the advent of artificial intelligence, many believe those translations have become flawless or nearly so, but that must be seen with caution. Words may have different meanings in different contexts. People who are proficient in one language can recognize translation errors resulting from that semantic multiplicity, but other people may inadvertently propagate mistakes due to those shortcomings inherent to imperfect technologies. Moreover, if automatic translators are all that good, why not use them to translate to English manuscripts originally written in other languages prior to publication? If the English version of a text is deemed comprehensible by the editors, then it can be considered fit for being disseminated to a larger audience.

## Peer review, scientific journals and the ruling of taxonomy

Finally, Article 8.1.1 suggests that published works should be scientific. This statement seems so obvious that its importance is easy to neglect. Scienze in general seeks the better explanation for a phenomenon by proposing and testing hypotheses. In taxonomy, the hypothesis that an array of individuals belongs to the same species—in general lines, that they share recent ancestors and are likely to share descendants—is implicit in the act of assigning one scientific binomen to that array. However, such a hypothesis is not clearly stated unless it includes a diagnosis, which is equivalent to a prediction that all specimens that happen to have a certain combination of character states will be members of a given species. A clearly stated, truly scientific diagnosis can be contested if new evidence contradicts it, leading to the proposition of new hypotheses that better suit the available data. A similar reasoning governs the proposition of supraspecific taxa.

Even though contesting the findings of another author by proposing new synonymies or by resurrecting a species is part of what taxonomists normally do, we do not expect that these actions be taken too often, which would make classification excessively unstable. We do expect that original descriptions be increasingly meticulous in providing comparisons with previously described taxa. Otherwise, a great deal of what us taxonomists do would consist in revisiting previous studies, which is expensive and delays scientific progress. Thus, a taxonomic work is not scientific unless it contains a clearly stated hypothesis that can be tested by other researchers.

Moreover, peer review is a fundamental part of nowadays science, and it is particularly important in taxonomy. Because nomina are permanent, we must make sure to propose them only when there is strong evidence that they are needed, and other researchers can verify the evidence. In my experience, articles published in respected journals occasionally contain flawed diagnoses, but those are by far more common in self-published papers and in those published in minor journals with doubtful peer review. (I have submitted two other papers to *Bionomina* dealing with the shortcomings of works by Carlos Ardila and César Román-Valencia, in which I give evidence to support that claim). That is why I think peer review is another condition without which a taxonomic paper is not scientific.

I cannot escape the feeling that taxonomists have long allowed the status of professional scientific publications before the *Code* to be equalled with that of amateur ones. When dealing with a quite intricate nomenclatural issue about a generic name and its available and unavailable synonyms, Kullander (2011) expressed that sentiment as follows: “Hobby publications are non-scientific literature. It is thus entirely questionable why we are discussing or using names dropped in hobby literature and written in an informal style”. Notably, in the entire paper Kullander did not deal with a

single taxonomic problem. Instead, he inventoried obscure aquarium literature, as a librarian would; translated passages from several languages, as a linguist; and interpreted dubious rules, as a jurist, all with the purpose of solving a problem that should never have come to be.

Schleip (2014) upheld that "Nowadays, determining whether works are to be considered published in the meaning of the *Code* is a simple and clear-cut 'yes' or 'no' decision on the question of if they were deliberately '... issued for the purpose of providing a public and permanent scientific record' ". I wish it was that simple, but the only people who can tell the purpose of a publication are the author and the publisher. Clearly, people may get hurt when their work is deemed non-scientific. Still, their work can keep taxonomists chasing windmills when names proposed by non-scientists become a problem to scientists. The *Code* remains aloof from such issues because it governs only nomenclature. I think this should change. As it seems to me, the spirit of Article 8.1.1 is to prevent the escalation of taxonomic instability; however, that is one possible reading of it. If my understanding of publicness, permanence and scientificness are to be regarded as correct, it follows that novel, unambiguous conditions should be determined, upon which a work is to be considered as published—including rules on how to make taxonomy.

That is not to advocate retroactive 'unpublication' of all works not complying with such conditions, for that would decimate taxonomic literature. In fact, the idea is that those rules apply mainly to material produced after a hypothetical amendment of the *Code*, and occasionally to material produced beforehand. For example, although the *Code* presently does not reject the nomina proposed in the self-published papers criticized by DoNascimiento & Prada-Pedreros (2020) and by Kaiser *et al*. (2013; see below), with the amendments proposed herein the publications in which they appear could be considered inexistent for nomenclatural purposes, given the evidence that they are detrimental to nomenclatural stability.

Another point that needs to be clarified is that my suggested amendments are not intended to determine whether, for example, we should adopt a lumper or a splitter approach; whether our classification systems should accept paraphyletic species; or whether species should be diagnosed with the aid of molecular data. Nomenclatural acts must be based on sound evidence, but whenever there is room for different interpretations of the data, it is up to the authors to defend their decisions to propose changes to the classification or not.

## Change is the only constant

Now, what amendments does the *Code* need, if any? Above all, I think the Commission should be empowered to approve lists of suitable scientific journals in each field of zootaxonomy. The international taxonomic community must recognise those periodicals as having an experienced editorial board, effective peer review, and guidelines for manuscript composition in accordance with the *Code*. In turn, the requirements for considering a paper as published should include a diagnosis in which new and redescribed species are diagnosed in pairwise comparisons with each other species belonging to the lowest diagnosable named group above the species being diagnosed (be it a family, subfamily, tribe, genus, subgenus, species group, etc.). Self-published articles, which do not undergo peer review supervised by authorised editors, would no longer constitute published work.

At this point, some might feel overwhelmed by the magnitude of the task of creating and maintaining such bureaucracy without creating more problems. Questions may be raised, such as how to warrant fairness and impartiality of judgement and who is to compile those lists. Yet, I do not think the obstacles are too great. Prokaryote systematists have chosen a single journal in which new names must be published to be considered available (Rule 27 in Parker *et al*. 2019). Zoosystematists can find their own way as well. If the power of the Commission emanates from international associations of

biologists, the prerogative of deciding which journals are suitable belongs to associations of zoologists specialised in each taxonomic group. In the case of Neotropical fishes, for instance, most experts are associated with the Sociedade Brasileira de Ictiologia (SBI), the American Society of Ichthyologists and Herpetologists (ASIH), or with other societies in South America or other continents. Therefore, those associations have the competency to call a council and deliberate on that matter.

The regrettable practice that elicited this paper, now commonly referred to as taxonomic vandalism, seems to be growing in Neotropical fish taxonomy. However, the large number of occurrences in herpetology since year 2000 led Kaiser *et al*. (2013) to champion the boycott of non-scientific names in this field. The main idea was to avoid the usage of names proposed in unscientific publications, and to replace them with new names proposed in scientifically sound papers (aspidonyms; Wüster *et al.* 2021). After ten years of this practice, they requested that the Commission use its Plenary Power (Article 81) to reject the offending nomina, albeit based on a rather heterodox interpretation of Article 23.9.1.2 (Kaiser *et al*. 2013: 20). As demonstrated by Wüster *et al.* (2021), the acceptance of this strategy among herpetologists has been overwhelming. Thus, despite their interpretation of the *Code* is controversial, the community has spoken, and its voice is clear.

Following the Commission's decision (Case 3601, Opinion 2468; Anonymous 2021) to not use its Plenary Power to suppress issues of the *Australasian Journal of Herpetology* nor to take Appendix A of the *Code* (Code of Ethics) into account in its ruling, Dubois (2025) stated his disapproval as follows: "The invalidation of Hoser's nomina under the Plenary Power has become a pragmatic necessity to put an end to a highly deleterious nomenclatural conflict, in order for it not to continue indefinitely, and to avoid the multiplication of such problems [e.g., the existence of two or more parallel classification proposals: one with names that are deemed unscientific by some; and another with aspidonyms that are deemed junior synonyms by others] concerning other works that some authors 'dislike' for various reasons". Dubois's (2025) editorial also called for papers dealing with several aspects of nomenclature, of which the present opinion paper is most concerned with criteria of availability, community self-organization, nomenclatural boycott or veto, and how those subjects relate to nomenclatural stability and intelligibility.

The opinions I express here converge with those of Kaiser *et al*. (2013) in several points, such as the need for peer review and for providing lists of boycotted names (for fishes, the latter could be provided by the *Catalog of Fishes*). However, I do not think we should let taxonomic vandals continue to aggravate what I call here the 'Kaiserian shortfall', i.e., the fact that a proportion of the taxa that have been named lacks a workable diagnosis, while many of their names were proposed in unscientific or unethical circumstances and are rejected by those adhering to scientific principles. To prevent this from happening, I think Article 8 must be amended, avoiding different interpretations about what constitutes published work. Otherwise, unscientific names will just pile up to the point that taxonomists will be relegated to the role of revising the vandals' misdeeds, while the Commission will spend most of its time ruling on cases concerning aspidonyms.

In summary, my suggestions (Appendix 1) are that: [1] only online papers be regarded as published work, observing Article 8.5; [2] only journals included in a list compiled by a consortium of scientific societies and approved by the Commission be suitable for the publication of nomenclatural acts; [3] a published work, in the sense of the *Code*, must include an exhaustive diagnosis for each taxon described or redescribed; and [4] only works issued in English can be regarded as published.

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## Appendix 1. Proposed amendments to the *Code*

Below I suggest amendments to the *Code*. New Articles could be established to include some of these provisions, although this would implicate major changes in the *Code*'s structure. Therefore, I spread my suggestions over extant Articles. Among them, Article 8 is the only one that I think should be largely rewritten, and that is the reason why I reproduce it in full. Excerpts that should be rejected are strikethrough and preceded by '[amended]', while my insertions are preceded by '[amendment]', as in the Commission's website. As for Articles 13 and 16, I suggested few insertions and replacements, whose positions in the respective Articles can be determined by their numbering. In my insertions, [year] refers to the hypothetical year in which the provisions will begin to be in force, while [year −1] refers to the year immediately before.

Suggestions that need further comment are the following. Accepting only holotypes as name-bearing types (Article 16.4.1) is necessary to better delimit a species because, when syntypes and hapantotypes are designated as name-bearing entities, there is the possibility that they include specimens that belong to what will later be recognized as separate taxa. When that happens, fixing a lectotype would be essential to restrict the species name to a single taxon. Fixing a holotype in the original description avoids the problem from the start. In turn, depositing the holotype in an approved collection (Article 16.5) guarantees that name-bearing specimens are accessible to any researcher who wants to reanalyse them. By making lists of approved collections, we would not only avoid the problem of having holotypes deposited in private collections of difficult access, but also in any collection not expected to outlast the time span during which the current curators will be caring for it. So, collections would have to exist for some time before they were deemed able to last long enough to house holotypes.

I am aware that these and several other suggestions made herein lack detail in their present form. For example, if only papers published in journals approved by the Commission are to be considered as available works (Article 8.1.2), how will we guarantee that the lists of approved journals are unbiased, i.e., that they are not excluding important taxonomic viewpoints? How are the fields of zootaxonomy (Article 8.1.2.1.2) going to be delimited? Or how to define what is an adequate illustration of the holotype (Article 16.6)? Detailing all those rules is something that must be done after those subjects are debated thoroughly in the literature, i.e., if the changes proposed herein are deemed relevant by the community. I want to emphasise that the spirit of all amendments proposed herein is to make each paper establishing nomenclatural acts a contribution to the advancement of taxonomy, i.e., a contribution to the fight against the Kaiserian shortfall.

## Article 8. What constitutes published work

A work is to be regarded as published for the purposes of zoological nomenclature if it complies with the requirements of this Article and is not excluded by the provisions of Article 9.

## 8.1. Criteria to be met

[amended]

~~A work must satisfy the following criteria:~~

~~8.1.1. it must be issued for the purpose of providing a public and permanent scientific record,~~

~~8.1.2. it must be obtainable, when first issued, free of charge or by purchase, and~~

~~8.1.3. it must have been produced in an edition containing simultaneously obtainable copies by a method that assures~~

~~8.1.3.1. numerous identical and durable copies (see Article 8.4), or~~

~~8.1.3.2. widely accessible electronic copies with fixed content and layout.~~

[amendment]
8.1.1. A work published before [year] must satisfy the following criteria:
8.1.1.1. it must have been issued for the purpose of being publicly accessible, i.e., obtainable by the scientific community at the time of publication, free of charge or by purchase,
8.1.1.2. it must have been produced in an edition containing simultaneously obtainable copies by a method that assures
8.1.1.2.1. numerous identical and durable copies (see Article 8.4), or
8.1.1.2.2. widely accessible electronic copies with fixed content and layout.
8.1.2. A work published after [year −1] must be issued online, in PDF format, in a peer-reviewed scientific journal listed in the *Official List of Approved Journals*.
8.1.2.1. The Commission will empower zoological associations to select peer-reviewed journals suitable for publication of nomenclatural acts to be added to the *Official List of Approved Journals*
8.1.2.1.1. An *Official List of Zoological Consortia* with the power to select and list suitable journals will be published at the Commission's website.
8.1.2.1.2. Each field of zootaxonomy (e.g., herpetology, ichthyology, malacology etc.) will be represented by a consortium of scientific associations representing a democratic assortment of zoologists from various geographic regions.
8.1.2.1.3. Each consortium will deliberate about the merits of candidate journals and decide by vote which of them are suitable for publishing papers containing new nomenclatural acts and scientific names.
8.1.2.1.4. The Commission will designate itself to represent a given field of zootaxonomy in the absence of suitable consortia.
8.1.2.1.5. To be considered suitable for publication of new nomenclatural acts and names, journals must, in addition to submitting articles to a thorough peer-review,
8.1.2.1.5.1. observe the provisions of the *Code*, especially those concerning the criteria of availability,
8.1.2.1.5.2. have an online version, and
8.1.2.1.5.3. be issued in English, although the contents or parts thereof may be translated to other languages, given that all the information is provided in English as well.
8.1.2.2. The Commission will publish the *Official List of Approved Journals* in an open-access online source.
8.1.2.3. Under plenary power, the Commission may decide to apply the provisions of Article 8.1.2 retroactively to articles published before [year], given that they contain nomenclatural acts that do not comply with the provisions of Articles 13.1.1 and 13.1.2, regarding criteria of availability.

## 8.2. Publication may be disclaimed

A work that contains a statement to the effect that it is not issued for public and permanent scientific record, or for purposes of zoological nomenclature, is not published within the meaning of the *Code*.

## 8.3. Names and acts may be disclaimed

If a work contains a statement to the effect that all or any of the names or nomenclatural acts in it are disclaimed for nomenclatural purposes, the disclaimed names or acts are not available. Such a work may be a published work (i.e. taxonomic information in it may have the same nomenclatural status as the taxonomic information in a published but suppressed work: see Article 8.7.1).

## 8.4. Works issued as physical copies

[amended]

~~Printing on paper and optical disc are the only recognized formats for works issued as physical copies. In addition to fulfilling the requirements of Article 8.1 while not being excluded by Article 9, works issued as physical copies are subject to the following criteria:~~

[amendment]

In observance of Article 8.1.2, after [year −1], only articles published and distributed online, as PDF files, can be considered as published. Before [year], physical copies are admissible as published works, although printing on paper and optical disc are the only recognized formats for works issued as physical copies. In addition to fulfilling the requirements of Article 8.1 while not being excluded by Article 9, works issued as physical copies are subject to the following criteria:

8.4.1. Works printed on paper

Before 1986 and after 2012, the only acceptable means of producing physical copies is by printing on paper using ink or toner.

8.4.2. Works on optical disc

To be considered published, a work on optical disc must be issued, in read-only memory form, after 1985 and before 2013, and

8.4.2.1. if issued before 2000, must contain a statement that any new name or nomenclatural act within it is intended for public and permanent scientific record and that the work is produced in an edition containing simultaneously obtainable copies, or

8.4.2.2. if issued after 1999, must contain a statement naming at least five major publicly accessible libraries in which copies of the optical disc were to have been deposited.

## 8.5. Works issued and distributed electronically

To be considered published, a work issued and distributed electronically must

8.5.1. have been issued after 2011,

8.5.2. state the date of publication in the work itself, and

8.5.3. be registered in the *Official Register of Zoological Nomenclature* (ZooBank) (see Article 78.2.4) and contain evidence in the work itself that such registration has occurred.

8.5.3.1. The entry in the *Official Register of Zoological Nomenclature* must give the name and Internet address of an organization other than the publisher that is intended to permanently archive the work in a manner that preserves the content and layout and is capable of doing so. This information is not required to appear in the work itself.

8.5.3.2. The entry in the *Official Register of Zoological Nomenclature* must give an ISBN for the work or an ISSN for the journal containing the work. The number is not required to appear in the work itself.

8.5.3.3. An error in stating the evidence of registration does not make a work unavailable, provided that the work can be unambiguously associated with a record created in the *Official Register of Zoological Nomenclature* before the work was published.

## 8.6. New methods of publication and archiving

[amended]

~~The Commission may issue Declarations to clarify whether new or unconventional methods of production, distribution, formatting or archiving can produce works that are published in the meaning of the Code.~~

[amendment]
No other methods of production, distribution, formatting or archiving can result in works that are published in the meaning of the *Code*, including methods created after the publication of this provision.

## 8.7. Status of suppressed works

A work that has been suppressed for nomenclatural purposes by the Commission by use of the plenary power [Article 81] and that satisfies the provisions of this Article remains published within the meaning of the *Code*, unless the Commission has ruled that it is to be treated as not having been published;
8.7.1. such a work remains available as a source of published descriptions and illustrations, but not as a work in which a name or nomenclatural act (such as the fixation of a name-bearing type, or the determination of precedence under Article 24.2) can be made available.

## 8.8. Permanence of available works

A work once published within the meaning of the *Code* remains so, unless the Commission rules otherwise. Any subsequent disclaimer or retraction of a work or parts of a work does not affect the availability of the original work or any new name or nomenclatural act contained therein.

[amendment]
8.8.1. After [year], the Commission may be required to deem a work unpublished under plenary power if it includes the description of a new taxon demonstrably based on plagiarism and/or fraud.

## Article 13. Names published after 1930

[amendment]
13.1.1.1. After [year −1], the work must include
13.1.1.1.1. an explanation for the allocation of any new species described therein in a given genus, subgenus, or species group, in a manner that their exclusion from other such groups is unambiguous;
13.1.1.1.2. for each new species described, a Diagnosis section, in which the character states distinguishing it are stated in pairwise comparisons with the other species the zoologist may consider to be a member of the same genus, subgenus, or species group, and with any other species whose exclusion from such a group is doubtful;
13.1.1.1.3. an explanation for the allocation of any new genus described therein in a given family, subfamily, tribe, or subtribe; and of any new subgenus in a given genus, in a manner that their exclusion from other such groups is unambiguous; and
13.1.1.1.4. for each new genus or subgenus described, a Diagnosis section, in which the character states distinguishing it are clearly stated in pairwise comparisons with the other members of the same family, subfamily, tribe, or subtribe or genus (in case a new subgenus is being proposed), and with any other genus or subgenus whose exclusion from such a group is doubtful.
13.1.1.2. If a work is published after [year −1] and a subsequent author deems as insufficient a Diagnosis originally proposed therein to distinguish a given taxon denoted by a new name, this fact alone does not make the newly established name unavailable.

## Article 16. Names published after 1999

[amended]

~~16.4.1. by the explicit fixation of a holotype, or syntypes, for the nominal taxon [Articles 72.2, 72.3, 73.1.1, 73.2 and Recommendations 73A and 73C], and,~~

~~16.4.2. where the holotype or syntypes are extant specimens, by a statement of intent that they will be (or are) deposited in a collection and a statement indicating the name and location of that collection (see Recommendation 16C).~~

[amendment]

16.4.1. by the explicit fixation of a holotype, or syntypes, for the nominal taxon [Articles 72.2, 72.3, 73.1.1, 73.2 and Recommendations 73A and 73C] before [year], or, after [year −1], of a holotype, and,

16.4.2. where, before [year], the holotype or syntypes are extant specimens, by a statement of intent that they will be (or are) deposited in a collection and a statement indicating the name and location of that collection.

16.5. **Species-group names: holotypes to be held by approved collections after [year]**

Holotypes designated after [year] must be deposited in a collection listed in the *Official List of Approved Collections*.

16.5.1. To be part of the *Official List of Approved Collections*, a collection must

16.5.1.1. have, at least, 20 years of uninterrupted existence,

16.5.1.2. be recommended by the scientific associations described in Article 8.1.2.1 responsible for the respective fields of zootaxonomy, and

16.5.1.3. indicate another collection listed in the *Official List of Approved Collections* as the receptor of its name-bearing specimens in case of an eventual extinction of the former institution.

16.5.2. The Commission will publish the *Official List of Approved Collections* in an open-access online source.

16.6. **Illustration of holotype to be mandatory after [year]**

Every description of a new species must include a photograph or other kind of faithful graphic representation of the holotype.